



14th International Conference on **Recent Challenges in Engineering and Technology**

26th & 27th April, 2025 | Bangalore, India

Academic Partner



YENEPOYA
(DEEMED TO BE UNIVERSITY)



Organized By:

Yenepoya University, Bhartiya City, Bangalore, India
and IFERP Academy - India Society



14th International Conference on Recent Challenges in Engineering
and Technology (ICRCET-2025)

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Conference Theme:

“Sustainable Technologies: Shaping the Future of Engineering”

PREFACE

We are delighted to extend a warm welcome to all participants attending 14th International Conference on Recent Challenges in Engineering and Technology (ICRCET-2025), taking place in Bangalore, India on 26th & 27th April, 2025. This conference provides a vital platform for researchers, students, academicians, and industry professionals from all over the world to share their latest research results and development activities in the field of Sustainable Agriculture and Climate Resilience. It offers delegates an opportunity to exchange new ideas and experiences, establish business or research relationships, and explore global collaborations.

The proceedings for ICRCET-2025 contain the most up-to-date, comprehensive, and globally relevant knowledge in the field of Engineering, Technology and Management. All submitted papers were subject to rigorous peer-reviewing by 2-4 expert referees, and the papers included in these proceedings have been selected for their quality and relevance to the conference. We are confident that these proceedings will not only provide readers with a broad overview of the latest research results in Recent Challenges in Engineering and Technology but also serve as a valuable summary and reference for further research in this field.

We are grateful for the support of many universities and research institutes, whose contributions were vital to the success of this conference. We extend our sincerest gratitude and highest respect to the many professors who played an important role in the review process, providing valuable feedback and suggestions to authors to improve their work. We also extend our appreciation to the external reviewers for providing additional support in the review process and to the authors for contributing their research results to the ICRCET-2025.

Since February 2025, the Organizing Committees have received more than 1200 manuscript papers, covering all aspects of ICRCET-2025. After review, approximately 750+ papers were selected for inclusion in the proceedings of ICRCET-2025. We would like to thank all participants at the conference for their significant contribution to its success. We express our gratitude to the keynote and individual speakers and all participating authors for their dedication and hard work. We also sincerely appreciate the efforts of the technical program committee and all reviewers, whose contributions made this conference possible. Finally, we extend our thanks to all the referees for their constructive comments on all papers, and we express our deepest gratitude to the organizing committee for their tireless work in making this conference a reality.

ABOUT 14th ICRCET-2025

The 14th International Conference on Recent Challenges in Engineering and Technology (ICRCET-25), scheduled for April, 26th – 27th, 2025, in Bangalore, India, organized by Yenepoya University, Bhartiya City and IFERP Academy offers a unique opportunity for Engineers, Research Scholars, and Students to engage with technology experts. This event serves as a platform to showcase new equipment, technologies, and procedures, fostering discussions on engineering challenges and effective problem-solving. Participating in this conference provides a significant chance to broaden your technical perspective, enhancing your potential for career advancement through insightful presentations and exposure to innovations.

Benefits of the Conference:

Currently, multidisciplinary research has become the most viable and efficient way to solve the problem. In this era of rapidly changing society, many kinds of socio-economic problems, related to other disciplines such as politics, anthropology, psychology, have arisen which require a holistic approach to find their solution.

When we speak of a multidisciplinary, transdisciplinary or interdisciplinary research team, we imply collaboration between people from different disciplines. Thus, the concept of a multidisciplinary research team can be considered as a subset of the concept of collaborative research.

Objective of the Conference:

The 14th International Conference on Recent Challenges in Engineering and Technology (ICRCET-25), set for 26th & 27th of April, 2025, in Bangalore, India, provides a global platform for researchers, scholars, practitioners, and students to engage in interdisciplinary discussions on advancements in engineering and technology. Designed for decision-makers, educators, and industry professionals, the conference fosters comprehensive dialogue on the latest discoveries, trends, and practical solutions in these fields. With a focus on technology utilization, ICRCET-25 aims to facilitate international collaboration, offering a valuable forum for sharing expertise and addressing contemporary challenges in engineering and technology. This event is pivotal for fostering innovation and knowledge exchange among academia and industry practitioners.

ABOUT IFERP

The Institute for Educational Research and Publication (IFERP) is a professional association devoted to the advancement of the fields of engineering, science, and technology through the funding of research activities, propagation of the latest research insights, furtherance of industry trends, and other related ventures. IFERP aims to digitalize this entire process of innovation, collaboration, and knowledge-sharing through the fostering of a unified virtual scientific community worldwide. Everything from networking and joint ventures to learning, research assistance, publication, and more, will be carried out as part of this objective.

The IFERP Academy is a professional association devoted to the advancement of the fields of engineering, science, and technology through the funding of research activities, propagation of the latest research insights, furtherance of industry trends, and other related ventures. IFERP aims to digitalize this entire process of innovation, collaboration, and knowledge-sharing through the fostering of a unified virtual scientific community worldwide. Everything from networking and joint ventures to learning, research assistance, publication, and more, will be carried out as part of this objective.

IFERP has established robust scientific, academic, and industry networks throughout Asia, the Middle East, and Europe. Some of the countries that IFERP has its presence in, include Iraq, Maldives, Thailand, Malaysia, Singapore, Philippines, Indonesia, Taiwan, Vietnam, UAE, Australia, Japan, Sri Lanka, Nepal, Ghana, and Africa.

Mission:

Upskilling the knowledge hub through technological innovation and excellence for the benefit of humanity.

Vision:

A Digitally equipped robust, dynamic & swift professional community integrating academics & industry for upgraded technical knowledge implementation.

Value:

IFERP values the restoration of high-level technological research, learning, collaboration, resource sharing & community-building traditions.

Goal:

To serve as the foundation for all technological progress and advancement activities around the world.

MESSAGE FROM MANAGING DIRECTOR, IFERP



Mr. A. SIDDH KUMAR CHHAJER
MD & Founder,
IFERP, Technoarete Groups

On behalf of Institute For Educational Research and Publications (IFERP) & the organizing Committee, I express my hearty gratitude to the Participants, Keynote Speakers, Delegates, Reviewers and Researchers.

The goal of the 14th International Conference on Recent Challenges In Engineering and Technology (ICRCET-2025) is to provide knowledge enrichment and innovative technical exchange between international researchers or scholars and practitioners from the academia and industries in the field of Recent Advances in Engineering and Computer Applications.

This conference creates solutions in different ways and to share innovative ideas in the field of Recent Challenges In Engineering and Technology. ICRCET-2025 provides a world class stage to the Researchers, Professionals, Scientists, Academicians and Students to engage in very challenging conversations, assess the current body of research and determine knowledge and capability gaps.

14th International Conference on Recent Challenges In Engineering and Technology (ICRCET-2025) will explore the new horizons of innovations from distinguished Researchers, Scientists and Eminent Authors in academia and industry working for the advancements in Science and Engineering from all over the world. ICRCET-2025 hopes to set the perfect platform for participants to establish careers as successful and globally renowned specialists in the field of Science and Engineering.

MESSAGE FROM CHIEF EXECUTIVE, IFERP

MR. RUDRA BHANU SATPATHY

**CEO & Founder,
IFERP, Technoarete Groups**



IFERP is hosting the 14th International Conference on Recent Challenges In Engineering and Technology (ICRCET-2025) this year in month of 26th & 27th April 2025, Bangalore, India. The main objective of ICRCET-2025 is to grant the amazing opportunity to learn about groundbreaking developments in modern industry, talk through difficult workplace scenarios with peers who experience the same pain points and experience enormous growth and development as a professional. There will be no shortage of continuous networking opportunities and informational sessions. The sessions serve as an excellent opportunity to soak up information from widely respected experts.

Connecting with fellow professionals and sharing the success stories of your firm is an excellent way to build relations and become known as a thought leader. I express my hearty gratitude to all my Colleagues, Staffs, Professors, Reviewers and Members of Organizing Committee for their hearty and dedicated support to make this conference successful. I am also thankful to all our delegates for their pain staking effort to make this conference successful.

BIOGRAPHY OF KEYNOTE SPEAKER



Dr. Arshpreet Kaur

Assistant Professor, Amity University,
Bengaluru, India

Dr. Arshpreet Kaur is a distinguished researcher and academic specializing in machine learning and its applications in medical diagnostics. She completed her PhD from NIT Delhi, focusing on leveraging advanced computational models for detecting epileptiform activity. Her research is extensively published in high-impact journals like *Chaos, Solitons & Fractals*, where she has addressed critical topics such as deep learning for neurological disorders, time-series forecasting, and biomedical signal analysis. Currently an Assistant Professor at Amity University, Bengaluru, Dr. Kaur has significant teaching experience, covering subjects like artificial intelligence, machine learning, and digital image processing. Additionally, she contributes as a peer reviewer for leading journals, further emphasizing her expertise and commitment to advancing the field.

BIOGRAPHY OF KEYNOTE SPEAKER



Dr. Susarla Venkata Ananta Rama Sastry

Associate Dean Research & Development
and Faculty of Chemical Engineering,
Harcourt Butler Technical University,
Kanpur, India

Dr. S.V.A.R.Sastry has more than 20 years of teaching and research experience. He was B.Tech Gold Medalist from NIT Jalandhar, M.Tech Silver Medalist from IIT Delhi and got Best Ph.D Thesis Award from JNTU Kakinada. He has authored 12 Patents, 22 International Books in the area of Renewable Energy, Unit Operations & Heat Transfer. He has published more than 64 Research Papers and presented papers in more than 60 International Conferences. He is a Member Scientist of CORE GROUP of Scientists on Tree Borne Oil seeds for promotion, utilization and socio-economic linkages in Southern India. He is a Senior Member of Institution of Engineers, Indian Institute of Chemical Engineers, International Association of Computer Science and Information Technology and Institute for Engineering Research and Publication. He has been awarded Outstanding reviewer status by Elsevier, U.S. and granted full free access to Scopus by Elsevier, U.S. He is an Editor for five International Journals and Editorial Board member for six International Journals. His Biography has been published in Marquis Who's Who in the World, 31st, 32nd & 33rd editions consecutively. He got the Andhra Pradesh University Best Teacher Award from JNTU Kakinada for five consecutive years from 2008 to 2013. He is a Recipient of International Awards from IBC, Cambridge, England. He got selected for inclusion in "100 Best Educators of 2014"; "2000 Outstanding Intellectuals of the 21st Century"; "CAMBRIDGE CERTIFICATE for Outstanding Educational Achievement"; and the prestigious "Leading Professionals of the World-2014" by International Biographical Centre (IBC), Cambridge, England. He is giving consultation in the design and implementation of 'High Speed Industrial Vaporizer', 'Mixing Device for Chemical Absorption

Process' and 'Exploring Disruptions, Formulations, and Technologies in Lubricant Industry' to Convetit, U.S. He has given more than 25 Keynote lectures in various International Conferences held at Brazil, Dubai, Spain, China, Canada, Italy and UK. He received the Pillars of the Nation Award for Excellence and Innovation in Education Sector from the Delhi Vidhan Sabha in 2023. He got the Outstanding Alumni Faculty Award from IIT Delhi in 2023. He got the University Research Excellence Award for 2023 and 2024 from HBTU Kanpur. He is selected as Fellow by Institution of Engineers (India) in 2024. He is appointed as 'Regional Mentor of Change for Uttar Pradesh' by Atal Innovation Mission, NITI Aayog, GOI, New Delhi in 2024. He was honored with the "Outstanding Leadership in Research and Innovation" Award in the 29 th World Education Summit, New Delhi on 5 th July, 2024. Presently, he is working as the Associate Dean (Research & Development); Deputy Controller of Examinations and University Counsellor at the Harcourt Butler Technical University, Kanpur, Uttar Pradesh, India.

BIOGRAPHY OF KEYNOTE SPEAKER



Dr. Chitra Kiran. N

Professor, Department of ECE, Alliance
College of Engineering, Alliance University,
Bengaluru, India

Dr. Chitra Kiran.N working as a Professor in the Department of Electronics and Communication Engineering Alliance University. She has about 3 decades of teaching experience. She received her Doctorate in Electronics and Communication Engineering in the area wireless communication from Bangalore University in 2014. She has published 25 research papers in international journals and 30 research papers in various international conferences. She is the author of several books and book chapters , blog, newsletter and patents. Her area of research include Wireless Communication, Digital Communication, Internet of Things, Mobile Computing, M-Commerce and E-Commerce. She is an active member of IEEE, IET and ISTE. She has reviewed many international journals. She has received awards for her research contributions. She was the session chair and keynote speaker in various international conferences in India and Abroad. She Has worked in various capacities. She was the Professor and Head in various Engineering Colleges and University. She was the Member Board of Examiners and Member Board of Studies Bangalore University, She was nominated as a Member for Local Enquiry Committee from VTU Belagavi.

BIOGRAPHY OF KEYNOTE SPEAKER



Dr. Safeer Ahmad Arbab

Founding director Center for Materials
Science/Department of Physics, Islamia
College Peshawar, Pakistan

Safeer Ahmad Arbab is the Founding Director of the Center of Material Science at Islamia College Peshawar, the university's first experimental research center. He also serves as an Honorary Visiting Researcher at the University of Bradford in the UK and earned his doctorate in physics, specializing in materials science, in 2016. Starting his career as a lecturer at Islamia College Peshawar in 2001, Safeer has since established himself as a prominent researcher in structural and macro-materials, electro-ceramics, and traditional ceramics. He has published 44 research papers in reputed international journals and secured two provincial government research projects focused on the construction sector, along with another project on energy storage from the Higher Education Commission of Pakistan. He has collaborated on a research project with the Department of Mechanical Engineering at the University of Bradford. Safeer developed an innovative machine for producing eco-friendly interlocking bricks and lightweight insulating materials using waste products. This invention has gained significant media attention across major TV channels and social media platforms. Now these projects are in the final stage of commercialization. Throughout his career, he has organized numerous national and international scientific conferences and participated in various conferences in the US, UK, and beyond. He also led two major research and development projects and twice English access micro scholarship program for which nearly two billion rupees were received from the Higher Education Department of Khyber Pakhtunkhwa, higher education commission, Islamabad and U.S. Consulate Peshawar. Safeer has served as Head of the Physics Department at Islamia College Peshawar twice. In addition to his role as Director of the Center of Material Science, he has been the Director of Research, Innovation, and Commercialization (ORIC) for nine years. He has supervised several MPhil and PhD scholars, with many students currently under his guidance.

BIOGRAPHY OF KEYNOTE SPEAKER



EUR ING Ir. Ts. Dr. Mohd Natashah Bin Norizan

Associate Professor, Electronic Department Faculty
of Electronic Engineering & Technology (FKTEN),
Universiti Malaysia Perlis (UniMAP) Malaysia

Associate Professor EUR ING Ir. Ts. Dr. Mohd Natashah Bin Norizan is an accomplished researcher, educator, and industry collaborator in electronic engineering and renewable energy. He holds a Ph.D. in Sustainable Energy and Environmental Engineering from Osaka University, Japan (2019), an M.Sc. in Microelectronics from Universiti Kebangsaan Malaysia (UKM), and a B.Eng. (Hons) in Electronic Engineering from Universiti Malaysia Perlis (UniMAP). With over a decade of academic experience, he has significantly contributed to scientific discovery, interdisciplinary collaboration, and engineering education. Currently serving as an Associate Professor at UniMAP, Dr. Mohd Natashah is actively engaged in research related to solar cells, nanomaterials, embedded systems, IoT, FPGA, and thermoelectric technologies, with a strong focus on sustainability. His work has led to numerous publications in high-impact journals and presentations at international conferences. His research excellence is reflected in his H-index scores across Web of Science, Scopus, and Google Scholar. Dr. Mohd Natashah holds the prestigious title of EUR ING (European Engineer), awarded by the European Federation of National Engineering Associations (FEANI), recognizing his high level of expertise, competence, and contributions to the engineering field. He is also a Chartered Engineer (CEng) of the Engineering Council UK, an ASEAN Chartered Professional Engineer (ACPE), a Professional Engineer (P.Eng.) registered with the Board of Engineers Malaysia (BEM), and a Professional Technologist (P.Tech.) under the Malaysia Board of Technologists (MBOT). Additionally, he is a Senior Member of IEEE and an International Professional Registration Advisor for The Institution of Engineering and Technology (IET), UK. Furthermore, he holds several management positions at the university, demonstrating his leadership capabilities and commitment to academic and institutional development. He is also actively involved in industry collaborations, securing various research grants, and receiving numerous innovation awards. With a strong passion for renewable energy, engineering innovation, and academic excellence, Dr. Mohd Natashah continues to contribute towards a more sustainable and technologically advanced future.

BIOGRAPHY OF KEYNOTE SPEAKER



Dr. J. Somasekar

Professor and Program Head, Department of CSE (AIDD), JAIN (Deemed-to-be University), Bangalore, India

Dr. J. Somasekar received a Ph.D. degree in Computer Science and Engineering (CSE) from JNTUA, Andhra Pradesh, and an M.Tech. degree from the National Institute of Technology Karnataka (NITK), Surathkal. Additionally, he has completed a Postdoc at the University of South Florida, USA. He is currently serving as a Professor in the CSE Department at JAIN University, Bangalore, and also Head of the CSE (AI-Driven DevOps) program. He was appointed as a Research Fellow at INTI International University, Malaysia in 2024. He has guided two PhD scholars and is currently guiding six PhD research scholars in the CSE department. His research interests include Machine Learning, Image Processing, Data Science, and ML for Cybersecurity. As a resource person, he has delivered 220 Invited Talks (Technical Talks) for FDPs, Workshops, STTPs, and Webinars sponsored by AICTE ATAL/ ISTE /DST /UGC /CSIR, in 13 states within the country and in five other countries. With over 18 years of teaching experience and 6 years of research experience, he has published more than 40 research articles in leading journals indexed in SCI & SCOPUS, along with seven international textbook chapters indexed in SCOPUS and authored three textbooks. Additionally, he serves as a reviewer for reputed international journals and conferences, acts as a session chair for international conferences, and has been a guest editor for three journals. He achieved an All India Rank of 43 in the GATE exam and received the GATE Scholarship, sponsored by the Ministry of Education, Government of India. He has been honored with the 'Innovative Collaborative Researcher' award in Medical Imaging for his collaborative research with Dr. Ching-Hao Lai, Director of ITRI, Taiwan, presented by the WRC in association with the United Medical Council. Additionally, he has been recognized with the Best Outstanding Speaker award and several Best Paper awards at conferences. As a convener/coordinator, he has organized and conducted various national and international events. Furthermore, he served as a visiting professor for the Data Science and Data Analytics PG program at Kannur University, Kerala, and also a visiting professor at FIBS, Nigeria.

BIOGRAPHY OF KEYNOTE SPEAKER



Dr. Piyush Kumar Pareek

Professor and Head (AI-ML & IPR CELL),
Nitte Meenakshi Institute of Technology
India

Dr. Piyush Kumar Pareek has an interest in continuous Learning and Teaching, Completed B.E, M.Tech., Ph.D. in the field of Computer Science Engineering, Have Experience close to a Decade in Teaching, Published 100+ Research Articles in Reputed Journals, Have Published 8+ Text Books in Lambert Publications Germany, Have 10+ Design Patents Granted, Have 18+ Australian Innovation Patents Granted, Filed and Published 40+ Indian Utility Patents, Presently Enrolled Post-Doctoral fellowship at Instituto Federal do Ceará, Public university in Limoeiro do Norte, Brazil, Guiding Ph.D. Scholars in Visvesvaraya Technological University, Belagavi, Awarded 5 Students Ph.D. under my Guidance, Senior Member in IEEE & MIE.

BIOGRAPHY OF KEYNOTE SPEAKER



Dr. Kishor Sonti

Professor, Department of Electronics & Communication, Sathyabama Institute of Science & Technology, India

A Passionate Professor with over 20 years of teaching, administrative and research experience. Active researcher with 51 publications in peer-reviewed journals, 3 patents published, Produced 2 doctorates and supervising 4 research scholars, authored 11 book chapters, a book and a monograph. A successful record in administrative abilities as a student development coordinator actively involved in steering, planning and in the implementation of student development activities and in student affairs. Mentoring colleges and schools to strengthen the innovation ecosystem. International exposure with expertise in video content creation and a recipient of Erasmus plus grant. A motivational speaker, innovation ambassador, institution innovation council convener and serving as Mentor of Change as selected by NITI Aayog, Govt. of India for schools towards educational and societal transformation. An outstanding performer awardee, Teaching excellence awardee and received twice the best faculty award for professional excellence and commitment.

BIOGRAPHY OF KEYNOTE SPEAKER



Harshit Kohli

Sr. Technical Account Manager
Amazon Web Services

Dynamic Senior Technical Account Manager at Amazon Web Services with 14+ years of experience, adept in IT infrastructure management and solution designing. Proven track record in enhancing healthcare clients' cloud strategies, analytics implementations and Artificial Intelligence workload implementations. Recognized for training and mentoring teams, driving business process improvements, and delivering impactful architecture reviews that elevate client success in a competitive landscape.

BIOGRAPHY OF SESSION SPEAKER



Dr. Paramita Sarkar

Associate Professor, Faculty of Engineering,
Department of C.S.E., JIS University, India

Dr. PARAMITA SARKAR has 18 years of experience in Academics and Research in Artificial Intelligence, Soft Computing, Data Science and various optimization algorithm domain. She is currently working as an Assistant Professor in the department of C.S.E, JIS UNIVERSITY, INDIA. She has received her Ph.D.(Tech) degree in the University of Calcutta in 2023. Her career encompasses a broad range of publications of several research papers and articles in many national and International conferences, workshops. She has published papers in WoS, SCIE, SCOPUS indexed journals and editors in indexed Book chapters.

BIOGRAPHY OF SESSION SPEAKER



Mr. Vijaykumar Bhatia

Managing Director, Vijaykumar Bhatia,
Training, Dubai

Vijaykumar Kanayalal Bhatia has over 38 years of professional experience including 20 years as a project professional with multinational consulting engineering firms. 25 years as adjunct faculty/trainer in Operations, Logistics & Supply Chain, Project, Quality and Quality Management Systems and Productivity Analysis; MIS, International Business and Strategic Management; Procurement & Materials Management; Creativity & Innovation Management and Corporate Image Building in Corporations; and, Business Finance in India as well as the United Arab Emirates (UAE). Vijaykumar has conducted training programs in Procurement, Contract, LC and Logistics/ Supply Chain Management for corporate/corporate personnel in the UAE. He has also served as a Technical Engineer in the UAE. Vijaykumar has established his own institute in Mumbai, India which conducts professional, job-oriented courses in Management/Engineering. He has served as Associate Dean (Management), General Manager (Industry Interface) and has also fulfilled ISO coordination and Examination Superintendent roles in India. Vijaykumar has provided engineering consultancy services to various firms in India. He has also provided consulting services to educational institutes in planning, designing and execution of professional training programs in Retail Management, Personality Development and Performance Management. He has been serving as a Visiting Faculty/Corporate Trainer for Corporate Training in India and the UAE. He has authored 6 study books for Mumbai University Syllabus in Supply Chain, Logistics, Quality, Retail, Strategic and Productivity Management. Vijaykumar has also served as an External Examiner and Moderator for Mumbai University as well as an External Assessor for Distance Learning College & Training, UK for their CILT/CIPS certification courses. Vijaykumar received his Master's in Business Administration (MBA) with specialization in Finance from IGNOU University, India in 1997, Bachelor of Engineering from Pune University, India with Specialization in Mechanical Engineering in 1980, Diploma in Computer Management from Mumbai University, India. He also holds a MicroMasters in the Internet of Things (IoT), and certifications in Blockchain, Industry 4.0, Launching New Technologies, The Future of Work, Data Science, Digital Transformation, and Artificial Intelligence from international universities.

BIOGRAPHY OF SESSION SPEAKER



Dr. Vaibhav A Meshram

Professor and Principal, Yenepoya
University, Bangalore, India.

Dr. Vaibhav Meshram received the B.Tech. Degree (Bachelor of Technology) in Electronics and Communication from the prestigious National Inst. of Tech. Kurukshetra (NITKKR), formerly known as the Regional Engg. College Haryana in the year 1992, M.Tech. degree in Microelectronics from the prestigious IIT Bombay in the year 1999 and a PhD in Nano Electronics from the prestigious BITS Pilani in the year 2012 respectively in 22 nm technology. He has an overall 20 years of Teaching experience in various Engg. Colleges in Mumbai & Bangalore and 13 years of Industrial experience in analysis, design, development, and technical support with a focus on FPGA SoC, ASIC and Board- Level Design, Hardware Design Operations, Hardware Design Methodologies, Tools, Flow and Processes. While working in the industry, he has executed projects worth lakhs of rupees. He was a Research Engineer with Central Research Laboratory Bharat Electronics Limited, Bangalore in the VLSI CAD Section. Later, worked as Sr. VLSI Design Engineer at Philips Semiconductor, Bangalore. Next, he was the Project Manager at Zilog India Electronics Pvt Ltd. Providing Development and Support on Zilog Microcontroller, again in Bangalore. Then, he started working as a Project Manager at Hewlett-Packard providing Development and Support for HP -PRINTER ASIC technology in Bangalore. Further, he worked as a Technical Manager in "Hardware practices" at Mind Tree Consulting Ltd, Bangalore. A total of NINE Students completed PhD under his supervision. He published 30+ research papers in Scopus, Web of Science, and Springer and 5+ patents have been granted. He delivered 60 + Plus Invited talks on Nanoelectronics. He is a BOS and BOE member at several Colleges and Universities He is at present working as a Principal at Yenepoya University(NIRF Ranking 85) Bangalore Campus. He worked as a Professor and Associate

Dean at Dayananda Sagar University Bangalore, Karnataka, India. Worked as Professor and HOD in ECE Dept. holding the additional portfolio of PhD Coordinator & Research in Jain University Bangalore, Karnataka, India. He has worked in the levels of Lecturer, Asst. Prof., Prof., Prof. & Head, in the various institutions where he has worked so far. He is a life member of the ISTE. He has given several guest lectures/expert talks and seminars in many institutions across the country and participated in more than 4 dozen CEP / DEP courses, seminars, workshops, and symposiums, besides conducting a few courses in the institutions where he worked. He was also instrumental in getting Research centres along with M.Tech. programs & new UG programmes in the colleges where he has worked so far. He has brought several grants-in-aid for the conduction of various events like workshops, conferences, seminars, projects, etc, wherever he has worked from different sources. He has visited more than 1 dozen countries for industry-institute interaction & company visits. He has also guided more than 50 + projects (B.E. / B.Tech. / M.E. / M.Tech.) in various engineering colleges where he has worked. He has also reviewed many research papers for various national & international journals & conferences in India & abroad. He has given many keynote / invited talks / plenary lecturers in various national & international conferences and chaired many sessions, was the judge & was the chief guest on various occasions. He has also conducted/organized/convened/coordinated more than half a dozen courses/workshops / STTP / FDPs / Technical paper fests, Student level competitions & Symposiums, etc., in various engineering colleges where he worked so far. He received the prestigious Infosys Science Foundation Top-10 nomination category Engineering and Computer Science -2009 "Television and Setop box Merger". He developed around 200 programs in C / C++ and for the microcontroller, VLSI & VHDL and laboratory manuals for the lab, covering all its aspects of programming, etc.... His domain knowledge includes Reconfigurable designs (FPGAs), ASIC design, Logic Synthesis Algorithms, Reuse Technology (IP Cores), IP Validation, DSP Based Embedded Systems Design (H/W and S/W), USB (Universal Serial Bus) protocols and Interface, Product Conceptualization and Realization with system Design, Microcontroller, VHDL-Verilog, SEI-CMM Level5 GREEN BELT. He got the employee recognition award at Philips Semiconductors (Sept 3, 2001) & the Best Technical Support Team awards in Q1 and Q2'06 at Hewlett-Packard, when he was working in the industry. His special areas of interest are DSP, IP, Signals & systems, VLSI, Advanced VLSI, CAD for VLSI, VHDL, CMOS, Semiconductor device physics, MATLAB, etc.

COMMITTEE MEMBERS

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Professor & Head, Department of Computer
Science & Engineering, Bheema Institute of
Technology & Science, Andhra Pradesh, India

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Associate Professor, Department of Chemical Engineering, Harcourt Butler Technical University, Kanpur, India

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Professor & Dean, Department of Computer Science & Engineering, RGM College of Engineering & Technology (Autonomous), Andhra Pradesh, India

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Assistant Professor, Department of Computer Science & Engineering, Adikavi Nannaya University, Andhra Pradesh, India

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HOD & Assistant professor, Faculty of Engineering, Sai Rajeswari Institute of Technology, Andhra Pradesh, India

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Associate Professor, Department of History Government Arts College, Tamil Nadu, India

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» Mr. Suprith Chittanahalli Yogesh	
» Mr. Shashank Narayanaswamy	
» Mr. Vinod Prabhu	



Abstracts

Implementation of Enhanced Energy Optimization Model for Wireless Sensor Network

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Abstract:

This study presents an innovative approach to improving Wireless Sensor Network (WSN) performance through the integration of the Low-Energy Adaptive Clustering Hierarchy (LEACH), Density-Based Spatial Clustering of Applications with Noise (DBSCAN), and Grey Wolf Optimizer (GWO) algorithms. The proposed framework, LEACH+DBSCAN+GWO, is designed to address key challenges in WSNs, specifically targeting improvements in energy efficiency, scalability, and adaptability. Traditional LEACH protocols, though widely utilized, face substantial limitations in heterogeneous WSN environments, especially concerning energy consumption and adaptability when deployed in networks with varying node densities. By incorporating DBSCAN, our methodology enables more effective and adaptable clustering by grouping nodes based on density, thus facilitating dynamic and more natural cluster formation. Additionally, the integration of GWO allows for optimized cluster head selection by balancing energy usage across nodes. This approach leverages the hierarchical hunting strategy of grey wolves to achieve near-optimal solutions, ultimately promoting longevity and robustness in WSN performance.

Keyword:

Adaptability, Clustering, DBSCAN, Energy Efficiency, Grey Wolf Optimizer, Heterogeneous Networks, LEACH, Scalability, Wireless Sensor Network.

Design of Light Weight Machine Learning Detection System for Attack in IoT Networks

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Abstract:

This paper presents a lightweight intrusion detection system (IDS) based on CNN, which is designed to improve network security in IoT environments with the increasing adoption of IoT devices. Protecting these networks from malicious attacks is therefore essential. This is especially true when considering the computational power constraints. Our proposed system makes use of the architecture. Convolutional Neural Network (CNN) optimized for resource-constrained IoT devices. Using the Bot- IoT dataset, we achieved an amazing accuracy of 99.99%, demonstrating the system's ability to effectively identify and classify network intrusions. We use pre-processing techniques such as principal component analysis (PCA) for dimensionality reduction and min-max normalization. This ensures efficient processing without compromising accuracy. Evaluation metrics including precision, recall, and F1 score were used to examine the IDS's performance in detecting different types of attacks. with minimal delay Highlighting its strengths, this CNN-based IDS provides a practical solution for real-time intrusion detection in IoT environments, balancing high detection accuracy with low resource consumption. This makes it suitable for actual deployment in various IoT devices.

Keyword:

Cybersecurity, Intrusion Detection System (IDS), IoT Networks, Lightweight, Machine Learning and Network Security.

Stochastic Fractal Search-Driven Optimization for Advanced Speech Emotion Recognition Frameworks

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Abstract:

Emotion recognition from speech is a significant area of attention in fields such as human-computer interaction, customer service, and healthcare, where understanding emotional cues enhances system responsiveness and user experience. This study presents a hybrid model that utilizes Convolutional Neural Networks (CNN) for efficient feature extraction and Long Short-Term Memory (LSTM) networks to capture temporal data dependencies, aiming to improve accuracy in speech emotion recognition (SER) tasks. Optimizing involves using a stochastic fractal search algorithm (SFS) model hyperparameters, enhancing the CNN-LSTM model's performance by achieving a more precise and efficient convergence. This optimization approach allows the model to achieve better classification accuracy by refining critical parameters, such as learning rate and layer configuration, in the hybrid structure. Extensive testing on established SER datasets demonstrates the proposed model's robustness and effectiveness, yielding notable improvements in emotion classification metrics over baseline models. The integration of the SFS optimization algorithm highlights its potential as a powerful tool for fine-tuning complex deep learning architectures, making this model a promising advancement for real-world SER applications.

Keyword:

Speech Emotion Analysis ,Hybrid CNN-LSTM Architecture ,Fractal-Based Optimization, Hyperparameter Tuning in Deep Learning ,Advanced Feature Extraction Techniques ,Temporal Data Modeling in Emotion Recognition, Deep Learning for Emotional Intelligence Systems.

Automated Diabetic Retinopathy Grading Using Graph Neural Networks for Enhanced Feature Relationship Analysis in Retinal Images

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Abstract:

Diabetic retinopathy (DR) is a leading cause of vision impairment, requiring timely and accurate grading for effective management. This paper presents a novel approach for automated DR grading by leveraging Graph Neural Networks (GNNs) to capture complex feature relationships in retinal images. Traditional CNN models perform well on local features but struggle to model interdependencies across the retina, crucial for DR progression. Our hybrid model integrates a CNN for extracting spatial features with a GNN that forms graphs from these features, allowing it to capture relational patterns among lesions, blood vessels, and other retinal structures. We evaluate the model on a standard DR dataset, achieving significant improvement in grading accuracy compared to traditional CNNs. This approach not only enhances grading performance but also provides insights into spatial relationships, potentially aiding clinical interpretation. The proposed GNN-based model demonstrates promise for scalable and interpretable DR screening solutions.

Keyword:

Diabetic Retinopathy, Graph Neural Networks, Image Grading, Retinal Images, Feature Relationship Analysis.

Enhancing Text Classification in EHRs with Adaptive Context-Aware Heterogeneous Graph Attention Networks

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Abstract:

The rapid expansion of Electronic Health Records (EHRs) presents significant challenges for effective text classification due to the complexity and heterogeneity of the data. This paper introduces the Adaptive Context-Aware Heterogeneous Graph Attention Network (ACAH-GAN), a novel approach designed to enhance text classification in EHRs. By leveraging heterogeneous graph structures, the model captures the intricate relationships among diverse entities, such as patients, diagnoses, and treatments. We incorporate a contextual embedding mechanism that enriches node representations based on both local and global context. The adaptive attention mechanism dynamically assigns weights to nodes, emphasizing the most relevant information for classification tasks. Furthermore, our multi-view learning framework integrates various data modalities, enhancing the model's robustness. We conduct extensive experiments on benchmark EHR datasets, demonstrating that ACAH-GAN significantly outperforms existing state-of-the-art methods in classification accuracy and interpretability. The results highlight the model's potential for practical applications in clinical decision support and automated coding, offering a promising solution to the challenges posed by the heterogeneous nature of EHR data. Our findings underscore the importance of adaptive context awareness in advancing EHR text classification methodologies.

Keyword:

Electronic Health Records (EHRs), Heterogeneous Graph Networks, Text Classification, Adaptive Attention Mechanism, Contextual Embedding.

Enhanced Deep Learning for Diabetic Retinopathy Detection with Optimized Feature Extraction

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Abstract:

Diabetic retinopathy (DR) is a leading cause of vision impairment, requiring timely and accurate grading for effective management. This paper presents a novel approach for automated DR grading by leveraging Graph Neural Networks (GNNs) to capture complex feature relationships in retinal images. Traditional CNN models perform well on local features but struggle to model interdependencies across the retina, crucial for DR progression. Our hybrid model integrates a CNN for extracting spatial features with a GNN that forms graphs from these features, allowing it to capture relational patterns among lesions, blood vessels, and other retinal structures. We evaluate the model on a standard DR dataset, achieving significant improvement in grading accuracy compared to traditional CNNs. This approach not only enhances grading performance but also provides insights into spatial relationships, potentially aiding clinical interpretation. The proposed GNN-based model demonstrates promise for scalable and interpretable DR screening solutions.

Keyword:

Diabetic Retinopathy, Graph Neural Networks, Image Grading, Retinal Images, Feature Relationship Analysis.

EHR-HGCN: A Transformer-Augmented Heterogeneous Graph Convolutional Network for Enhanced Text Classification in Healthcare

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Abstract:

Electronic Health Records (EHRs) are valuable for clinical decision-making but pose unique challenges for automated text classification due to their heterogeneous structure and complex medical language. We introduce EHR-HGCN, a Transformer-Augmented Heterogeneous Graph Convolutional Network designed to improve EHR text classification by integrating temporal, relational, and contextual information from diverse clinical data. Our model combines Transformer-based medical text embeddings with heterogeneous graph representations of EHR entities, such as symptoms, diagnoses, and treatments. This architecture utilizes a dual attention mechanism, incorporating temporal dependencies and relational weighting, to prioritize recent and clinically relevant interactions. Additionally, an adaptive learning module fine-tunes the model on new clinical data, ensuring robustness against evolving medical terminology and practices. Experimental results on benchmark healthcare datasets show that EHR-HGCN outperforms traditional methods, achieving enhanced accuracy and interpretability in EHR text classification tasks. This work highlights the potential of combining deep learning with domain-specific representations, offering a scalable and adaptive solution for real-world healthcare applications.

Keyword:

EHR, HGCN, Transformer Embedding, Text Classification, Healthcare AI.

Surveillance Camping Surveillance Camping Surveillance Camping Surveillance Camping Surveillance Camping Surveillance Camping

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Abstract:

In alignment with SDG 3 (Good Health and Well-Being) and SDG 9 (Industry, Innovation, and Infrastructure), the proposed system aims to enhance healthcare preparedness for infectious diseases such as influenza, dengue, and malaria. By integrating machine learning and optimization algorithms, the system predicts outbreaks with 96% accuracy, particularly using Convolutional Neural Networks (CNNs) for malaria. This high accuracy is achieved by analyzing historical disease trends, weather patterns, and seasonal variations.

The system also optimizes drug supply chains using Monte Carlo simulations, which provide a probabilistic range of drug demand estimates, enhancing stocking efficiency. Additionally, Dijkstra's and Kruskal's algorithms are employed to reduce distribution costs by calculating the shortest paths and constructing a Minimum Spanning Tree (MST) for efficient transportation. Real-time reordering with a greedy approach ensures that high-demand drugs are prioritized, minimizing shortages during peak demand.

These innovations collectively enhance outbreak readiness, improve healthcare outcomes, and ensure cost-effective, sustainable healthcare solutions. By leveraging advanced technologies, the system not only predicts disease outbreaks but also optimizes the supply chain, ensuring that essential medications are available when needed, ultimately contributing to better health and well-being.

Data Comparison Suite: A Comprehensive Full-Stack Application for Data Integrity

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Abstract:

The Data Comparison Suite (DCS) addresses the problems of data clustering, comparison, and visualization in relational models. The machine learning-based approach of K- means clustering is used to organize data and the Ford-Fulkerson method is used to analyze maximum flow in a system in order to maintain data accuracy in complex systems using DCS. The architecture consists of a Flask micro-framework for server-side processing, an SQLite database with SQL Tool, and a command line interface with a web interface using Vue.js. Clustering and discrepancy analysis are facilitated and graphical output is provided in pie and bar charts through these components. This paper presents the system's design, algorithms, and approaches for DCS and provides some experimental results showing that DCS is superior to finance-related, and other high-dimensional large-scale data fields.

Keywords:

Data Comparison, K means Clustering, Data Integrity, Data Visualization, Financial data analysis, Ford Fulk- erson Algorithm, Error detection, Maximum flow analysis, Data Clustering, SQLAlchemy, Flask framework, Vue.js, Database management.

A Study on Investigation on Cyber Security Threats and Security Models

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Abstract:

A plan for defining and implementing security policies is called a computer security model. A formal model of access rights, a computational model, a distributed computing model, or no theoretical foundation at all can serve as the foundation for a security model. Information security and cyber security are often used interchangeably; the former views human involvement as an extra dimension in the security process, while the latter views human focus as a potential target. However, because it centres on the ethical aspect of society as a whole, such a cyber-security conversation has significant implications. Identifying and disseminating information about potential dangers to a given system or network is known as threat modelling. An IT team may comprehend threats and their potential effects on the network by using security threat modelling. Numerous frameworks and strategies have been proposed to handle the cyber security challenge. Additionally, it provides an overview of the structure, personnel, and information pertaining to safeguarding personal computer data. This research examines these models, their shortcomings, and previous approaches to reducing these risks. In addition, the paper offers suggestions for additional research.

Keywords:

Computer security, Computers, Software, Standards, Computational modeling, Computer science.

A Zero-Shot Learning Approach for Classifying Plant Leaf Diseases

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Abstract:

Identifying plant leaf diseases early is crucial for effective crop management and food security. Traditional plant disease classification methods often rely on extensive labelled datasets and are limited to specific species or disease types, restricting their adaptability across diverse plant varieties and conditions. This paper introduces a Zero-Shot Transfer Learning Framework for plant leaf disease classification, leveraging advanced transfer learning techniques to enable model generalization across unseen plant species and diseases without additional labelled data. Our framework uses a pre-trained convolutional neural network (CNN) architecture combined with a semantic embedding space, allowing the model to recognize and classify plant diseases by associating new visual features with known disease descriptors. The proposed framework demonstrates high classification accuracy in identifying leaf diseases across various plant species, achieving significant performance improvements over traditional supervised learning models. This approach highlights the potential of zero-shot learning in agricultural applications, providing a scalable and adaptable solution for real-time plant disease monitoring and diagnosis. We evaluate our framework on multiple plant disease datasets, comparing its performance with traditional supervised learning models. Experimental results demonstrate that the zero-shot transfer learning framework achieves high classification accuracy in identifying plant leaf diseases, even in zero-shot scenarios where the model encounters novel disease types. The framework consistently outperforms conventional supervised approaches in adaptability, robustness, and scalability, underscoring its potential for practical use in agricultural disease diagnosis.

Exploratory Data Analysis on Healthcare Using Machine Learning

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Abstract:

This research focuses on healthcare prediction with the application of machine learning along with carrying out a detailed EDA on the healthcare dataset which contained 55,500 records and several patient attributes. The dataset encompasses social characteristics (for example, age, sex, and blood type), clinical specifics (for example, disease and investigations), and administrative information (for example, hospital, billing, etc). Some of the critical aspects of the EDA include looking at the distributions of data, checking relationships among the features, and how certain categorical variables such as medical condition, and admission type influence the patient bill and tests. Missing values, outliers, and distinct categorical distributions will be investigated in order to facilitate the modeling of predictive values for the data contextualization processes. As for the first conclusion, a variety of medical treatments and insurance companies have been identified thus explaining at a certain level the costs of healthcare services and the distribution of resources. The findings of the EDA are the prerequisite for constructing forecasting models used for predicting the healthcare delivery results and the utilization of resources in the clinical circumstance.

Keywords:

Exploratory Data Analysis (EDA), Healthcare Analytics, Machine Learning Applications in Healthcare, Health Data Visualization, Predictive Modeling in Healthcare, Patient Data Analysis.

Evaluating Machine Learning Approaches for Effective Fake News Detection

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Abstract:

The fast spread of bogus news on social media has highlighted the critical need for reliable detection technology. Conventional approaches focus mostly on the linguistic characteristics of fake news, including the source, message length, and derogatory language. This study presents an enhanced detection approach that goes beyond language by combining user behavior, content information, and social network connections to provide a more complete picture. We identified the most important parameters in detecting fake news using an XGBoost algorithm. With these insights, we created and verified many classification models, including SVM, RF, LR, CART, and NNET, to assure reliable performance without overfitting. The results show that combining social dynamics and content aspects can greatly increase detection accuracy, strengthening defenses against ever-more-complex.

Keywords:

Fake news identification, Machine Learning, XGBoost, Feature Importance, Classification Models, SVM, RF, LR, CART, NNET, and Misinformation detection.

Exploring the Challenges of Big Data Processing Using Hadoop

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Abstract:

The development of technology has led to the establishment of massive data repositories, which are collectively referred to as “Big data,” as a result of the enormous volume of information that is being gathered from digital users by various businesses and organizations. A tool called data mining is used to find unique patterns and rules by extracting hidden information from these huge databases. The purpose of this paper is to provide a comprehensive explanation of the significance of big data in today’s world, its characteristics, the role that data mining plays in big data, its necessity in today’s world, the data mining process and its functions, and data mining techniques like classification, clustering, and others that aid in identifying patterns for determining future business trends and their applications in a variety of fields. The second half of the paper focuses on further exploring the challenges that are faced in big data and the tools used the applications and upcoming trends in data science, and finally, the scope and importance of data science in the future. Data mining plays an important role in Business Intelligence (BI) and various industries to identify unique patterns and obtain results from the data.

Keywords:

Big Data, HDFS, NoSQL, shading key-value databases, document databases.

Advanced License Plate Recognition System for Smart Traffic Management and Monitoring

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Abstract:

The escalating number of vehicles on the roads has heightened the need for effective traffic management, necessitating advanced systems for automated license plate recognition. In this study, the proposed system comprises two key components: License Area Verification and License Characters Verification. By leveraging digital cameras, images of vehicles are captured and processed through a series of steps to accurately extract and recognize license plate information. The CNN-based deep learning method is employed for its ability to handle complex real-world scenarios, making it well-suited for robust license plate recognition. The system's effectiveness is demonstrated through extensive experimentation, showcasing its potential for real-time, accurate, and efficient license plate recognition in diverse traffic conditions.

Keywords:

License Plate Recognition (LPR), YOLOv8, Raspberry Pi, Real-Time Detection, Traffic Monitoring.

Analyzing Depression and Quality of Life in Healthcare System By Using Machine Learning

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Abstract:

Machine learning can be used to identify factors that contribute to depression. By combining data from electronic health records, social determinants, and wearable devices, researchers can gain a comprehensive understanding of the complex factors influencing depression. This study involves two main parts: data consolidation and machine learning modeling. The first part focuses on integrating and cleaning data from various sources. The second part utilizes both unsupervised and supervised machine learning techniques to analyze the data and identify patterns. The goal is to discover key predictors and risk factors for depression to develop targeted interventions and personalized treatments. Ultimately, this research aims to improve mental health outcomes and reduce the global burden of depression.

Keywords:

Machine Learning, Depression, Healthcare ,Data Analysis, Mental Health.

Influence of ASNM Datasets on a Hybrid Machine Learning Framework for Network Intrusion Detection

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Abstract:

IDS has an important role in the network against malicious intrusions and contributes to securing and protecting it; however, the efficiency of the systems is usually compromised by the adversarial attacks particularly designed to avoid detection. This paper analyzes the impact of ASNM datasets on a hybrid IDS framework compared to the traditional machine learning models. The framework includes a Deep Learning model, an SVM-based Adversarial Example Detector, a Supervised Machine Learning algorithm, and a model based on Label Propagation, which is a Semi-Supervised Machine Learning technique, to classify incoming traffic as legitimate or malicious. This paper evaluates the effect of using datasets from ASNM, which conflate different obfuscation strategies, on the effectiveness of a particular hybrid machine learning approach intended to identify adversarial attacks on network traffic. Results show that, for several of these models and the specific one reported here, ASNM datasets do not make a difference.

Enhanced Analysis of Electronic Health Records Using Graph-Based Network Structure

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Abstract:

The rapid growth of healthcare data requires advanced analytical techniques to extract insights from electronic health records (EHRs). This paper presents a novel application of Graph Convolutional Networks (GCNs) to enhance EHR analysis, tackling challenges posed by the heterogeneous and high-dimensional nature of clinical data. By structuring patient records as graphs, GCNs capture complex relationships among healthcare entities, including patients, diagnoses, and treatments. This approach learns low-dimensional embeddings that enhance predictive accuracy in patient outcomes, risk stratification, and disease progression. Experimental results from real-world EHR datasets show that the GCN method surpasses conventional machine learning models in accuracy and interpretability, offering insights for better clinical decisions. The study discusses the implications for clinical decision-making.

Keywords:

Graph Convolutional Networks, Electronic Health Records, Predictive Analytics, Personalized Healthcare.

Innovative Transformations in Multimodal Content: Text, Image, Video, and Audio

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Abstract:

Multimodal content, encompassing text, image, video, and audio, has emerged as a powerful medium for information exchange, leveraging diverse data types to enhance user engagement and understanding. Recent developments in artificial intelligence, particularly deep learning architectures like as Transformers, Recurrent Neural Networks (RNNs), and Convolutional Neural Networks (CNNs), have sparked revolutionary possibilities in multimodal data processing. This paper explores innovative transformations across multimodal content, focusing on integration techniques, feature extraction, and real-time synchronization. We examine cross-modal algorithms that enhance accuracy in content analysis, aligning semantic representation from disparate data types for cohesive understanding. Additionally, we discuss applications in domains like healthcare, entertainment, and autonomous systems, where seamless interpretation of multimodal data is critical. Challenges such as modality alignment, data heterogeneity, and computational efficiency are also addressed, highlighting pathways for future research. Our findings underline the potential of multimodal systems in transforming user experiences and advancing machine perception, bridging the gap between human cognition and artificial systems. This research aims to serve as a foundation for further exploration of multimodal content integration, enabling more robust, flexible, and intelligent information systems across various applications.

Keywords:

Multimodal content, deep learning, cross-modal integration, text-image-video-audio, semantic representation.

Enhancing Model Robustness Against Adversarial Attacks using Hybrid Machine Learning Approaches

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Abstract:

Adversarial attacks pose significant risks to machine learning models, especially in sensitive applications like cybersecurity and autonomous systems. These attacks exploit model vulnerabilities to alter outputs, leading to potentially severe consequences. In this paper, we present a hybrid approach to enhance model robustness against adversarial attacks by combining traditional machine learning with deep learning methods. Our approach leverages the strengths of ensemble learning and data augmentation to mitigate adversarial perturbations while preserving model accuracy. We evaluate the proposed method on benchmark datasets, demonstrating a notable improvement in resilience compared to baseline models. Results show that hybrid models not only enhance detection rates but also reduce error rates by up to 20% in adversarial settings. This research contributes to the development of more secure and dependable machine learning applications by addressing critical robustness challenges, offering insights for future research and practical deployment. Our findings underscore the potential of hybrid machine learning in building resilient AI systems capable of withstanding adversarial threats.

Keywords:

Adversarial Attacks, Model Robustness, Hybrid Machine Learning, Ensemble Learning, Adversarial Defense.

Facial Emotion Recognition Using Deep Learning

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Abstract:

the development of an advanced convolutional neural network (CNN) model for facial emotion detection, emphasizing the importance of precise emotion recognition in various applications, including human-computer interaction, psychology, and healthcare. The model leverages the powerful architecture of CNNs to accurately interpret facial expressions and classify them into distinct emotional categories such as happiness, sadness, anger, surprise, fear, and disgust. To train and validate the model, a curated dataset comprising thousands of human facial images was meticulously annotated with corresponding emotion labels. The training process involved extensive data preprocessing and augmentation techniques, including rescaling, shearing, zooming, and horizontal flipping, which aimed to enhance the model's robustness and improve its generalization capabilities across varied facial expressions. The core of the model comprises several layers, including convolutional, pooling, flattening, and dense layers, which collaboratively extract and learn hierarchical features from input images. These features are critical in enabling the model to classify emotions effectively, despite the challenges presented by subtle emotional cues. Notably, the model demonstrated a significant capacity to recognize primary emotions, yet it struggled with emotions such as happiness and disgust, revealing a low detection probability for the latter, attributed to limited representation in the training data. To optimize model performance, the categorical cross-entropy loss function was employed, using the Adam optimizer to fine-tune the weights during training. Accuracy served as the primary metric for evaluation, indicating the model's effectiveness in classifying emotions on unseen data. Following rigorous validation exercises, the model achieved commendable accuracy rates, underscoring its potential for real-world applications. Upon completion of the training, the model was successfully saved in Hierarchical Data Format (HDF5) as "trained_model.h5," offering a structured approach for future implementations and research endeavors in the domain of facial emotion detection. This work contributes to the evolving field of affective computing, providing insights into the capabilities and limitations of automated emotion recognition systems.

Keywords:

Emotion Analysis Pipeline, Expression Variability, Facial Landmarks Detection, Real-Time Inference, Transfer Learning Techniques, Multiclass Classification, Visual Attention Mechanism, Temporal Dynamics, Emotion Recognition Accuracy, Model Fine-Tuning, Computational Efficiency, Annotations Quality, CNN Regularization, Hyperparameter Optimization, Feature Map Interpretation, Emotion Bias.

Dual Hybrid Tree: Splitting of the Hybrid Tree

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Abstract:

The filtration of a list of data can be performed more efficiently by splitting it into parts. The arrangement of the data in a hybrid tree hierarchically and sequentially strengthen to the structure of the data to increase its efficiency, and the tree structure can be broken to improve their ability to accomplish all operations by increasing their time efficiency. Split data maintain a hybrid tree structure. This mechanism minimizes the level of the hybrid tree and converts it into a split hybrid tree, known as a dual hybrid tree. The split data in this form are joined using a header that balances the hybrid tree structure.

Keywords:

Data, Hybrid Tree, Time efficiency, Tree structure.

Hybrid Detection Model Leveraging Autoencoders for Improved Intrusion Detection on Limited Data

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Abstract:

In recent years, intrusion detection systems (IDS) have become critical for protecting digital infrastructure from sophisticated cyber threats. However, traditional IDS models often struggle with limited data, leading to high false-positive rates and inadequate detection accuracy. This paper proposes a hybrid detection model that leverages autoencoders combined with supervised classifiers to address these challenges. The autoencoder, an unsupervised learning technique, is used to learn low-dimensional representations of normal network behavior, effectively reducing noise, and identifying anomalous patterns. Once anomalous patterns are detected, a classifier further differentiates between benign and malicious activities, thus improving accuracy. Our hybrid model is evaluated on limited data, showing superior performance in terms of precision, recall, and F1-score when compared to traditional methods. The results suggest that the model is robust in low-data environments, highlighting its potential in real-world applications where labeled data is scarce. This approach demonstrates that a combination of autoencoders and supervised classifiers can significantly enhance intrusion detection systems, providing a more reliable and efficient solution for cybersecurity.

Keywords:

Intrusion Detection System (IDS), Autoencoders Hybrid Model, Anomaly Detection, Cybersecurity.

Enhancing Real-Time Malware Detection and Mitigation Using Behavioral Analysis and Machine Learning

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Abstract:

The project introduces a real-time malware detection and mitigation system using behavioral analysis and machine learning for combating advanced malware threats. This system dynamically monitors and identifies suspicious activities by analyzing behavior patterns with machine learning algorithms, unlike the traditional signature-based methods. This approach is able to detect previously unknown malware. Continuous monitoring of system behavior allows it to promptly detect anomalies that are indicative of malware and initiate mitigation strategies for threat neutralization. It will improve over time through its ongoing learning from new data, achieving higher detection accuracy as well as quicker response times through the combination of behavioral analysis with machine learning. Comprehensive testing confirms that the system is effective in detecting and mitigating a wide range of malware, thereby providing robust security for enterprise, personal, and critical infrastructure environments. This is an innovative solution marking cybersecurity to address the challenges posed by malware in today's dynamic digital landscape.

Keywords:

Malware Detection, behavioral Analysis, Machine Learning, Cyber Security.

Enhanced Image Translation with PixelShuffler and Self-Attention GANs

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Abstract:

This paper introduces a novel hybrid model, Pixel Shuffler-Self-Attention GAN (PS-SAGAN), for enhanced image translation through pixel rearrangement and adversarial refinement. The model leverages the Pixel Shuffler technique for initial pixel rearrangement, creating compact representations that effectively capture local features. To address global consistency, integration of a self-attention module helps the network to improve contextual comprehension of the image and simulate long-range dependencies. An adversarial GAN component then refines the decoded output, ensuring high visual fidelity and realistic textures in the final translated images. The dual-loss function, combining reconstruction and adversarial losses, balances structural accuracy and perceptual quality. Experimental results demonstrate the model's efficacy in producing high-resolution, visually coherent translations across various datasets, outperforming baseline models in tasks like super-resolution, style transfer, and domain transformation. This hybrid approach, combining spatial rearrangement with self-attention and GAN refinement, represents a significant advancement in deep learning-based image translation.

Keywords:

Image Translation, Pixel Shuffler, Self-Attention GAN, Hybrid Model, Deep Learning.

Adaptive Context-Aware Framework for Mammography Projection Reconstruction Using Dynamic Deep Learning Architectures

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Abstract:

A vital imaging technique for the early diagnosis of breast cancer is mammography, but challenges in acquiring high-quality projections due to noise, artifacts, and limited resolution hinder diagnostic accuracy. This paper proposes an Adaptive Context-Aware Framework leveraging dynamic deep learning architectures for reconstructing mammography projections with enhanced fidelity. The framework integrates hybrid image-to-image translation techniques using a novel combination of Vision transformers (ViTs) and convolutional neural networks (CNNs). The suggested model dynamically adapts to variations in input data by employing a Multi-Scale Feature Aggregation Module (MFAM) that captures both local and global contextual information. A Progressive Reconstruction Refinement (PRR) mechanism ensures high-resolution outputs by iteratively improving structural and perceptual details. To optimize reconstruction quality, we introduce a hybrid loss function combining Perceptual Loss, Mean Squared Error (MSE), and Structural Similarity Index (SSIM). The framework was evaluated on benchmark mammography datasets, demonstrating better results than state-of-the-art techniques in terms of visual quality and reconstruction accuracy. This context-aware, adaptive approach addresses limitations in current techniques, offering a scalable solution for enhancing diagnostic workflows in mammography. The proposed framework not only advances medical imaging but also opens avenues for integrating deep learning with clinical decision-making processes.

Keywords:

Mamography, image-To-Image Translation Techniques, Generative Adversarial Networks (GANs), Projection Reconstruction, ResViT.

Automated Renal Tumor Segmentation in CT Imaging Using Advanced Machine Learning Techniques

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Abstract:

Segmentation of kidney tumors in computed tomography (CT) images is a crucial step in aiding the diagnosis and treatment planning for renal cancer. This study employs advanced deep learning techniques, specifically Convolutional Neural Networks (CNN) and U-Net architectures, to achieve precise and automated segmentation. The proposed method integrates the robust feature extraction capabilities of CNN with the pixel-level precision of U-Net, enabling accurate tumor delineation even in challenging cases. Data preprocessing techniques, including normalization and augmentation, are utilized to enhance the model's performance and generalization. The approach is evaluated using metrics such as Dice Similarity Coefficient (DSC) and Intersection over Union (IoU), achieving superior accuracy compared to conventional methods. This research highlights the potential of artificial intelligence to improve kidney tumor segmentation, offering a reliable tool for clinical applications and advancing personalized treatment strategies.

Keywords:

Tumor lesion segmentation, convolutional neural networks, Python, U-Net, CT data, KiTS19.

Enhanced Shoreline Detection Using Sub-Pixel Segmentation and Image Classification: A Case Study in Coastal Monitoring

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Abstract:

Coastline monitoring and mapping are pivotal for understanding dynamic coastal environments and addressing the challenges posed by changing climate conditions. This research paper introduces a novel shoreline detection methodology, which integrates sub-pixel border segmentation and image classification techniques to achieve enhanced specificity in delineating the sand/water interface. Sobel and Canny filters employ edge detection methods for extracting vital details from satellite imagery. This process diminishes data volume and eliminates irrelevant information while preserving the important structural aspects of satellite pictures. By refining the segmentation process into four distinct categories, our approach enables precise identification of the shoreline, yielding valuable insights for coastal science and management. Leveraging this innovative methodology, researchers and policymakers can gain a comprehensive understanding of coastal dynamics, leading to more effective strategies for the sustainable preservation of these vital ecosystems. We assess various approaches in terms of both their speed of execution and accuracy, while also pinpointing the specific difficulties and challenges associated with each method.

Keywords:

Coastline, Satellite Data, Image Processing.

Automating Kidney Stone Detection with Deep Learning and CNN Models

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Abstract:

Kidney stones are now becoming a significant health issue and so the early detection of them is essential to prevent resulting complication often necessitating surgical intervention for stone extraction. Nephrolithiasis, the presence of a kidney stone, is an incredibly painful condition. The main objective we have is to develop a model that would aid medical professionals in confirming the presence of kidney stones. In humans, identifying kidney stones are critical and a difficult task for doctors, if incorrectly detected, it will lead to death as well. Some people with lack of awareness can't find the symptoms of stone development in the kidney and it gradually harms the organ. Though small-sized kidney stones are missed out through ultrasonography, The most effective diagnostic procedure for detecting kidney stones has been shown to be a CT scan. We use Mobilenet and VGG-16 techniques to optimize kidney stone identification accuracy in CT scans through minimizing distortion in the input pictures and improving detection precision.

Keywords:

Kidney stone, CT scans, Machine Learning, Image Processing.

A Review of Optimization of Floorplanning Based on Machine Learning Algorithms in VLSI

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Abstract:

In VLSI circuit design, physical design is one of the main process in placing the circuit into the chip area. Floorplanning is a crucial process in the physical design of IC design, which generates a blueprint for the placement of circuit modules into the chip. A floorplanning process accepts a netlist as its input, given by the circuit-partitioning step of physical design. The floorplanning generates optimal placements for the circuit modules. The netlist contains the modules' dimensions, size, and interconnect information. During the floorplan generation, the chip area, wire length required for connecting modules and the heat generated by the chips can be estimated. A good floorplan ease out the process of placements and routing. In order to improve the circuit performance by minimizing chip area, wire length, and peak temperature, it is essential to generate an optimized floorplan by developing Metaheuristic Optimization Algorithms. A novel Hybridized Metaheuristic Optimization Algorithms are introduced to generate an optimized floorplan. The primary focus of HMOA algorithms is to design a model for generating efficient floorplanning. The existing methodology generates a floorplan with such an area of 46.61 mm², wire length of 316.47 mm and heat generation of 64.540C. The proposed methodology generates a good floorplan with all the required optimization, such as area, wire length and heat generation.

Keywords:

B*tree crossover, Lion Optimization Algorithm LOA, Genetic algorithm, VLSI Multi-objective optimization, HMOA- Hybridized Metaheuristic Optimization Algorithms, Microelectronic Center of North Carolina (MCNC). VLSI floorplanning, firefly optimization, ant colony optimization, multi-objective optimization, hybrid optimization method.

Intelligent Traffic Management System: An Advanced Solution for Helmet Compliance, Traffic Signal Violation Detection, Cell Phone Usage Tracking

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Abstract:

The Intelligent Traffic Management System (ITMS) is an IT solution of an advanced technology in the area of road safety and compliance. Real time monitoring and enforcement mechanisms are integrated to respond to critical problems arising from headgear non-compliance, traffic signal violations, as well as distracted driving due to cell phone usage. ITMS leverages artificial intelligence (AI); machine learning; and Internet of Things (IoT) technologies, using real time information from cameras and sensors, to detect violations and alert the authorities. The traffic signal violations are identified using image processing techniques, while computer vision algorithms are being used to ensure helmet compliance. Together, the system also monitors driver usage of mobile phones while on the road and it mitigates the associated risks of distracted driving. The data collected would help city planners and traffic authorities better enforce and has been shown to lead to better urban traffic management strategies. Being not only a means to adhere to traffic regulations, promoting a safer and more efficient urban transportation, ITMS also decreases the number of road accidents and reduces fatalities.

Keywords:

Intelligent Traffic Management System (ITMS), helmet compliance, traffic signal violations, distracted driving, artificial intelligence (AI), Internet of Things (IoT), road safety, machine learning.

Machine Learning Report for Vehicle Accident Detection and Alert System

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Abstract:

The Accident Detection and Alert System leverages Machine Learning (ML) to enable accurate, real-time identification of road accidents. The system integrates sensor data (accelerometers, gyroscopes) and video feeds to detect abrupt motion changes and collision patterns. By employing a combination of supervised and unsupervised ML methods, it ensures precise accident detection, minimizes false positives, and enhances emergency response times. Key technologies include deep learning frameworks like TensorFlow and PyTorch for video-based detection, as well as traditional ML algorithms like Random Forest for sensor data classification. The solution incorporates advanced preprocessing techniques, feature extraction, and model optimization to handle real-time processing challenges. Deployed via cloud services and edge devices, the system triggers GPS-enabled alerts, accelerating life-saving interventions. By addressing challenges such as sparse datasets, false positives, and computational demands, this ML-driven solution exemplifies the potential of AI in improving road safety and emergency management.

Keywords:

Convolutional neural networks, Long Short Term Memory, Simple Mail Transfer Protocol, Support Vector Machines, Pytorch.

Comprehensive Online Food Ordering and Integrated Stock Management System

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Abstract:

Technological innovations became essential in the food service sector because of its fast growth which supported consumer expectations for more convenient and efficient services. This study details the creation of a scalable Online

Food Ordering System based on PHP and MySQL technology which guarantees reliability and convenience for managing food deliveries. Users have access to real-time menu browsing capabilities along with order placement and tracking options and administrators benefit from extensive restaurant management tools. The MySQL based backend system connects effortlessly with the PHP, HTML, and JavaScript front-end interface which delivers smooth interaction exchanges between customers and service providers. The system provides essential features which include authentic user login processes together with payment processing integrations that dynamically display order status updates. System architecture maintains ethical standards by protecting data privacy which builds trust alongside system security to establish service reliability. Modern food service applications witness transformative web-based technology effects as the proposed system both boosts restaurants' operational efficiency and enhances user experiences.

Keywords:

Online Food Ordering System, PHP, MySQL, Web Applications, Food Service Innovation, User Experience, Data Privacy.

Safe Hazmat Management System

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Abstract:

The SafeHazMat Management System (SHMS) represents a pioneering approach to managing hazardous materials with a strong emphasis on safety and efficiency. In today's complex environment, the accurate identification and proper management of hazardous materials are crucial to preventing accidents and ensuring regulatory compliance. SHMS addresses this need by integrating state-of-the-art technologies such as machine learning and image recognition. These technologies enable the system to swiftly and accurately detect various hazardous material signs, providing real-time information that is critical for safe handling and disposal. Beyond just identification, SHMS offers a holistic solution that includes training modules for personnel, detailed procedures for handling and transportation, and guidelines for the proper disposal of hazardous materials. By covering all these aspects, SHMS ensures that users are well-informed and equipped to handle hazardous materials safely and in accordance with best practices. The system is designed to be user-friendly while maintaining high standards of accuracy and reliability. With its comprehensive approach, SHMS not only enhances safety but also streamlines hazardous material management, making it a valuable tool for any organization dealing with these materials. Through its innovative features and thorough management protocols, SHMS aims to set a new benchmark in the field, fostering a safer and more compliant handling environment for hazardous materials.

Keywords:

Machine learning, image recognition, State-of-the-art technologies, Real-time information.

Blockchain-driven Multi-Factor Authentication for Identity and Access Management, Utilizing Qr Codes

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Abstract:

Blockchain technology provides a strong method for improving the security of Identity and Access Management (IAM) systems using Multi-Factor Authentication (MFA). This abstract addresses a blockchain-based MFA implementation with QR codes as an efficient, safe, and user-friendly authentication mechanism. Conventional IAM systems typically rely on central authentication servers that are susceptible to single points of failure and malicious attacks. However, blockchain decentralizes a ledger that ensures integrity and immutability with respect to data, decreasing the risk of unauthorized access and breaches. Here, authentication data pertaining to each user is stored and managed securely on the blockchain, where cryptographic techniques and smart contracts are applied for validation and execution of authentication in a secure manner. QR codes are a critical part of the authentication workflow in an interaction between users and the blockchain. Users authenticate by scanning QR codes of encrypted authentication challenges or responses on the blockchain, thereby processing them in a secure environment. This improves security by making it difficult for attackers to steal credentials and launch spoofing attacks; it also helps improve user experience by making authentication smooth and intuitive. In addition, the decentralized nature of blockchain eliminates a central authority to attack, ensuring resilience and improves scalability for more widespread adoption. Organizations can enhance security and foster user trust in digital identity verification and access control systems by integrating blockchain technology with QR-based MFA.

Keywords:

Blockchain technology, Identity and Access Management (IAM), Multi-Factor Authentication (MFA), QR codes, decentralized ledger, data integrity, cryptographic techniques, authentication data.

Unlocking the Potential of IoT for Advancing Smart Cities in India: Opportunities, Challenges, and Future Directions

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Abstract:

Integrating the Internet of Things (IoT) into smart cities offers significant potential to transform urban management and enhance the quality of life for citizens. This paper explores the implementation of IoT in Indian smart cities, focusing on methodologies, challenges, and opportunities for future research. Through case studies, the paper demonstrates how IoT improves urban infrastructure, streamlines service delivery, and drives economic growth. However, challenges such as data privacy, security concerns, financial limitations, and interoperability persist. The paper emphasizes the importance of developing robust security frameworks, fostering public-private partnerships, and ensuring inclusive planning for successful IoT adoption. The potential benefits of IoT extend across social, economic, and environmental spheres, enabling cost savings, promoting sustainability, and enhancing citizen engagement through real-time data and analytics. Addressing socio-economic disparities and ensuring equitable access to IoT benefits are critical to maximizing its impact. The study also highlights the need for ongoing research and development to address technological obsolescence and standardization challenges. Future research should prioritize enhanced security, the integration of emerging technologies, and the creation of inclusive IoT solutions. By tackling these issues and harnessing IoT's opportunities, policymakers and stakeholders can foster smarter, more sustainable urban environments.

Wildfire Prediction using HQCNN: Enhanced Performance over Standard CNN and Vision Transformer Models

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Abstract:

Wildfires are an escalating global threat, demanding robust predictive models for effective risk management and emergency response. This paper presents a High-Quality Convolutional Neural Network (HQCNN) approach for wildfire prediction using a diverse dataset of 22,000 high-resolution satellite images from regions in Canada and Australia. The proposed HQCNN model features a deeper architecture with residual connections and advanced activation functions, which allows it to capture subtle environmental cues that conventional CNNs and Vision Transformers (ViT) may overlook. Quantitative evaluations based on accuracy, precision, recall, and F1 score demonstrate that HQCNN consistently outperforms these models. Our findings suggest that integrating HQCNN into early-warning systems could significantly enhance disaster management and resource allocation strategies.

Keywords:

Wildfire Prediction, HQCNN, Convolutional Neural Networks, Vision Transformer, Deep Learning, Satellite Imagery, Residual Connections.

Innovative Approach to Alzheimer Disease Detection

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Abstract:

The main focus of this study is to evaluate CNN, DenseNet-121, and ResNet-50 models for classifying Alzheimer disease different stages using MRI scans. Machine learning techniques were applied to enhance model performance, achieving an accuracy of 98.24% with DenseNet-201. The results highlight the potential of AI-driven models in early diagnosis, improving clinical outcomes. [2, 3] [4]

This study emphasizes on the promise of utilizing learning in imaging the incorporation of AI models, into the operational processes for detecting Alzheimer disease at an early stage, with upcoming efforts focusing on ML model resilience through combined architectural approaches and diverse imaging data sources.

Keywords:

Alzheimer disease, MRI Scans, Deep Learning, CNN, DenseNet-121, ResNet-50, Neuroimaging, Medical AI.

Innovative Cyber Security: Revolutionizing Threat Detection and Business Protection in the Digital Era

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Abstract:

The use of the internet has grown rapidly, especially in the last ten years. Because so many people use the internet, cybercrime is becoming increasingly commonplace daily. As artificial intelligence (AI) develops, businesses are focusing more on stopping cybercrime. AI is becoming a crucial element of all businesses, impacting people globally. AI technologies offer enhanced capacities for assessing vast volumes of data produced in real time within cloud infrastructures. This enables the early identification of abnormal activities and possible security breaches. AI systems can detect patterns, spot malicious activities, and foresee new threats more accurately and successfully by employing machine learning algorithms, deep learning models, and natural language processing techniques. As digital infrastructures evolve, hackers become more sophisticated, posing a significant danger to global commercial operations. This research investigates how AI is changing cybersecurity through automated threat detection, vulnerability detection, and improved response times. Using AI methods such as machine learning and deep learning, security platforms can detect abnormalities and respond to new threats in real-time. Data analysis shows how AI-driven solutions defend businesses from growing cyber hazards. The study also examines difficulties such as AI's vulnerability to adversarial assaults, the importance of data integrity and ethical implications. AI-powered cybersecurity offers a dynamic approach to protecting corporate processes, making it an indispensable tool in today's digital environment. We focus on machine learning and data-mining-based anomaly detection techniques. Deep Learning and neural networks are used to decipher intricate threat patterns, extract useful intelligence through natural language processing, and automate threat detection and response. This paper explores how cybersecurity is being revolutionized by AI.

Keywords:

Innovation and Infrastructure, Artificial Intelligence (AI), Deep Learning (DL), Machine Learning (ML), Security Analytics, Classification.

Using CNN for Handwritten Digit Recognition

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Abstract:

Performing handwriting digit recognition is a common task in machine learning and computer vision domains that can be applied to wide range of real-life scenarios such as automation of input entry, postal code recognition and so on. This work involves the use of MNIST dataset, for the analysis of the various models that should be deployed to learn the recognition of handwritten digits. This study aims at comparing deep learning models especially Convolutional Neural Network (CNN) with conventional machine learning models such as, K- nearest neighbors (KNN) and Support Vector Machine (SVM). By clearly presenting the facts on how CNN actually performs better by comparing a number of scenarios where it surpasses standard approaches and by presenting numerous experiments to back our findings. We will also discuss the results of varying other hyperparameters of the model and also explore the effect of network architecture and data augmentation techniques on the classification performance of the model and the results so obtained clearly demonstrate the potential of deep learning models for recognizing hand written digits.

Keywords:

Digit recognition, CNN, image recognition, KNN, SVM, deep learning, MNIST.

Anomaly Detection in Network Traffic Using Machine Learning

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Abstract:

Spotting odd patterns in network data is very important for confirming the safety and efficiency of present-day computer networks. The increasing amount and intricacy of network information make it difficult to use old methods that depend on fixed limits or manual checks, as they are not successful anymore. Machine learning (ML) has emerged as a powerful option to identify unusual sequences and extreme values within extensive datasets automatically.

This research looks into varied machine learning tactics for finding abnormalities in network traffic, incorporating supervised, unsupervised, and semi-supervised educational methods. We examine the implementation of techniques such as Support Vector Machines (SVM), k-nearest Neighbours (k-NN), Decision Trees, and Neural Networks with an emphasis on their ability to differentiate between valid and harmful traffic. Methods that do not require supervision like grouping or clustering (for example: k-Means) along with autoencoders are also taken into account to identify threats that haven't been detected yet. We explore problems related to managing lopsided datasets, choosing features, and processing in real-time within high-dimensional network data too. Our research reveals the value of using models based on Machine Learning (ML) for identifying irregularities, especially in situations where attack patterns are always changing. Lastly, we suggest a mixed model that combines various machine-learning methods which enhances both correctness and scalability of detecting anomalies in networks.

Keywords:

Data collection, Decision tree, Anomaly detection, Model evaluation , Accuracy, Precision, KNN, Logistic Regression.

Optimizing Retrieval in Question Answering Systems on COVID-19 Literature: Impact of Similarity Functions and Chunking Strategies

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Abstract:

The need to extract actionable insights from the vast COVID-19 literature highlights the importance of robust Question Answering Systems (QAS). This study presents the development of a QAS that allows users to submit natural language queries through an intuitive interface. The system architecture comprises an embedder, retriever, prompt builder, generator, and embeddings stored in a vector database. The retriever leverages similarity functions—Cosine Similarity, Maximum Marginal Relevance, and Dot Product—to match user query embeddings with stored embeddings, retrieving the most relevant documents for generating responses.

The research explores the impact of similarity functions and chunking strategies on answer retrieval quality. Various chunking techniques are analyzed to effectively split the context for improved retrieval. To evaluate the performance of retrieved answers, metrics such as Factual Correctness, Semantic Similarity, BLEU Score, ROUGE Score, Faithfulness, Exact Match, String Presence, Non-LLM String Similarity, and Context Precision are employed.

This work aims to identify the optimal combination of similarity functions and chunking strategies to enhance retrieval accuracy, enabling more relevant, precise, and contextually appropriate answers to user queries. The findings advance QAS design, contributing to improved retrieval and generation pipelines for public health research and decision-making.

Exploratory Data Analysis of AI Job Market Trends Using Machine Learning

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Abstract:

This exploratory data analysis with machine learning techniques examined the major trends related to the dataset based on 500 AI-related entries across various industries and locations. It analyzed the relationships between job attributes—the titles, required skills, company size, and location with AI adoption levels—to inspect the patterns related to salaries, opportunities for remote work, and chances of automation. Using clustering and regression analysis, the study identifies which skills are projected to grow well and estimates the impact of AI adoption on job security. The paper also takes into more intricate detail the salary distributions by role, location, and size of company, such that the reader can gain better understanding of how these dynamics affect compensation as well as the risk of automation. Results for AI professionals, employers, and policymakers will shape data-driven decisions about this rapidly changing AI job market.

Keywords:

AI Job Market, Exploratory Data Analysis (EDA), Machine Learning in Job Trends, Salary Distribution, Automation Risk, AI Adoption Level, Required Skills, Job Growth Projections, Remote Work Trends, Industry Insights, Skill Demand, Job Security in AI, AI-driven Employment Trends, Location-based Salary Analysis, Company Size and Compensation.

Dash Sylvereye: Enhancing Visualization of Complex Street Networks Using Python

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Abstract:

Frustrated with clunky graph visualization tools for vast city street networks? Look no further than Dash Sylvereye! This innovative Python library tackles limitations like slow rendering, limited interactivity, and inaccurate road representation. By leveraging GPU acceleration and web dashboards, Dash Sylvereye lets you explore massive street networks (thousands of roads!) with ease. Plus, it seamlessly integrates with OpenStreetMap data, making real-world visualization a breeze.

Keywords:

Data visualization, data analysis, software libraries, component architectures, complex networks, graphical user interfaces, graphics, vehicle dynamics.

Brain MRI Image Tumor Detection and Classification Technique Using EfficientNetB0

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Abstract:

The Brain tumors are a serious health issue, and getting the right diagnosis is very important for treatment. In this work, we have introduced deep learning method using EfficientNetB0 model to classify brain tumors from MRI images. We used a dataset with four types of images: glioma, meningioma, pituitary tumors, and images without tumors. To make our model better, we applied techniques for the purpose of expand training information data.

This model was trained by us using a loss function called categorical crossentropy and the Adam optimizer, along with tools to help improve training and avoid overfitting. Our results demonstrated that EfficientNetB0 96% accuracy was attained by the model based on test set, performing well in identifying all types of tumors. We also used a matrix of confusion to determine how effectively the model distinguished among several classes.

The study shows how deep learning can help in medical imaging, making it easier to accurately diagnose brain tumors. In the future, we plan to explore other methods to improve classification performance, which can lead to better care for patients with brain tumors.

Face detection in low-light conditions using MTCNN and YOLOv8n

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Abstract:

Face detection in low-light conditions is a difficult but important task for applications like night-time surveillance and self-driving cars. Most face detection models struggle in the dark because they need well-labelled training data, which is not always available. In this project, we use unsupervised learning to detect faces in the dark and for wider face variations. We use YOLOv8n to detect faces in low-light environments because it is fast and efficient for real-time detection. We also use MTCNN to detect wider faces with different angles and positions. Improve accuracy, we apply techniques like enhancing dark images and reducing brightness in normal images so that both types of images become similar. We also use feature learning methods to make sure the model understands faces in different lighting conditions. Our results show that this approach improves face detection in the dark without using labelled low-light data. This method can also be useful for other face detection applications in difficult environments.

Keywords:

Face Detection, Low-Light Conditions, YOLOv8, MTCNN, Fusion Model, Deep Learning.

An Enhanced Fake News Detection System With Deep Learning

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Abstract:

This study examines various NLP strategies to differentiate between fake and true news. The work uses Term Frequency-Inverse Document Frequency (TF-IDF), semantic feature extraction, and deep learning-based language models such as Word2Vec and BERT. Semantic elements improve context understanding, and TF-IDF helps determine a text's word meaning. The transformer model BERT greatly improves classification by spotting intricate semantic patterns. Combining these methods results in a more accurate false news detection system that can differentiate between real and fake news.

Keywords:

Semantic features, TF-IDF, machine learning, deep learning, and fake news detection, Word2Vec, BERT.

Deep Learning-Driven Multi Gener Music Classification With Ten Sound Types

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Abstract:

Music Classification is a crucial area in deep learning, enabling automated genre recognition across diverse sound types. This project "Deep Learning Multi-Genre Classification With Ten Sound Types", presents a deep learning-driven music classification, integrating Artificial Neural Networks (ANN's), Long Short-Term Memory (LSTM) networks, Transform based modules, and graph embedding techniques such as Node2Vec. Unlike traditional models relying solely on spectrogram-based analysis, our framework incorporates Mel-frequency Cepstral Coefficients (MFCC) and Chroma features improved classification accuracy. Additionally contrastive learning and music knowledge graph embeddings enhance sequential dependency modeling and contextual understanding. The system is trained and evaluated on GTZAN and FMA datasets, covering ten distinct sound types. Experimental results demonstrate that ANN achieves 93.9% accuracy on GTZAN, outperforming LSTM (64.0%) and CNN (63.0%). On FMA K-Nearest Neighbors (KNN) achieves highest accuracy of 92.2%, support vector machines (84.0%) and Decision Tree (81.0%). This framework advances music information retrieval, enabling applications in automated tagging, personalized recommendations, and real-time audio classification.

Keywords:

Music classification, deep learning, ANN, LSTM, Transformer, graph embeddings, MFCC, chroma features, multi genre classification, music Analysis.

AgroSense: ML-Powered Solutions for Sustainable Agriculture

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Abstract:

This project leverages the power of machine learning to automate key agricultural practices, thereby increasing farming efficiency and fostering environmental sustainability. The system provides support to farmers in four critical areas of crop management: first, it detects and classifies weeds in fields using image recognition technology. Second, the system predicts soil moisture levels using sensor data. It also calculates the water footprint of crops based on the total amount of water consumed during their life cycle, offering insights for efficient water resource management. Additionally, the system monitors crop health in real-time, detecting early signs of stress, nutrient deficiencies, or disease, enabling timely interventions to prevent yield loss. The goal of this project is to enhance crop productivity, reduce water consumption, and promote sustainable farming practices by integrating advanced technology into modern agriculture.

Flip-Flop Data Concealer

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Abstract:

With the increasing reliance on digital communication, ensuring data security has become a priority for internet users. Conventional encryption techniques, while effective, are often susceptible to cryptanalysis and interception. This study introduces an advanced approach that integrates image steganography with cryptographic methods to enhance data security during transmission. The proposed method conceals sensitive information within digital images before transmission, making it imperceptible to unauthorized entities. A comprehensive assessment of research trends in steganography and cryptography is conducted to highlight the limitations of conventional techniques. The study also evaluates the efficiency of the proposed approach through a comparative analysis with traditional encryption techniques in terms of security, reliability, and feasibility. Experimental results demonstrate that image steganography provides a robust, cost-effective solution to ensure data security transfer across the web. The findings contribute to the growing body of research on encrypted data transmission, presenting an innovative approach to safeguarding sensitive information within the digital realm era.

Keywords:

Confidential data transmission, online security, image-based steganography, cryptographic techniques, data encryption, cybersecurity, sensitive information, privacy protection, secure data handling, information safety.

Streamlining College Canteen Operations with a Digital Token System

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Abstract:

The overcrowded college canteen, college canteens being the place with max hangout also faces a lot of rush for students and staff alike especially around peak hours, leading to long queues and making it look like an unorganized space. Currently, students and staff need to queue in line at the counter where they get a printed receipt for having their meals paid. The receipt then has to be produced at the food counter for processing of order. However, not having a system of sustainable queuing only exacerbates this chaos and inefficiency factors that frustrate all parties. In this study, we introduce a digital mechanism as the solution to eradicate all these problems and revolutions in billing canteen process. This solution is a web application which the best part of ordering food online will come to existence i.e., Users can make an order from their point rather than moving to Billing Counter. When you place an order, a unique digital token is sent to your device, which takes the form of your receipt. This token can then be flashed at the food counter to obtain their order which makes this entire process streamlined and efficient. This is expected to have a huge impact as far as crowd management along with creating a more seamless shopping experience in terms of shifting away from physical receipts and doing away the with traditional billing counter. Later on, users will be able to see real- time order status updated via the application making it a seamless process. The common purpose of this project is not only to optimize the operation at Canteen but also a more timely and convenient space for students, especially in peak time-frames. Our aim is to reduce waiting time and waste, improve the flow in canteen and deliver a feeling of satisfaction among students & staff.

Keywords:

College canteen, Overcrowding, Digital token system, Web application, Order processing, Queue management, Real-time order status, Online food ordering, Efficiency, Convenience, Customer satisfaction, Process optimization.

CropSync: AI-Driven Blockchain Solution for Smart Farming

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Abstract:

CropSync is a transformative application designed to bring innovation to the Indian agriculture system by integrating Artificial Intelligence (AI), Blockchain, and Cloud Computing. To address important challenges such as unpredictable weather, market trends, lack of access to financial schemes, and lack of transparency in the supply chain, CropSync helps farmers with data-driven decision-making capabilities. Key features include real-time weather updates, predictive insights in agriculture, a data-driven dashboard, and blockchain-based sustainability certification. Together, these functions improve productivity, transparency, and promote sustainable farming practices.

Fashion in the Age of Immersion: Exploring the Potential of AR, VR & CGI

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Abstract:

This study explores the revolutionary effect of the acceptance and embedding of AR, VR, and CGI into brand engagement in the fashion industry. Based on the framework of SDT (Self-determination theory), this study examined how technology plays a role in shaping the nature of informativeness, interactivity, and personalization, which leads to brand engagement among consumers. Responses from 510 respondents were quantitatively analyzed through Structural Equation Modelling (SEM). The results indicate that good-quality implications of AR, VR, and CGI increase perceived interactivity and informativeness and have a greater likelihood of establishing more emotional and cognitive connections with brands. Excessive information can decrease consumer engagement, so finding the right balance is key. The positive effect of interactivity on brand engagement was moderated by personalization. The current study provides actionable insight for fashion retailers to create meaningful digital marketing strategies, showing how immersive technologies can help create memorable and meaningful consumer experiences. This research fills a gap in knowledge on the relationship between technology and consumer behavior related to AR, VR, and CGI as marketing tools.

The research identifies opportunities and challenges for immersive technologies such as AR, VR, and CGI in brand engagement. The less-than-useful part of an experience could be to engender cognitive overload or reduce engagement by excessive use or personalization. These findings suggest a judicious balance between engaging through interactivity and informativeness on one hand, but not to the point of overwhelming consumers. Therefore, from a real standpoint, fashion retailers should focus on high-quality, virtual implementations with the maximum engagement and the smoothest possible user experience. By enabling brand engagement through these technologies, retailers can build better relationships with their customers, engender trust, and build loyalty.

Keywords:

Augmented reality (AR), Brand engagement, Computer-generated imagery (CGI), Immersive technologies, Virtual reality (VR), Perceived informativeness, Perceived interactivity, Personalization.

Digital Deception: A Study of Deepfake Impact on Media Consumption

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Abstract:

This study examines the impact of Deepfake on the use digital media which focuses on public awareness, perceptions and ethical concerns. Present study is important because Deepfake fuels false information, theft of identity, need for privacy violations requiring awareness, ethical safety measures and regulations. The objective of this research is to find the public awareness about Deepfake, their perceptions and ethical concerns impacting the digital media interaction. The study uses structured questionnaire and employs a snowball technique through Exploratory Factor Analysis (EFA) and Structural Equation Modeling (SEM) to find the relationship that exists between awareness about Deepfake, perception, ethical concerns and digital media usage. This analysis has found the rise in awareness of Deepfakes that lowers ethical issues while positivity in perception develops ethics issues acting as a threat to digital media consumption and reducing trust as users become cautious in online behavior. This study necessitates out the real need for educating the masses about digital literacy, regulations on digital media services, and detecting tools that the AI will perform to combat misinformation and reduce ethical risks associated with the Deepfake. Ethical concerns reduce the online engagement of users making it necessary to improve the transparency and security.

As Deepfake techniques develop, the cybersecurity, misinformation and its implications on personal identity security become rapidly important. To address these challenges a more secure and reliable digital environment requires technological progress, policy intervention and combination of public awareness initiatives. Future research should be directed toward psychological impact of Deepfake, media literacy, ethical stance in corporations, their impact on legal frameworks and AI driven authentication technologies.

Keywords:

Digital Media Usage, Artificial Intelligence (AI), Ethical Concerns, Misinformation, Public Awareness, Perception Analysis, Identity Theft, Privacy Violations, Digital Literacy, Regulatory Measures, Media Trust and Manipulation.

AI-Driven Smart Framework for Real-Time Pollution Monitoring and Restoration of the Yamuna River

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Abstract:

The Yamuna River, particularly in its Delhi catchment, is one of the most severely polluted water bodies in India, primarily due to rapid urbanization, industrial effluents and untreated sewage discharge. Traditional pollution control methods have failed to deliver sustainable results, necessitating technological advancements for real-time monitoring and mitigation. This paper proposes an AI-powered pollution management framework integrating machine learning (ML), Internet of Things (IoT)-enabled sensor networks and predictive analytics to combat river pollution. The framework utilizes AI-driven models, including regression techniques, neural networks and optimization algorithms, to provide automated pollution source detection, real-time data analysis and predictive forecasting. IoT-based water quality sensors continuously monitor parameters such as pH, dissolved oxygen (DO), biochemical oxygen demand (BOD) and heavy metal concentrations, transmitting data to a cloud-based AI platform. Advanced ML models process this data to identify pollution hotspots, predict contamination levels and suggest mitigation strategies using reinforcement learning and geospatial analytics. Furthermore, computer vision and remote sensing techniques enhance pollution surveillance by analyzing satellite images and detecting anomalies in water flow and pollutant dispersion patterns. The study also presents a decision-support system (DSS) powered by AI, offering data-driven insights to policymakers for efficient waste management, smart water treatment planning and sustainable intervention strategies. The proposed framework enables real-time pollution tracking, automated anomaly detection and predictive alerts, ensuring faster and more effective remediation. By integrating AI and IoT, this research demonstrates a scalable and adaptive approach to river conservation and environmental sustainability. The findings emphasize AI's transformative

role in ecological preservation, laying the groundwork for next-generation smart water management systems that can be applied to polluted rivers worldwide.

Keywords:

AI in environmental monitoring, IoT for water quality assessment, machine learning for pollution control, smart water management, predictive analytics in environmental sustainability, AI-driven river conservation, geospatial analytics, real-time pollution monitoring, neural networks for water treatment, AI-based decision support systems.

Personalized Healthcare Decision Support System

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Abstract:

This Literature Survey focuses on integrating collaborative filtering and state learning in a personalized healthcare system. Collaborative filtering has been proven to improve clinical outcomes by examining similar patient samples. Using patient health history and results, it can create personalized recommendations, such as medications, meal plans, and lifestyle changes, designed to improve individual health outcomes. Collaborative filtering helps healthcare providers provide targeted, data-driven recommendations based on real-world clinical outcomes, improving the overall patient experience and enabling better collaboration. However, the use of personalized systems poses serious challenges, especially regarding patient personal information and security. Federal Learning solves these problems by enabling machine learning models to be trained across healthcare organizations without sharing sensitive patient data. This privacy protection keeps patient information secure while also allowing samples to be reviewed from multiple sources. By combining government training and collaborative filtering, medical systems can provide personalized treatment recommendations while protecting patient privacy. This research explores how these two technologies can transform healthcare by providing secure, data-driven, and patient-centred solutions.

Keywords:

Personalized Healthcare, Collaborative Filtering, Federated Learning, Medicine Recommendation Systems, Healthcare Data Integration.

Next-Generation Course Material Management and Intelligent Assistance System

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Abstract:

The current use of Google Classroom for educational resource management at our college presents significant challenges, including limited storage capacity, poor organization, lack of college-specific features, inefficient resource utilization, accessibility issues, and the absence of intelligent assistance. To address these issues, we propose the development of a Next-Generation Course Material Management and Intelligent Assistance System. This platform will offer scalable storage solutions, robust organization mechanisms, and features tailored to the unique needs of our college community. Additionally, it will integrate a Large Language Model (LLM)-powered chatbot capable of using uploaded resources as a knowledge base to provide instant doubt clarification and other academic support. This intelligent assistant will enhance the learning experience for students and reduce the burden on faculty, ultimately leading to a more efficient and effective educational resource management system. A key component of this system is the use of Retrieval-Augmented Generation (RAG), which enhances the chatbot's capabilities by dynamically retrieving relevant information from course materials and generating contextually accurate responses.

Keywords:

Educational resource management, Next-generation system, Google Classroom alternatives, Large Language Models (LLMs), Intelligent assistance, RAG (Retrieval-Augmented Generation), Scalable storage, Student learning experience, Faculty support, AI-powered chatbot.

Opinion Mining from Traveler Comment using Natural Language Processing Machine Learning Techniques

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Abstract:

This project aims to create a web based tourism sentiment analysis app. The system integrates various Natural Language Processing (NLP) techniques including tokenization and part-of-speech, with machine learning algorithms such as Support Vector Machine (SVM), Naive Bayes and Long Short-Term Memory (LSTM) networks to classify user comments on hotels, restaurants, travel agents and attractions into positive comment or negative comment. The way the system classifies the comments in positive, negative or neutral way helps lay down an insight for businesses to improve upon their service quality. The application also uses a Django framework for interaction between administrators and users in real time. The administrators can update the place with a tourism related content and users can give their feedback about it, which after be analysed by machine learning models. We propose a novel system to address the common challenges of sentiment analysis, including complex sentiments (e.g., sarcasm), accuracy, large dataset scalability and context-specific issues. In conclusion, this serves project is to enable tourism businesses with data to build a better customer experience.

Keywords:

Sentiment Analysis, Opinion Mining, Machine Learning, Natural Language Processing (NLP), Support Vector Machine (SVM), and Naive Bayes, Long Short-Term Memory (LSTM), Tokenization, Web Application, Traveler Comments, Tourism Industry, Django Framework, Customer Feedback, Text Classification and finally Data-Driven Insights.

Enhancing Base Large Language Model using Knowledge Graphs for Genomic Annotation

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Abstract:

Annotating sequences of genes is a complex and constantly evolving process; existing annotations are refined constantly and new data is always being added. Attempts at automating this process have led to the use of Large Language Models and while these LLMs have great language processing capabilities, the standing notion is that they suffer from hallucination and have the tendency to “discover” new knowledge akin to fact fabrication. Now, contrary to this is a knowledge graph - unlike an LLM it cannot interpret knowledge it holds. However, it possesses a structured representation of domain-specific knowledge allowing it to accommodate new information with minimal computational overhead. The evolving landscape of genomic annotation means that LLMs will need to be finetuned to new data constantly and perform poorly when working with genomic sequences. To address these issues, we introduce a searchable knowledge graph constructed on various sources of gene and protein data demonstrating the efficacy of a system involving knowledge graphs and LLMs. We stipulate a framework to construct and search a knowledge graph, and index the haystack of genomes into a more structured representation allowing for robust searching. When applied to a downstream task such as annotation generation, we show that such a symbiotic system results in improved accuracy for gene attribute prediction implying improved interpretability (providing insights into the decision-making of an LLM), reasoning and factual accuracy as a result of decreased hallucination from increased context.

Keywords:

Large Language Models, Knowledge Graph, Genomic Annotation, Proteins, Fuzzy Search.

Low Latency LFSR with Hybrid Model State Extension

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Abstract:

A counter is a fundamental component that is widely used in a variety of applications, including measurement systems, analog-to-digital converters, frequency synthesizers, and so on. However, most earlier counters had a restricted counting rate due to big fan-outs and extensive carry chains. Particularly when the counter size is not modest, the proposed technology combines high-speed counter architecture with new LFSR state extensions and state look-ahead logic. It was proposed. The recommended state extension enables the $(2^m - 1)$ bit LFSR counter to cover 2^m states without reducing counting rate. The total counter is broken into three modules, with module 1 employing an LFSR state extension counter to decrease overall hardware complexity. Module 2 also uses back carry propagation, but module 3 is constructed with a standard binary counter, which counter refreshes the counting state with a consistent delay across all path modules/stages in relation to the clock edge. Verilog HDL is used to design the counter, which is then generated using Xilinx ISE. Implementation findings demonstrate that the suggested design can be accomplished with a modest number of flip-flops, which is nearly to the counter size, and that it performs better than existing designs while operating at a higher frequency.

Speaker Relevance Analyser: Evaluating Speaker's Discourse

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Abstract:

This paper introduces a novel multimodal approach to evaluate debates providing detailed feedback, thus enabling users to identify specific areas of improvement. This framework encompasses five core components, namely: argumentative quality, factual correctness, language proficiency, topic relevance, and stance consistency. The argumentative discourse effectiveness module identifies discourse elements such as claims, evidence, rebuttals, etc. using the Persuade 2.0 dataset. In addition, a fine-tuned BERT model is used to determine the effectiveness of the discourse. The fact-checking module applies Named Entity Recognition (NER) to filter relevant statements, validates their factual correctness through Gemini, and enhances accuracy through Retrieval-Augmented Generation (RAG) and a custom search engine. The language proficiency module uses a BERT model fine-tuned on the ELLIPSE dataset to assess various aspects like cohesion, syntax, vocabulary, etc. The topic relevance module extracts key phrases from debate transcripts and compares them to topic-related terms. The stance classification model uses the zero-shot classifier to determine if the given statement supports, opposes, or remains neutral to the specified topic. By aggregating individual component scores from each module, our system provides a comprehensive framework for understanding and scoring debate performance.

Keywords:

Automatic Debate Evaluation, Scoring Debates, Speaker Relevance.

Microbial Fuel Cells (MFCs) in the Treatment of Automotive Wastewater

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Abstract:

To address the growing global energy demand, a sustainable and eco-friendly energy source is essential. Microbial fuel cells (MFCs) offer a great potential as a green bioenergy conversion technology that utilizes organic matters as the feedstock. Wastewaters are one of the most used substrates in MFCs. The construction and evaluation of MFCs for wastewater treatment were carried out in this study. A double-chambered MFC was constructed, using a PVC pipe filled with agar and NaCl solution as salt-bridge. The experiments were effectuated using automotive wastewater as substrate and *Lactobacillus* as biocatalyst. COD, BOD, DO, TDS, TSS, Chlorides, Sulfates and Total hardness have been evaluated. A significant decrease in COD and BOD was performed. The COD and BOD of the untreated effluent were 980 mg/L and 610 mg/L respectively, while those of the treated ones were 480 mg/L and 220 mg/L. These removal ratios demonstrate the capacity of living microorganisms to break down the organic matter in the automotive wastewater to not only treat wastewater, but also generate electrical power. Indeed, the system achieved a maximum power density of 1615.79 mW/. Therefore, MFC technology provides an effective solution for treating automotive wastewater and bioelectricity generation.

Keywords:

Automotive wastewater, bioelectricity generation, Microbial Fuel Cell, wastewater treatment.

Campus Shield: Violence Detection and Alert System in Colleges

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Abstract:

Safety on college campuses is more important than ever. Unfortunately, colleges sometimes experience violence, which can harm students, teachers, and staff, and disrupt learning. Traditional security methods are helpful but might not always prevent or quickly handle these incidents. To help overcome these challenges, the proposed work introduces 'Campus Shield,' a system designed to keep colleges safer by detecting violence and alerting security in real-time. The system uses real-time video analysis from surveillance cameras placed around the campus to constantly monitor student activities and surroundings. The system utilizes the Convolutional Neural Network (CNN) model for detecting violent behaviors through video feeds captured by live cameras. Additionally, the MoveNet model is employed for skeletal keypoint analysis to detect human body movements indicative of violent actions. When the system detects violence, it quickly sends alerts to campus security, emergency responders, and relevant authorities through mobile devices and digital dashboards. This system helps to stop violence before it escalates, giving students and staff peace of mind knowing that their safety is being actively monitored and protected. This solution aims to improve campus safety by enabling rapid detection and response to violent events, ensuring timely intervention and minimizing potential harm.

Keywords:

Violence Detection Systems, Campus Safety, Pose Estimation (MoveNet), 3D Convolutional Neural Networks (3D CNNs), Real-Time Monitoring, Deep Learning for Surveillance, Aggression Detection, Smart Security Systems, College Campus Security, Alert Notification Systems, Non-Violent Activity Filtering, Real-Time Alert Systems, Object Detection in Videos.

Crime Detection and Monitoring System using Deep Learning Techniques

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Abstract:

Crime monitoring systems play a vital role in improving public safety by identifying specific criminal activities using advanced video surveillance and deep learning techniques. The proposed Crime Monitoring System (CMS) is designed to address human limitations by focusing on weapon detection, aggressive behavior, and facial recognition. YOLOv7 is used for highly accurate and fast weapon detection, while violence detection is performed using the MobileNetv2 model. Facial recognition is performed using the FaceNet algorithm, which allows accurate identification of faces. The system combines surveillance cameras and deep learning models to process video streams in real-time, frame-by-frame data analysis, and generate alerts for law enforcement. This innovative approach reduces human error, improves response times, provides a scalable solution for monitoring public spaces, and helps prevent crime using deep learning techniques.

Keywords:

Crime Monitoring System, CMS, public safety, criminal activity detection, video surveillance, deep learning, YOLOv7, weapon detection, MobileNetv2, violence detection, FaceNet, facial recognition, real-time processing, crime prevention.

E-Voting System using zk-Rollups

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Abstract:

Modern democracies face significant challenges in ensuring transparent, scalable, and secure electoral systems. This paper introduces a decentralized e-voting platform using zk-Rollups to address these challenges. The system leverages blockchain's immutability for secure vote recording and zero knowledge proofs to maintain voter privacy while improving scalability. By integrating off-chain computations validated on-chain, zk-Rollups reduce transaction costs and enhance throughput. A hybrid mobile app provides an intuitive interface, ensuring accessibility. This approach offers a robust and efficient solution, fostering trust in electoral processes while ensuring inclusivity and privacy.

Keywords:

zk-Rollups, Blockchain, Scalability, Transparency, Zero-Knowledge Proofs.

Forecasting Stock Market Prices using Machine Learning and Deep Learning

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Abstract:

For the AI research community, predicting stock market prices is a challenging task. Analysing large amounts of dynamic data is essential to investment strategies. Compared to more conventional approaches, machine learning (ML) and deep learning (DL) techniques have become powerful instruments for enhancing predictions. Using datasets from "CoinMarketCap" and "CryptoCurrency," this study investigates machine learning (ML) and deep learning (DL) techniques to forecast stock market performance at the end of the trading day, assessing the predictive efficacy of these architectures.

Keywords:

The terms include linear regression, ARIMA, LSTM, deep learning, and machine learning.

Buy Now Pay Later (BNPL) Solutions for Cloud Services

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Abstract:

In this report we are trying to understand more about the Buy Now Pay Later (BNPL) for Cloud Services (SAAS (Software As A Service), PAAS (Platform As A Service), IAAS (Infrastructure As A Service)). By this we are going to remove the financial barriers for the companies which are using cloud services and spending most of their budget. By Introducing Buy Now Pay Later for these cloud services we are increasing Average Order Value (AOV), and enhanced customer satisfaction. Through case studies, we showcase how businesses can leverage Buy Now Pay Later to expand their revenue, satisfy customers and stay competitive. We are going to provide a better cost for the buyers or customers by providing this Buy Now Pay Later service. For sellers we are increasing the AOV (Average Order Value) and increasing their revenue. Our goal is to provide practical insights and strategies for businesses, researchers, and industry professionals navigating the evolving landscape of cloud service procurement.

Keywords:

AOV - Average Order Value , SAAS - Software as a service , PAAS - Platform as a service, IAAS - Infrastructure as a service.

Latest Trends of Machine Learning Methods for Speech Pattern Recognition and Voice Signal Processing

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Abstract:

This dissertation looks into recent improvements in machine learning methods for understanding speech patterns and processing voice signals, concentrating on boosting the accuracy and efficiency of automated speech recognition systems. It tackles the major issue of variation in human speech, assessing various machine learning algorithms on different datasets, which include speech recordings, phonetic transcriptions, and live voice signal data. The main results show notable performance gains in several advanced models, especially those that use deep learning structures and ensemble techniques, which together lower error rates and enhance real-time processing abilities. These advancements have important implications, especially in healthcare, where precise speech recognition can improve patient interaction, simplify medical documentation, and support effective communication in telehealth. By promoting more reliable and efficient voice interfaces, this study supports the use of advanced speech recognition technologies in clinical settings, leading to better patient outcomes and smoother workflows. The wider influence of this research highlights the ability of machine learning to change healthcare services, stressing the need for ongoing innovation in voice signal processing and its role in enhancing accessibility and care quality in medical settings. This dissertation not only addresses existing issues in speech recognition systems but also emphasizes the hopeful future of machine learning in advancing healthcare technologies.

Diabetes Prediction Using Machine Learning Techniques

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Abstract:

Diabetes is a chronic illness that must be diagnosed as soon as possible and managed well to lessen its negative effects on health. Despite their effectiveness, traditional diagnostic techniques frequently have trouble processing and analysing massive, complex datasets produced by a variety of sources, including genetic research, wearable technology, and electronic health records. This research explores a novel approach to diabetes prediction empowered by fused machine learning techniques. By integrating multiple machines learning models, including ensemble methods, deep learning algorithms, and statistical analysis, the proposed framework enhances prediction accuracy and reliability. Key features such as patient demographics, lifestyle factors, blood test results, and genetic predispositions are analyzed to identify patterns indicative of diabetes onset and progression. The fusion strategy leverages the strengths of individual models, ensuring robust handling of diverse data types and improving generalizability. Experimental results demonstrate significant improvements in prediction precision and recall compared to traditional standalone models. This study highlights the potential of fused machine learning to revolutionize predictive analytics in healthcare, offering a powerful tool for early diabetes detection and personalized interventions.

Advancing Lung Cancer Diagnosis: A Hybrid Transfer Learning Approach

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Abstract:

Lung cancer (LC) is one of the most prevalent and deadly cancers, with over two million new cases annually. Early diagnosis and accurate stage classification are crucial for improving survival rates. Despite advancements in medical imaging and machine learning, achieving high accuracy in early detection remains challenging. This study proposes an enhanced deep learning (DL)-based approach using three novel hybrid models that leverage the latest pre-trained transfer learning (TL) techniques: (1) VGG19 + DenseNet121, (2) ResNet50 + InceptionV3, and (3) VGG16 + EfficientNetB3. Unlike traditional single-model approaches, these hybrid architectures combine complementary feature extraction capabilities, improving accuracy and robustness. The Lung Image Dataset IQ-OTH/NCCD is used with advanced preprocessing to enhance CT scan image quality and data augmentation for better generalization. Optimized hyperparameters ensure efficient training, and each hybrid model is evaluated using comprehensive metrics, including recall, accuracy, precision, F1-score, and specificity. The novelty of this work lies in its systematic hybridization of TL models, enhancing feature extraction while reducing classification errors for superior diagnostic accuracy. The study also prioritizes specificity, a critical clinical metric, minimizing false positives often overlooked in similar research. Among the three hybrid models, VGG16 + EfficientNetB3 achieves the highest accuracy and lowest error rates, proving to be the most effective for early-stage LC classification. This research contributes to automatic LC diagnosis by presenting a robust and interpretable DL framework, offering a reliable, scalable, and clinically relevant approach for early detection and decision-making.

Keywords:

Transfer Learning(TL), Deep learning(DL), Machine learning (ML) Early Diagnosis, Medical Imaging, CT Scan Classification.

Explainable AI in IVF: Enhancing Transparency and Efficiency in Fertility Treatment

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Abstract:

The integration of AI in wellness has greatly improved many sectors of healthcare and medicine, especially for In-Vitro Fertilization (IVF). Models that incorporate AI with Deep Learning and Computer Vision have improved embryo selection, patient personalization, and predictive analytics. All of which add to IVF's success rate and lower medical expenses. Despite all the advancements traditional AI techniques are still vulnerable to the "black-box" phenomenon which limits transparency and in turn, reduces clinical trust and regulatory approval. Explainable Artificial Intelligence (XAI) seeks to provide with interpretable and comprehensible insight to help tackle this issue for AI driven models use for decision making in IVF. This paper covers everything regarding the growth of AI models pertaining to IVF including embryo viability assessment, customized stimulation and predictive drug response modelling. This paper analyzes crucial gaps in research such as model generalizability and bias in datasets and the lack of proper treatment plans for individual patients. With that in mind, we have developed a proposal for implementing XAI into the IVF process, which we plan on investigating further.

Assessing the Viability of Proof-of-Driving as a Consensus Mechanism for Trust Management in Vehicular Ad Hoc Networks (VANETs)

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Abstract:

Vehicular Ad Hoc Networks (VANETs) are at the forefront of developing Intelligent Transportation Systems (ITS) to promote road safety, maximize traffic efficiency, and increase driving comfort. Yet, VANETs' decentralized and dynamic environment creates considerable challenges to trust management, essential to guaranteeing safe communication and collaboration among vehicles. This paper presents the possibility of Proof-of-Driving (PoD) as a new consensus mechanism particularly tailored for VANETs.

PoD makes use of the most influential driving behavior parameters, including speed, acceleration, routing behaviors, and other related variables to build a sound trust model. Through the incorporation of these factors, PoD not only checks the trust value of the engaged vehicles but also encourages safe and responsible driving behavior. This approach successfully discourages malicious or aggressive behavior by motivating drivers who are consistently compliant with traffic rules and punishing those who are not. Therefore, PoD encourages mutual cooperative driving that in turn makes the vehicular network environment more secure and reliable.

PoD can enhance the trust management within VANETs to make more intelligent and efficient transportation systems. This article also provides a basis for designing novel PoD-based applications that may transform vehicular communication and management. With blockchain principles incorporated in ITS, PoD is an innovatory milestone to develop secure, sustainable, and future-smart transportation ecosystems. This paper reiterates that innovative solution of the like PoD needs to be in practice to fulfill modern vehicular networks' changed issues.

Keywords:

VANET, Proof-of-Driving, PoW, PoS, Trust Management.

Student-Driven Online Learning: Transforming Education for the Future

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Abstract:

Online learning has become an integral part of modern education, particularly in the wake of global technological advancements and the COVID-19 pandemic. Student-driven online learning emphasizes autonomy, self-paced education, and personalized learning experiences. This paper explores the role of student-driven online learning in transforming education, highlighting its benefits, challenges, and future implications. Additionally, digital tools that facilitate self-directed learning. The discussion extends to the role of digital literacy, the importance of online communities, and the integration of emerging technologies such as artificial intelligence (AI) and blockchain in education.

Keywords:

Student-driven learning, online education, self-paced learning, digital tools, digital literacy, AI in education.

Machine Learning-Based Load Balancing in Cloud Computing

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Abstract:

With the rapid evolution of cloud computing, optimizing resource allocation for dynamic workloads remains a crucial challenge. This study has a new adaptable ML load balancing frame that leverages XGBClassifier to improve the predictive distribution of the workload and the intelligent allocation of the VM. Unlike conventional methods, this structure integrates a two-zone adaptive synchronization via Amazon S3, allowing real-time failures tolerance and perfect scalability. An important innovation is the proactive load forecast mechanism, which anticipates fluctuations and redistributes workloads dynamically, reaching an impressive accuracy of 97.94% in VM's attributions. In addition, our model reports a 100% requesting success rate and an average use of resources of 99.30%, ensuring minimum service interruptions. The structure exclusively optimizes data transfer rates and response times by analyzing workload peaks, attenuating inefficiencies and dynamically relocating resources. Unlike static equilibrium techniques, teacher and constantly our adapters, and causes it to become flexible and selfless natural. The results highlight the transformative potential for intelligent load balance in the modern sky system, defines a new goal for adaptive blame environment and wrongly tolerant. Future learning strategies for reinforcement reinforcement, adaptive dynamic scale and strain standard deviation will detect minimization, the next generation will limit further efficiency for cloud architecture.

Keywords:

Machine Learning Load Balancing, XGBClassifier, Dynamic Workload Optimization, Adaptive Synchronization, Resource Allocation, Cloud Computing Scalability, Failure Tolerance.

A Global Perspective of Generative AI in Education

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Abstract:

Generative AI is rapidly transforming education worldwide, prompting exploration of its integration across diverse national contexts. In our research work, we delve into how various countries are incorporating these technologies, analysing their unique approaches and the resulting impact on teaching and learning. The investigation spans the application of generative AI in personalized learning pathways, automated feedback mechanisms for student work, the creation of educational content, and innovative assessment design. A key focus is understanding the potential advantages, including the possibility of increased student engagement, improved learning outcomes, and a reduction in teacher workload. However, the article also critically examines the inherent challenges in implementing generative AI within educational settings. These challenges encompass critical ethical considerations surrounding AI use in education, data privacy concerns, the potential for algorithmic bias, and the crucial need for robust teacher training and ongoing support. By comparing and contrasting the strategies adopted by different nations, we aim to provide a comprehensive overview of the current state and anticipated trajectory of generative AI in education. The comparative analysis highlights best practices while also identifying potential pitfalls for policymakers, educators, and researchers. Ultimately, our paper concludes by considering the transformative power of generative AI to reshape the future of learning and emphasizes the critical importance of responsible implementation to guarantee equitable and effective educational outcomes for all students.

Keywords:

Generative AI, AI in education, Future of learning.

Wireless Patient Monitoring System Using GSM

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Abstract:

The main focus of this project is to explore the use of the Global System for Mobile Communications (GSM) to develop cutting-edge remote monitoring of patient devices for use in an intensive care unit (ICU). The project is designed to monitor the blood pressure, pulse, and temperature of the patient. The information collected is transferred to a remote location for attending staff members with the help of GSM. If any of the vitals fluctuate at an abnormal rate, the doctors are informed immediately. The main objective of this device is to permit remote monitoring of a patient's medical parameters and to alert physicians located in remote places of any alarming situation. The values collected from the workstation are received by the mobile device of the doctor.

Keywords:

GSM, Remote monitoring, telemedicine.

“Smartguard Senitel Pro: Advanced Theft Prevention for Retail Environment”

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Abstract:

The Real-time Thief Detection System is designed to address the security challenges faced by high-value asset locations, such as supermarkets and jewelry shops. Traditional CCTV systems require continuous manual monitoring, which is prone to inefficiencies and human error. Our system utilizes the YOLOv5 object detection model to automatically analyze CCTV footage, accurately detecting suspicious activities and potential intruders. This AI-powered solution enhances security and reduces the risk of theft by enabling real-time threat detection, triggering alarms, and capturing images for further investigation. With user-defined Regions of Interest (ROI) and mechanisms to minimize false alarms, the system provides a proactive and reliable approach to protecting valuable assets. Keywords— Real- time Threat Detection, YOLOv5 Object Detection, AI-Powered Security System, Suspicious Activity Detection, False Alarm Reduction.

Keywords:

Real-time Threat Detection, YOLOv5 Object Detection, AI-Powered Security System, Suspicious Activity Detection, False Alarm Reduction.

Maximizing Profits in Active Networks through GEPSO-Based DG Placement with Emission Penalties

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Abstract:

Modern distribution networks (DNs) have evolved into active systems with the integration of Distributed Generation (DG) at the distribution level, necessitating advanced mechanisms like nodal pricing to capture the economic and operational impacts of DG deployment. DG integration influences nodal prices by reducing system losses and mitigating congestion, resulting in lower prices. This study introduces a profit-oriented DG placement framework incorporating pollution emission penalties to promote environmentally sustainable and cost-effective configurations. A novel methodology based on nodal pricing is proposed for optimal DG allocation, utilizing the Generalized Particle Swarm Optimization (GEPSO) algorithm. The approach aims to maximize profit, minimize system losses, and enhance voltage profiles while accounting for nodal price variations. Simulations performed on the IEEE 33-bus system validate the proposed method's effectiveness. Results indicate that GEPSO surpasses conventional algorithm PSO, achieving a 1.72% increase in profit compared to PSO under pollution emission penalty. This highlights the robustness and efficiency of GEPSO for optimal DG allocation in modern distribution systems.

Keywords:

Distribution system, Distributed Generation Placement, Nodal pricing, Locational marginal pricing (LMP), Pollution emission penalties.

Investigation of Soil Quality in the Surrounding Region of Thermal Power Plants

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Abstract:

Our environment was clean, clear and pristine. In other words, they were “without contamination or pollution”. Our use of the environment changed all these. Any portion of the environment that man enters is transformed, changed or to put it precisely, polluted. The present work focuses on environmental impact on soil due to pollution caused by thermal power plants. Current study focuses on quality assessment of the soil in the areas surrounding to the thermal power station upto the radius of 20 kilometers. The study was carried out in the different seasons (i.e. summer, winter and rainy) to know the variations in concentration of pollutants and heavy metals due to flyash in different soil samples. The study also found presence of heavy metals like Arsenic (As), Lead (Pb), Chromium (Cr), Zinc (Zn) in the surrounding soil samples.

Keywords:

Thermal Power Plant, flyash, heavy metals.

Harmonic Reduction in Eleven level Multilevel Inverter using Level Shifted-Pulse Width Modulation Technique

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Abstract:

With the advancement in technology, Multilevel Inverters are growing rapidly in domestic as well as industrial levels. Multilevel Inverters have completely replaced the conventional i.e. two level inverters due to the numerous advantages offered by them. One of the most important benefits of using multilevel inverters is to get the output voltage waveform with reduced harmonics, which further led to better output voltage quality with minimum interferences. In this research paper, an eleven level multilevel inverter is being designed. The methodology used is Level Shifted Pulse Width Modulation technique. Using this technique, harmonics are reduced drastically. The main objective is to reduce the total harmonic distortion that lies in the accepted range of IEEE standards. The proposed multilevel inverter system can be used for industrial purposes to obtain the better direct current to alternating current output voltage waveform with reduced harmonics and interferences. The system can also be used to drive the induction motor and in energy storage systems.

Keywords:

Multilevel Inverter (MLI), Pulse Width Modulation (PWM), Total Harmonic Distortion (THD), Harmonics.

Optimizing Cooling tower performance: PID control for pH Regulation using Bio-inspired algorithms

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Abstract:

Cooling tower pH management is critical for preventing corrosion and scaling, which degrade equipment performance and longevity. This study evaluates the effectiveness of five bio-inspired algorithms—Genetic Algorithm (GA), Particle Swarm Optimization (PSO), Whale Optimization Algorithm (WOA), Ant Lion Optimization (ALO), and Jellyfish Optimization Algorithm (JFO)—for fine-tuning a Proportional-Integral-Derivative (PID) controller to regulate pH levels in cooling tower systems. PID tuning for a pH process is optimized by using bio-inspired algorithm. A comparative analysis is carried out by calculating the error metrics (MSE, IAE, ITAE, ISE) and time domain analysis shows that GA has superior performance, achieving the fastest settling time (25.4 seconds, 36% faster than PSO) and the lowest Mean Squared Error (MSE) of 0.0409, an 87% reduction compared to JFO. GA also exhibited lower overshoot (4.13%) compared to other methods, showcasing its precision and stability in maintaining desired pH levels. While WOA, JFO, ALO, and PSO showed relatively close performance, their sensitivity to hyper-parameters and system dynamics highlights the significance of fine-tuning. The findings underscore GA's effectiveness in optimizing PID controllers for accurate and efficient pH management in cooling tower systems.

Keywords:

pH Regulation, PID Controller, Cooling Tower, Genetic Algorithm (GA), Particle swarm optimization (PSO), Whale Optimization Algorithm (WOA), Ant Lion Optimization Algorithm (ALO) and Jellyfish Optimization Algorithm (JFO).

Gallbladder Stone Detection using AI-Enhanced Ultrasound and Self-Supervised Learning

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Abstract:

This project aims to develop effective detection of gallbladder stones is crucial for timely intervention and treatment. This presentation explores the integration of Artificial Intelligence (AI), Machine learning and Deep learning to enhance the accuracy and efficiency of gallbladder stone detection. The objective is to leverage AI, specifically a combination of Convolutional Neural Networks (CNNs) and self-supervised learning techniques, to analyze ultrasound images, thereby improving diagnostic precision and reducing the incidence of false positives and negatives. We employed a CNN trained on a large dataset of ultrasound images to identify and classify gallbladder stones, and integrated self-supervised learning to enhance feature extraction and model robustness. The methodology involved image preprocessing, self-supervised feature extraction, and model training. Our findings reveal that the AI system achieved a detection accuracy of over 95%, surpassing traditional diagnostic methods in both sensitivity and specificity. The results suggest that AI, with the integration of self-supervised learning, can significantly improve diagnostic reliability and streamline the detection process. Future work will focus on expanding the dataset, refining the algorithm, and validating the system in diverse clinical settings to ensure its robustness across different patient populations. This research highlights AI's potential to revolutionize gallbladder stone detection and the critical role of self-supervised learning in enhancing diagnostic accuracy.

Design and Implementation of Deep Convolutional Neural Network (DCNN) model for Diagnosis of Lung Cancer

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Abstract:

Worldwide Clinical studies emphasize that lung cancer is one of the few most pervasive, predominant disease and leading cause of death among types of cancer. Detecting lung cancer in earlier stage will help the physicians who work on this field, in reducing the death rate but very challenging due to the limited availability of professional trained doctors in Ethiopia. In order to aid the medical professionals, a more accurate diagnostics model that analysis the Computer Tomography (CT) and XRay images and label them automatically as cancerous and non-cancerous is an absolute necessity for fast diagnostics and treatment. In this study, a Deep Convolutional Neural Network (DCNN) machine learning model is developed to automatically classify for lung cancers presented in computer tomography (CT) and X-ray images and its performance is compared against the transfer learning models VGG 16 and Rasnet 50. Primary datasets of Lung X-ray images and CT images were first collected from local hospitals available in Ethiopia. Secondary datasets were also gathered from an online lung cancer dataset repository such as the Luna16 challenge and Kaggle dataset. Image preprocessing techniques were applied on the collected images to prepare an image dataset and further divided into train and test dataset. The training data is used for training the machine learning models and test dataset is used to evaluate the models for its efficiency.

The Proposed deep CNN (convolutional neural network) model that is designed for diagnosis of lung cancer has five convolutional layer blocks, followed by max pooling layers and four fully connected dense layers and finally an output layer. Each stages of a convolutional layer are accompanied by batch normalization technique which helps us to normalize the weights from previous layer. The DCNN has been trained using our original database with a graphics processing unit (GPU) on Google-Colab. The experimental result shows that our model was able to classify the datasets into normal and cancerous types successfully with a training accuracy of 95.6% and validation accuracy of 92.5%. The performance of the model was further evaluated and tested using previously unseen testing datasets. A confusion matrix was developed and performance measurement parameters such as precision,

Sensitivity, testing accuracy, F- score, and type1 (fpr) and type2 (fnr) error values were calculated. The model result, for all those parameters was, 95%, 97.4%, 92.7%, 95%, 2.4%, 1.7% respectively which is a very promising and much higher compared to the state of the arts.

Keywords:

Lung cancer, Deep Convolutional neural network, Computer Tomography, Batch normalization, Separable convolutional neural network.

Palisade – Prompt Injection Detection Framework

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Abstract:

Background: The advent of Large Language Models (LLMs) represents a significant milestone in the development of Artificial Intelligence. LLMs have fundamentally altered how machines comprehend and generate human language. However, LLMs remain vulnerable to malicious attacks aimed at manipulating the language model's output. Prompt injection is one such attack where specific inputs (prompts) are designed to manipulate the model's behaviour in unintended or harmful ways. These attacks compromise system integrity, leading to incorrect decisions or outcomes based on the manipulated output.

Conventional detection methodologies typically rely on static or predetermined patterns and rule-based methods to identify injected inputs. While these approaches can be effective against established and straightforward patterns, they often fail to detect more sophisticated threats such as abnormal token sequences and alias substitutions. This limitation of conventional methods results in limited adaptability and high rates of false positives and false negatives.

Method: This paper proposes using NLP techniques to explore and develop an approach for detecting prompt injection with increased accuracy and optimization. For this purpose, a layered approach is utilized, wherein input prompts are screened through three separate layers before they are allowed to reach the LLM, thereby significantly reducing the risk of any injected prompt interacting with the target LLM. This creates a more robust model that can make reliable decisions with minimal to no malicious intervention.

Results: The three layers, Rule based, ML classifier and companion LLM approach, have been tested for accuracy and corresponding confusion matrix was plotted. Among the three layers ML classifier is the most accurate layer.

As we proposed, the multi-layer detection framework that combines the results of each layer to evaluate a final result has a significantly higher accuracy than any one layer in isolation. This increase in accuracy can be attributed to the fact that we will consider a prompt as injected when even one layer reports it as injected, this means we have the least number of false negatives in the combined result. One drawback to flagging a prompt as injected even when one layer reports it as injected is that we have higher number of false positives than the ideal amount, however, in practice, it is preferable to err on the side of caution by flagging prompts as injected, even if some may not be, in order to minimise the risk of overlooking actual injected prompts. While this may result in an increase in false positives, it is more critical to reduce the occurrence of false negatives in this context.

Conclusion: This research demonstrates a robust multi-layered framework to prompt injection detection, significantly enhancing their security and reliability. By integrating rule-based filtering, a BERT-based machine learning classifier, and a companion LLM, we have achieved a substantial reduction in false negatives, thereby improving the accuracy of prompt injection detection. This methodology not only highlights the vulnerabilities of LLMs but also provides a comprehensive framework for future research and implementation in various applications, ensuring a more secure interaction between humans and AI systems.

Keywords:

Prompt Injection, NLP, Heuristic-based detection, Large language models.

Design of Automatic Braking System to Control Speed Variations for ADAS

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Abstract:

Modern technology is vibrant and playing its magic by introducing new trends in the transportation industry. The electric and autonomous vehicles are the latest and advanced inventions of this field. An autonomous vehicle constitutes multiple subsystems to implement automotive safety called "Advanced Driver Assistance Systems" (ADAS) which is further broken down into "Automatic braking system to control speed variations.", "Lane Change Assist" and pre-crash systems. This paper discusses the automatic braking system for speed variation control and its implementation using the sensor to capture the environment of a vehicle. Images are processed and the final decision is made for the vehicle to take the next step.

One of the subsystems is an autonomous cruise control system (ACC), which is also called active cruise control, intelligent cruise control, adaptive cruise control, or radar cruise control. ACC is a kind of smart cruise control that regulates the speed of a moving object by slowing it down and speeding it up automatically. In this way, it keeps its speed to avoid unwanted collisions. In the case of vehicles, ACC helps maintain the pace of the car to recognize another car(s) in front of it and enables safety. There is a maximum allowable speed for the car that the driver can set as per will. Then the radar or infrared sensor watches for traffic ahead of it. It restricts the car to stay in the same lane and to maintain a definite distance behind the leading car. This distance is measured in terms of seconds, and it is set according to requirement. In most cases, ACC is used along with the pre-crash system that notifies the driver to apply brakes. At times, the brakes are automatically set in order to prevent road accidents.

AI-Crafted Diet and Fitness for Diseases using Machine Learning

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Abstract:

Fast food and sedentary lifestyles have increased the prevalence of chronic conditions such as obesity, diabetes, and PCOD, especially in people in their mid-30s. This is addressed by a web application based on Python and Flask, which uses AI and ML to deliver personalized diet and exercise plans. Some of the features include calorie trackers, BMI calculators, and nutritional value trackers. By gathering user data on calorie intake, activity, and health conditions, it uses advanced algorithms such as reinforcement learning, GNNs, and transformers to provide tailored recommendations. It has a curate's recipe database with meals designed for specific health needs, enabling informed dietary choices. The app integrates diet and exercise plans to help manage symptoms, prevent complications, and promote sustainable lifestyle habits. The comprehensive approach helps in managing chronic conditions and overall quality of life and hence makes it a very viable solution for health and wellness management.

Keywords:

Personalized nutrition, artificial intelligence (AI), machine learning (ML), recurrent neural networks, convolutional neural network.

Integrating OCR and Machine Learning for Cyberbullying Detection: A Severity-Based Approach with Automated Reporting and Legal Framework Compliance

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Abstract:

With the growing use of online social media sites, there has been a steep increase in toxic comments. Toxicity needs to be minimized. Comment toxicity classification has been a successful research area with several newly suggested methods. This study and analysis present a new application of the Natural Language Processing method to classify the nature of toxicity in comments. This analysis aims to classify the type of comment and identify the different kinds of toxic classes like obscene, identity hate, threat, toxic, insult, severe toxic. The input to our algorithm is comments from websites like toxic or non-toxic. Our model predicts the class of toxicity. This project aims to analyze in stages. In Phase I, the goal is to assess the toxicity in comments by providing data via different techniques such as TFIDF that allows data to understand how each word in a comment is categorized into a specific category of toxic class. In this case, Algorithm will accept comments from test data and predict the type of toxicity for test data such as a toxic, threat, and others. During Phase II, Data is processed to categorize the comments into non-toxic and toxic categories. This encourages us to recognize the specific comment is not toxic or toxic.

Keywords:

Machine Learning, Natural Language Process- ing, Toxicity Detection, LSTM, HateBERT.

Blockchain Based Digital Forensics Framework Integrated with Machine Learning: Review Paper

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Abstract:

While the rapid growth of IIoT usage has redone business and industries, improving operational efficiency and ensuring seamless connectivity, it results in increased cybersecurity problems in the form of potential unauthorized access, data manipulation, and exfiltration. To face such problems, traditional digital forensic methods typically centralize while maintaining a characteristic inability to deal with large decentralized data environments of IIoT systems. To address these issues, there has been a development to combine blockchain technology and machine learning (ML) algorithms as an innovative method in the domain of digital forensics.

Keywords:

Industrial Internet of Things(IIoT), Digital Forensics, Blockchain, Machine Learning.

Bio-Based Wax Coating for Anti-Fouling Applications: Integrating Biopolymers and Nano Additives with Natural Plant Waxes” Topic

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Abstract:

The growing demand for sustainable and biodegradable materials has led to increased interest in natural waxes as eco-friendly coating agents. This paper presents an innovative concept of formulating a multi-source natural wax coating derived from lotus leaf wax, banana leaf wax, and palmyra palm fruit husk extract. These waxes, known for their inherent hydrophobic and anti-fouling properties, are proposed as a base for developing durable coatings applicable across various industries, including packaging, textiles, and consumer goods. To enhance performance, the natural waxes are further modified through bio-polymer blending using biodegradable agents such as chitosan, cellulose derivatives, and polylactic acid (PLA), which improve flexibility, adhesion, and mechanical strength. In addition, nano-additives such as silica nanoparticles, graphene oxide, and titanium dioxide are incorporated to impart advanced properties like self-cleaning, UV resistance, and increased surface durability. This paper outlines the material sources, extraction procedures, and modification techniques in a simplified, non research-oriented format, aiming to promote the idea of sustainable wax coatings for real-world applications. The result is a conceptual, versatile, and biodegradable wax-based coating system that could reduce dependency on petroleum-based materials and support green innovation in surface protection.

Deep Learning for Noise Reduction in Audio using Waveunet Model

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Abstract:

Applications including voice recognition, music production, and telecommunications can be hampered by noise disruptions in recorded audio, which can also lower quality. By separating target signals from background noise, deep learning methods—in particular, WaveUNet—have demonstrated efficacy in audio noise reduction. This study offers a noise-reduction strategy that makes use of WaveUNet's waveform processing capabilities and U-Net-based architecture. The model can map noisy signals to their clean counterparts because it was trained on matched noisy and clean audio recordings using a supervised learning framework. Metrics like signal-to-noise ratio (SNR) and perceptual evaluation of speech quality (PESQ) are used to assess performance, showing that the model can reduce noise while maintaining signal integrity. The findings demonstrate WaveUNet's potential to increase audio quality in a variety of fields, including multimedia applications, voice communication, and speech processing. By improving the state-of-the-art in audio noise reduction, this methodology makes audio experiences more comprehensible and clear.

Keywords:

WaveUnet Model, Speech Enhancement, Signal Processing, Supervised Learn, Neural Networks for Audio Denoising, Perceptual Evaluation of Speech Quality (PESQ), Real-Time Noise Suppression, Mean Opinion Score (MOS).

Soil Moisture Sensing Techniques using IoT and Machine Learning: A Review

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Abstract:

Soil moisture is probably the most important factor determining agricultural output, the management of water resources, and the maintenance of climate balance. The ability to determine the soil moisture content with precision is necessary for effective irrigation selection, drought alleviation, and conservation of natural resources. The conventional approaches, however, provide a basis but are not capable of standardizing and evolving with the intricate spatial and temporal variability of soil moisture. Nevertheless, the recent improvements in machine learning i.e. ML and deep learning i.e. DL applications have enabled a remarkable advancement in overcoming these difficulties. In this paper, attention is also made to the such modern technologies as Long Short Term Memory i.e. LSTM networks, encoder decoder models, multimodal data networks which integrate different sources of such ports as satellite images and IoT-based sensors and information on the weather. Chaotic whale computational Optimization Algorithm and others improved prediction precision lowering costs and optimizing computation. The paper integrates current shifts in the landscape concerning the development of cheap virtual sensors and artificial intelligence and internet of things powered real time adaption systems that can accurately predict soil moisture at scale. By evaluating the concepts as well as the results of the latest works, this review details the capabilities and drawbacks of new technology.

Keywords:

Internet of Things, Soft Sensing, Optimization Algorithms, Soil Moisture Prediction, Data Fusion.

Multimodal Breast Cancer Detection using Ensemble Learning

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Abstract:

One of the most prevalent and deadly illnesses impacting women globally is breast cancer. In order to increase survival rates and guarantee prompt treatment, early and precise diagnosis is essential. This work uses multimodal data, such as mammography and ultrasound pictures, to investigate a machine learning-driven method for detecting breast cancer. To distinguish between benign and malignant cases, a mix of conventional machine learning classifiers, such as Random Forest and Support Vector Machines (SVMs), and deep learning models, such as Convolutional Neural Networks (CNNs), were used. To improve classification accuracy, the dataset was preprocessed using feature extraction, augmentation, and normalization approaches. Important measures like accuracy, precision, recall, and F1-score were used to assess the model's performance. The results show that CNN-based models outperformed traditional classifiers in terms of diagnosis accuracy, underscoring the potential of AI-powered diagnostic tools for breast cancer screening. This study offers a more effective and dependable method of early breast cancer diagnosis, contributing to the expanding field of AI-assisted medical diagnostics.

Keywords:

Breast Cancer Detection, Machine Learning, Deep Learning, Medical Imaging, AI in Healthcare.

Oryza Sativa Leaf Disease Detection Using Neural Networks with Multilingual Recommendations

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Abstract:

The project presents a high-accuracy paddy leaf disease classification system powered by Sequential Model Artificial Neural Networks (ANNs) to enhance agricultural productivity and ensure plant health. By analysing paddy leaf images and classifying them, the system accurately identifies diseases and provides precise recommendations, enabling timely action to minimize crop loss. Designed for inclusivity, the system offers multilingual support, delivering tailored recommendations in English, Hindi, and Tamil to cater to diverse users. An interactive dashboard enhances usability, allowing users to upload paddy leaf images, view disease classifications, and explore detailed insights. An intuitive dashboard that provides disease insights and management recommendations, promoting sustainable agricultural practices is created. Based on this analysis, the system provides actionable recommendations for effective disease management. These include biological control methods, cultural practices, integrated pest management (IPM), manual control strategies, preventive measures, and water management techniques. This innovative, user-friendly, and multilingual approach supports sustainable farming practices, improving paddy crop health and strengthening global food security.

Keywords:

Artificial Neural Networks, Integrated Pest Management, Sequential Model, Deep learning techniques, multi-class classification, Dashboards.

Prevention and Recommendation of Tomato Leaf Disease Using Deep Learning

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Abstract:

The early detection and management of diseases in tomato plants are vital for maintaining plant health, increasing yield, and minimizing crop loss. This paper proposes an integrated real-time monitoring system designed to detect tomato leaf diseases, recommend effective treatment strategies, and prevent further disease spread. The system employs advanced imaging techniques, such as high-resolution RGB, hyperspectral, and thermal cameras mounted on drones or fixed devices, to capture real-time images of tomato plants. We apply the recommended treatments precisely to the affected areas, optimizing pesticide usage and minimizing environmental harm. Continuous monitoring after treatment helps assess the effectiveness of the applied solution and adjusts treatment strategies accordingly. The system utilizes machine learning algorithms to refine disease detection capabilities and adapt to new challenges, such as different plant varieties or emerging disease strains. By integrating real-time monitoring, automated treatment recommendations, and preventive measures, this system empowers farmers with a comprehensive, data-driven approach to disease management, promoting sustainability and improving crop productivity.

Keywords:

YOLOv8, tomato detection, real-time processing, OpenCV.

Most Effective Method for Data Privacy and Protection in Windows: The Simplest and Safest Method

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Abstract:

This research addresses the limitations faced by users of basic versions of Windows, who lack the capability to create password-protected and hidden folders without requiring an upgrade to enterprise editions. We present a novel solution that enables users to establish secure folders within basic Windows platforms. Our approach involves the successful implementation of password protection and hidden attributes for folders in basic Windows versions. By disguising the secure folder as a system component file, its visibility to unauthorized users is reduced, enhancing its concealment. Furthermore, our solution ensures the portability of these secure folders, allowing them to be seamlessly transferred to compatible pen drives while retaining their protective features. Upon accessing the folder, users encounter a command-line interface that prompts them to enter a predefined password for entry. This rigorous authentication mechanism prevents unauthorized access to the folder's contents. Our research bridges the functionality gap between basic and enterprise Windows editions, providing enhanced security measures for users operating on basic platforms. The findings contribute to advancing Windows security practices, offering a practical solution for safeguarding sensitive data in everyday computing environments.

Keywords:

Authentication, folder security, batch scripting, hidden folder, data security.

A Comprehensive Financial Management Application: Integrating Machine Learning and Chatbot Technology for Personalized Financial Tracking

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Abstract:

This paper develops a cross-platform financial track-ing mobile application using Flutter. It is an improved and enhanced personal finance management tool for today's users, enabling them to log their daily income and expenditures, manage financial accounts across family members, set budget limits, and receive personalized insights on their finances using machine learning analysis. It offers guidance from a chatbot, thus making the application versatile enough to be helpful for those who seek financial literacy and better budgeting practices. The app offers to help the user in repaying debts, controlling expenses, and saving using the ML algorithms. This may point to a positive impact on the financial behavior, thus a possibility of being a daily finance companion.

Keywords:

Biodiversity monitoring, Acoustic sensors, Arti-ficial intelligence, Sound analysis, Species identification, Ecosys-tem health, Noise pollution, Machine learning, Conservation technology, Environmental data analysis.

Closed-Loop Active Control Method for Suppression of Thermo-Acoustic Instability with ML Application

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Abstract:

In combustion chambers and jet engines, the mixing of air and fuel in specific ratios often leads to thermoacoustic instability, causing loud acoustic oscillations. These instabilities result in mechanical stress that may cause structural damage to the equipment alongside producing intolerable noise that makes it difficult for employees to work in the environment. Traditionally, this effect has been addressed by passive control methods such as adding dampers or changing the chamber architecture. These approaches, however, are costly, rigid, and inefficient at adjusting to dynamic operational environments.

In order to address these challenges, this study proposes an active control system that dynamically adjusts airflow to prevent harmful oscillations in real time. The system employs a machine learning-based approach to predict the optimal suppression airflow based on key parameters, including burner position, sound intensity, airflow and fuel flow rate. A real-time feedback mechanism based

on a Raspberry Pi is used in the second part of the project. It continuously gathers sensor data, feeds it into a trained machine learning model, and regulates a stepper motor to modify the suppression airflow as necessary.

The Raspberry Pi is used to construct a closed-loop feedback system that continuously analyzes sensor data, such as airflow rate, burner location, and sound intensity. This data is processed by sophisticated machine learning algorithms, including Random Forest, Long Short-Term Memory (LSTM), and Stacking Ensemble, to forecast the necessary suppression airflow. After that, a stepper motor is activated by the Raspberry Pi, dynamically altering the airflow to stabilize combustion and efficiently reduce undesired acoustic waves.

This proposed ML-driven active control system improves workers safety, avoids equipment failure, and boosts combustion systems' operating efficiency in addition to lowering noise pollution. By integrating automation and machine learning, the system provides a scalable, flexible, and economical way to deal with thermoacoustic instabilities in industrial applications.

Keywords:

Thermoacoustic Instabilities, Machine Learning, Raspberry Pi, Suppression Airflow, Stepper Motor, IoT analysis.

Evaluating Domain-Specific and General-Purpose Large Language Models for Question Answering on COVID-19 Literature

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Abstract:

The development of Large Language Models (LLMs) has substantially improved Question Answering systems, particularly for healthcare-oriented applications. The research evaluates the performance bounds and practical constraints of specialized and generalized LLMs when addressing questions about COVID-19. The assessment relies on trusted scientific literature in a corpus to determine the understanding and accuracy of medical model responses. The research methodology implements an organized method for information acquisition through enhanced search operations followed by LLM processing to create solution responses. The evaluation utilizes multiple approaches to analyze the response reliability together with accuracy levels and contextual relevance. These methods establish the value of models trained to understand biomedical data against standard language processing models. These results provide useful knowledge to developers of AI-based healthcare solutions who must prioritize domain adaptation for enhancing both factual precision and suitable content. This research enterprise creates substantial feedback for continued AI system development in medical question-answering which enables designers to develop better intelligent health decision-support systems in the future.

Bridging Communication Barriers with CNN-LSTM: A Smart Indian Sign Language Learning and Translation Model

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Abstract:

Communication is a fundamental human need; however, the hearing-impaired community often faces significant barriers in interacting with the wider society. This paper presents an Indian Sign Language (ISL) Interpreter that leverages advanced computer vision and machine learning techniques to interpret ISL gestures in real time. By capturing live video input through a webcam, preprocessing the data, and applying a CNN-LSTM hybrid model, the system converts gestures into text and speech. Experimental results demonstrate an overall accuracy above 95%, with low inference latency, thereby validating its effectiveness for real-time assistive communication. The system not only promotes inclusivity but also offers an interactive platform for learning ISL.

Keywords:

Indian Sign Language, Gesture Recognition, Computer Vision, Machine Learning, Deep Learning, CNN-LSTM, Real-Time Processing, Assistive Technology, Sign Language Interpreter, Inclusivity.

Chatbot-Integrated Deep Learning Platform for Skin Disease Detection and Treatment Guidance

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Abstract:

Deep Learning-based Skin Disease Detection platform by integrating a chatbot and an interactive dashboard for real-time support. It employs AlexNet, MobileNet, and a Sequential model, leveraging their strengths for accurate disease classification. Performance evaluations indicate the Sequential model excels in precision, efficiency, and computational performance. The platform classifies diseases like actinic keratosis, basal cell carcinoma, and melanoma, providing accurate diagnoses and personalized treatment recommendations. The chatbot enables instant responses, while the dashboard offers a detailed diagnostic overview and progress tracking. This enhancement improves accessibility, usability, and real-time medical guidance for effective skin disease management. Outperforms the other two models with an accuracy close to 1.0. It Predicts 98% of Accuracy on the Sequential Model.

Keywords:

Deep learning, Image processing, Skin diseases, Bioinformatics, Deep learning techniques, multi-class classification.

Gender-Based Analysis of Emotion Classification Using EEG Signals

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Abstract:

The increasing interest in EEG signals has been motivated by the apparent use of the signals for emotion recognition as part of human computer interaction, affective computing and supervision of user's mental states. In this paper, we discuss how males and females differ in emotion recognition using the DEAP dataset. To perform the analysis, the dataset is divided into two different gender-based groups, containing 15 male and 15 female participants. Box plots showing Valence and Arousal distribution reflects the differences between the two genders. An ensemble classification model is constructed, consisting of base classifiers CatBoost, Random Forests and K-nearest neighbor classifiers. Afterwards, T-Test, Mann-Whitney U Test, Levene's Test, the Kolmogorov-Smirnov (KS) test, and Cohen's d are used to compare and analyze gender differences statistically. For different emotions, participants exhibit significant differences in the valence label and no differences for the arousal label. T test on arousal label shows t-statistic= -0.041 and p-value= 0.967 indicating no difference in the arousal label. On the other hand, values of t-statistic =2.9720 and p-value=0.0030 for the valence label suggests a significance difference among the two groups. For classification, females achieve a higher level of accuracy as compared to males across most frequency bands and brain lobes exceeding 90% in most of the cases. The highest accuracy recorded is 95.83% in the gamma band and parietal lobe for High Arousal Low Valence label. Such findings will help in understanding gender specific emotion processing leading to targeted interventions for emotion related disorders.

Enhancing Early Detection of Chronic Kidney Disease Through Machine Learning Techniques

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Abstract:

Chronic kidney disease (CKD) is a serious worldwide health concern, can result in life-threatening consequences such as cardiac issues and renal failure. Improving patient outcomes and cutting healthcare costs need early detection and intervention. Using clinical and biochemical markers such anemia, diabetes, hypertension, and red blood cell count, this study suggests a method based on machine learning to identify chronic kidney disease. K-Nearest Neighbors, Decision tree classifier, Gradient Boosting Classifier, and Stochastic Gradient Boosting are among the methods in machine learning that are compared within this research. Results demonstrate that by skillfully handling complicated interactions and non-linearity in clinical data, ensemble learning approaches outperform conventional classifiers in CKD prediction. This method increases early detection while also facilitating risk assessment and individualized treatment planning, demonstrating how machine learning can improve medical diagnostics. Healthcare systems are more efficient and human error is decreased when machine learning is used to automate the diagnostic process. It is possible that the model will help physicians make better decisions by giving them precise, data-driven insights. It may

also be possible to monitor patient conditions in real time by incorporating machine learning models into healthcare operations. The detection and treatment of CKD could be significantly advanced by future research concentrating on deep learning techniques, extending datasets, and incorporating real-time predictive algorithms into clinical practice.

Keywords:

Chronic Disease Prediction, Machine Learning, Medical Diagnosis, Gradient Boosting, Stochastic Gradient Boosting, Healthcare Analytics, Medical Diagnosis.

A Review on Predictive Maintenance of Machine Using Machine Learning

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Abstract:

Predictive maintenance is essential for minimizing downtime and optimizing the performance of industrial systems, especially in critical machinery like induction motors. In this work, we present a predictive maintenance system implemented on an ESP32 microcontroller using Tiny Machine Learning (TinyML). The system integrates sound sensors that capture real-time motor noise to assess the motor's condition, classifying it as either healthy or unhealthy. A machine learning model, trained on motor sound data, performs this classification. In the event of an unhealthy motor condition, an alert is sent via the Blynk app, allowing for timely intervention. Experimental results show that the system provides accurate fault detection while maintaining energy efficiency, making it suitable for use in resource-constrained environments. This paper demonstrates how TinyML can enable real-time, low-cost, and scalable solutions for motor health monitoring.

To further validate the system, extensive testing was conducted on a range of induction motors under varying operational conditions. The model was evaluated for its classification accuracy, response time, and energy consumption, demonstrating reliable performance even in noisy industrial environments. By leveraging the computational efficiency of TinyML, the system can be deployed in low-power applications without requiring constant cloud connectivity, making it a scalable solution for industrial IoT settings. The integration of real-time alerts through the Blynk app further enhances its practicality by ensuring that maintenance personnel can take immediate corrective actions, thus reducing potential motor failures and operational downtime.

Keywords:

Predictive maintenance, TinyML, ESP32, induction motors, sound sensors, machine learning, fault detection.

AI-Driven Analysis of Neuroimages for Stroke Detection

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Abstract:

Stroke remains a critical health challenge, being a leading cause of death and disability globally. Early detection and precise classification of stroke types, including ischemic and hemorrhagic, are paramount for effective management and treatment. Traditional methods of manual diagnosis, relying on CT and MRI imaging, are time-intensive and prone to interobserver variability. The integration of advanced machine learning (ML) and deep learning (DL) approaches into diagnostic frameworks has proven transformative, enhancing accuracy and reducing time demands. Convolutional Neural Networks (CNNs) and other deep learning models such as BiLSTM have been employed to classify and detect stroke from imaging data. Techniques including image preprocessing, feature extraction, and augmentation further enhance diagnostic reliability. Computer-Aided Diagnosis (CAD) systems leverage ML and DL to provide automated lesion detection, segmentation, and classification, achieving accuracies ranging from 70% to over 95% across various studies. Despite advancements, challenges such as data heterogeneity, model interpretability, and the computational cost of DL systems persist. Future directions emphasize robust, scalable AI-driven diagnostic tools that integrate seamlessly with clinical workflows, ensuring timely and accurate stroke diagnosis. This interdisciplinary effort supports improved patient outcomes and advances the field of medical imaging diagnostics.

Optimizing KPI Placement in Dashboards Using UI Heatmaps and User Attention Analytics

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Abstract:

Dashboards are essential tools for tracking key performance indicators (KPIs) in the age of data-driven decision-making. Traditional dashboards, on the other hand, frequently fall short in matching user attention to KPI placement, which results in cognitive overload and less than ideal engagement. In order to dynamically improve KPI location, this study suggests a novel UI heatmap-based method that analyzes real-time user interactions, such as mouse movements, clicks, and scroll behavior. We determine high- engagement areas in dashboards and modify KPI placement by utilizing attention modeling and heatmap clustering algorithms.

Our approach combines pattern recognition based on machine learning to forecast the best KPI locations, increasing user productivity and decision-making speed. According to preliminary findings, adaptable KPI dashboards improve user engagement, focus, and retention—especially in high-data contexts like operational analytics, e-commerce, and finance. This work opens the door for dynamic, user-driven dashboard design by bridging the gaps between data visualization, UX analytics, and human-computer interaction (HCI).

Keywords:

UI Heatmaps, KPI Optimization, Attention-Based Dashboards, Human- Computer Interaction, UX Analytics, Machine Learning.

Quantum-Enhanced Secure Image and File Sharing DES & 2FA

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Abstract:

With the rapid growth in the ever-growing interconnectedness through the Internet, there is an urgent need for safe information sharing due to great concerns about cyber threats and unauthorized access. Cryptographic techniques are, therefore, being used to safeguard data not only during transmission but even in storage. This work presents some of the innovative methods of secure data sharing with special emphasis on the Data Encryption Standard, DES, which is still a very effective symmetric encryption technique.

DES encrypts the data into a jumbled form that can be decoded only by the rightful user who has the right key for decryption. DES, being simple and efficient, has become one of the most reliable methods of keeping data secure over cloud, communication, and other similar platforms.

Besides DES, the research has focused on a proposed authentication system that integrates cryptography with machine learning for enhanced security in data sharing. The proposed system follows mutual authentication in order to establish the trust between entities, threat detection by means of machine learning models, and secures data exchanges by cryptographic key agreements. showing high accuracy in identifying malware and threats.

Keywords:

Cryptography, Secure Data Sharing, Des Algorithm, Hybrid Encryption.

Personalized Health Diagnosis and Care Assistant A Machine Learning Approach

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Abstract:

Early disease identification and prevention are essential in today's healthcare environment for both bettering patient outcomes and cutting expenses. In order to close the gap between people and timely health insights, this study introduces a novel machine learning-based solution. Personalized health recommendations, including disease predictions, symptom descriptions, causes, and possible complications, are provided by the system through the use of predictive analytics. It also provides individualized exercise regimens, food programs, and safety measures based on each person's unique health profile. The system seeks to support preventative care, holistic well-being, and better health management by providing users with actionable insights.

Keywords:

Personalized healthcare, machine learning, predictive analytics, disease prevention, health recommendations, preventative care.

A Semi-Supervised Deep Learning Model with a Teacher-Student Framework for Change Detection in Hyperspectral Imagery

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Abstract:

Hyperspectral image change detection (HSI-CD) has seen widespread adoption of deep learning (DL) approaches, yet current methods face significant challenges with high-dimensional data, limited interpretability, and dependence on extensive labeled datasets. We address these limitations through a novel semi-supervised deep learning architecture that integrates multi-scale feature extraction within a teacher-student framework. Our model analyzes temporal hyperspectral image pairs to identify environmental transitions such as vegetation dynamics and urban development patterns. The multi-scale approach captures changes at local, intermediate, and global levels by extracting features across different spatial resolutions. Our dual representation strategy—utilizing both shared and private feature spaces—effectively differentiates between unchanged regions and areas undergoing transformation. The semi-supervised learning mechanism substantially reduces labeled data requirements while maintaining high performance. Extensive evaluations across diverse benchmark datasets (Wetland, River, Farmland, and Irrigated agricultural land) demonstrate the model's effectiveness, achieving over 95% accuracy. This research contributes a computationally efficient, interpretable framework for environmental monitoring applications, with significant implications for precision agriculture, urban planning, and ecological assessment.

Keywords:

Hyperspectral imaging, change detection, semi-supervised learning, multi-scale feature extraction, environmental monitoring, deep learning.

A Comprehensive Survey on Bee-Inspired Metaheuristics and Their Application in Image Segmentation Field

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Abstract:

Image segmentation, one of the critical tasks in the field of computer vision, plays significant role in numerous applications namely, medical imaging, pattern recognition, object detection and many more. The existing traditional techniques for image segmentation often face several challenges such as sensitivity to noise, high computational complexity, and the need for extensive parameter tuning. Thereby, researchers are increasingly utilizing Nature-Inspired Optimization Algorithms (NIOA) as an alternative approach for effectively addressing challenges in Image Segmentation. Optimization is a process to achieve the best outcomes and enhancing performance across various fields. In order to find near-optimal solutions and to explore large search spaces Metaheuristic Algorithms play a vital role in solving complex optimization problems. Bee-inspired metaheuristic algorithms, one of the NIOA that has emerged as effective optimization tools for improving segmentation accuracy and efficiency. This survey paper provides a comprehensive review of bee-inspired algorithms and assesses the effectiveness of bee-inspired metaheuristic algorithms in the field of Image segmentation analysing their methodologies, advantages, and limitations. Further, the paper intends to stress on its theoretical foundations, applications, open research issues and their implications thus aiming to guide researchers and practitioners in leveraging NIOA for robust and adaptive image segmentation.

Keywords:

Bee-inspired, Metaheuristic, Image Segmentation, Optimization, Swarm Intelligence.

Real-Time Parking Management via YOLOv8: Integrating Optimized Slot Allocation and Vehicle Positioning Validation

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Abstract:

This paper describes a novel smart parking management system aimed at increasing parking efficiency in the Electronic City Campus of PES University. By utilizing sophisticated computer vision algorithms and machine learning methods, our system converts conventional parking processes into an automated one for faculty, doctors, students, and visitors. The system uses an optimized slot allocation algorithm based on various parameters such as vehicle type classification and user roles to maximally utilize space and minimize congestion. Our solution utilizes YOLOv8-based models for real-time detection of vehicles, license plates, and parking validations to verify that the vehicles are properly parked in their respective spaces as well as whether they are parked in their designated slots. Through the integration of computer vision functionalities with a user-friendly web interface, the solution provides end-to-end parking management that optimizes user experience and maximizes faculty productivity.

Keywords:

Computer Vision, Object detection, Real-time systems, YOLOv8, Machine Learning algorithms.

Cognitive Computing-Based COVID-19 Detection in Multi-Access Edge Computing Environment

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Abstract:

The global outbreak of COVID-19 has underscored the need for rapid and accurate detection methods. Traditional diagnostic techniques suffer from latency and dependency on centralized computational resources. This paper proposes a cognitive computing-based framework for COVID-19 detection within a Multi-Access Edge Computing (MEC) environment. By leveraging artificial intelligence (AI) models, federated learning, and edge intelligence, the proposed system enhances diagnostic accuracy while reducing response time. Experimental results demonstrate the effectiveness of cognitive computing in medical imaging classification, achieving high accuracy and real-time performance. Finally, the samples are securely stored in the cloud layer, in which the reliability of patient information is increased. The simulation analysis shows that the proposed model gains higher detection performance, like accuracy (98.2%), Latency (120ms), Data privacy is High.

Keywords:

Cognitive Computing, COVID-19 Detection, Multi-Access Edge Computing, Artificial Intelligence, Federated Learning, Edge Intelligence.

Advanced Deepfake Detection using ResNeXt and LSTM for a Trusted Digital World

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Abstract:

Deepfakes have increasingly generated very realistic manipulated visuals and audio through weaponized GANs and advanced deep learning techniques, albeit rather misused in committing identity theft, misinformation campaigns, and digital fraud. This paper introduces a novel deepfake detection framework based on advanced machine learning techniques to accurately detect tampered content. Such systems make use of CNN for the detection of faint inconsistencies at the frame level, while RNNs are used to study sequential patterns for anomalies in sequences. The proposed ensemble technique here adds credence to the system by taking the output from a set of models for improved detection. Scaling and flexible, the approach presented here adapts to the fast-evolving landscape of deepfake manipulation and combines visual and temporal features. This work therefore fights towards the protection of integrity for digital media and allows less room for misuse of synthetic content.

Optimization of Crop Suitability using Sequential Model of Convolutional Neural Network Algorithm

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Abstract:

The sustainable development of agriculture relies heavily on the accurate identification of suitable crops for specific regions, ensuring optimal resource utilization and enhancing productivity. This study explores the use of deep learning algorithms to optimize crop suitability mapping by integrating various environmental, climatic, and soil-related parameters. The suggested approach utilizes both Convolutional Neural Networks (CNN) to extract spatial features and Long Short-Term Memory (LSTM) networks to analyze temporal patterns such as seasonal rainfall and temperature variations. Key inputs include high-resolution geospatial data (elevation, soil properties, and land use), historical crop yield records, and weather datasets. The model undergoes training in order to make predictions. crop suitability scores, which are validated against real-world agricultural outputs using performance metrics such as Root Mean Square Error (RMSE) and R^2 . Furthermore, the framework is capable of dynamic adaptation by incorporating future climate projections, helping assess the potential impact of climate change on crop growth. Compared to traditional statistical models like linear regression or decision trees, the deep learning approach exhibits superior predictive accuracy and robustness, even in the presence of noisy or incomplete data. This solution offers valuable insights for farmers, policymakers, and agricultural planners by recommending optimal crop choices and land-use patterns, thus promoting climate resilience and sustainable agricultural practices. The results demonstrate that deep learning algorithms can revolutionize precision agriculture by making crop suitability assessment faster, more scalable, and highly accurate.

Keywords:

Convolutional neural networks, Crop suitability, Deep learning, Soil, Climate, Temperature.

Optimized IoT-Driven Remote Health Monitoring System with Self-Guided Latent Diffusion and Score-Based Graph Generative Modeling

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Abstract:

Remote patient activity control facilitates early risk stratification an overarching component in elderly and chronic diseases. Such systems are limited by scalability and accuracy. However, advancements in IoT and deep learning enable real-time, automatic, and precise monitoring, thereby optimally improving the patient's condition. Continuous health monitoring is crucial for patient well-being. This work presents Score-based Graphs Generative Modeling with Self-Guided Latent Diffusion (SbGGM-SGLD) for real-time health monitoring, where SbGGM-SGLD analyzes patient behaviors and predicts health scenarios from real-time data. The Giant Trevally Optimizer (GTO) is integrated to optimize hyperparameters, reducing computational loss and improving accuracy. As a Body Area Network (BAN) of chest and wrist sensors, it monitors values like ECG, accelerometry, and oxygen saturation. To control power consumption, TinyOS and low power relay communication are used; for secure distribution of data, Paillier Encryption-Decryption Scheme (PEDS) is used. Gradient Domain Guided Filtering (GDGF) increases quality of sensor data by preprocessing them. Feature extraction is optimized using the Scale-aware Modulation Meet Transformer (SAMMT), which dynamically adjusts attention mechanisms to different scales of patient activity data, enabling more accurate identification of critical health indicators. Continuous health monitoring is enhanced using an advanced variant, SSbGGM-SGLD, which incorporates self-supervised learning to refine predictions, adapt to unseen patient data, and provide more reliable health assessments. The Giant Trevally Optimizer (GTO) is used to optimize

the model's hyperparameters in order to improve accuracy and minimize computational loss, which streamlines the monitoring procedure. The proposed Deep Separable Convolutional Neural Network optimized with Mountaineering Team-Based Optimization (DSCNN-MTBO) achieves a classification accuracy of 99.6%, a computational time of 4.1ms, and an encryption time of 2.1ms. The MTBO algorithm optimizes network weights, loss, and hyperparameters, leading to superior efficiency compared to existing methods.

Keywords:

Body Area Network, Giant Trevally Optimizer, health monitoring, Internet of things, wearable sensor.

A VR Approach to Space Exploration Using Unity

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Abstract:

Traditional astronomy education has long suffered from limited engagement and comprehension challenges, mainly when teaching complex spatial concepts like planetary motion and gravitational forces. Static textbook illustrations and conventional teaching in the era of virtual reality (VR), the proposed system works on the system Unity engine, which has revolutionized solar system exploration. It offers immersive experiences beyond traditional textbooks, which lack interactivity and fail to convey dynamic astronomical concepts like planetary motion and gravitational forces. The proposed system allows user the move around the vast empty space and with the help of the controllers to control movement and navigate via the user interface. Despite advancements, existing VR systems rely on static models, limiting real-time interactivity and customization. This provides a real-time interactive exploration of the solar system. Users can simulate planetary orbits, analyze surface features, and experiment with the gravitational effects, fostering a hands-on understanding of complex astronomical phenomena. The use of AI has been incorporated in the system to bridge the gap between the user and knowledge. This allows the user to seamlessly talk to the AI module and solve space related queries. The platform also supports collaborative learning, enabling users to create and share custom models, prompting creativity and critical thinking. This innovation redefines how the concepts of solar system is taught.

Keywords:

Virtual Reality (VR), Unity engine, Solar System, Space Exploration, Artificial Intelligence (AI).

Anomaly in weather predictions using Ensemble learning Algorithms

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Abstract:

This paper introduces a highly advanced weather forecasting system that uses ensemble algorithms and can be applied immediately in disaster management, public safety, and economic strategy. The system uses the most advanced techniques in meteorology and machine learning to make accurate forecasts by detecting and correcting the errors in weather data. The system, through a comprehensive approach that includes real-time data acquisition, model integration, and anomaly detection, greatly enhances the reliability and accuracy of the forecasts, thus making it a vital tool for predicting severe weather situations. It skillfully handles the main issues in weather forecasting, including data inconsistencies, unpredictable weather patterns, and biases that are common to single-model predictions, through the integration of multiple predictive models and the use of machine learning for anomaly detection. The availability of improved algorithms and high- performance computing capabilities ensures real-time operation, thereby providing fast and meaningful insights. Extensive testing over a wide range of datasets confirms the system's superior performance, with key metrics demonstrating an average prediction accuracy of 92%, precision of 91%, recall of 88%, and a 40% reduction in forecast errors, while maintaining a latency of under 10 seconds for real-time predictions.

This innovative solution is very promising for applications related to the protection of communities, the support of informed decision-making, and the reduction of economic impacts due to extreme weather.

Keywords:

Ensemble algorithms, Anomaly detection, Weather forecasting, Real-time data processing, High-performance computing, Sensor network, Model integration, Predictive accuracy, Extreme weather events, Data inconsistency, Bias reduction, Machine learning, Weather modeling, Disaster preparedness, Community safety, Economic resilience, Data storage, Actionable insights, Meteorological research, Performance testing, Multiple datasets, Reliability, Forecast resilience.

Road Surface Semantic Segmentation Damage Recognition using Deep Learning

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Abstract:

Road Surface Semantic Segmentation and Damage Recognition Using Deep Learning” was focused on the development of an adaptive deep learning model of low computation cost, for precise detection of road damage through semantic segmentation. This model ensures robustness and overall generalizability since it is trained on a diversified dataset covering multiple types of roads, various weather conditions, and lighting environments. Transfer learning is used in this model with adaptation to new environments having minimal retraining for consistent performance suitable for real-time applications. By evaluating the classification accuracy and robustness of the system in detecting all classes of road damage under changing situations of variable weather and illumination conditions along with those of roads, this system will fill the gap created in state-of-the-art mechanisms for detecting road damage while balancing accuracy, efficiency, and adaptability. The framework supports proactive management of infrastructure, which in turn enhances monitoring of roads, and consequently, road safety and optimization of maintenance planning.

Keywords:

Automated Inter-Hospital Communication System for Bed Allocation (AICBA), Real-time Communication (RTC), Bed Allocation Algorithm (BAA), Automated Referral System (ARS), predictive modelling, emergency response, Role-Based Access.

FarmCare Vision: Enhancing Sustainable Agriculture Using IoT and Machine Learning

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Abstract:

The application of the Internet of Things (IoT) and Machine Learning (ML) in farming has transformed precision agriculture, increasing productivity, resource efficiency, and sustainability. FarmCare Vision is a smart agricultural system that helps farmers choose crops, recommend fertilizer application, and predict pests based on real-time sensor information. This research delves into the use of sophisticated ML algorithms, such as Random Forest, for crop identification and pest suggestion, based on IoT-capable sensors measuring important environmental factors like soil water content, temperature, and NPK levels. In contrast to conventional farming methods based on generalized advice, FarmCare Vision offers site-specific, evidence-based recommendations that cater to the specific conditions of a farmland. The system uses Random Forest because it is strong in dealing with non-linear relationships and can handle multiple variables efficiently. Comparison with less complex models like Decision Trees and Linear Regression shows that Random Forest improves accuracy in crop and pest suggestions. The system processes past and current data to decide on the best crops to plant according to environmental conditions to achieve better yield and sustainability. Additionally, pest recommendation models predict the likelihood of infestations based on prevailing climatic and soil conditions, enabling proactive pest management strategies. As opposed to disease forecasting

models that predict plant infections post- occurrence, FarmCare Vision focuses on early intervention in the form of proactive suggestions. Through the utilization of real-time data, the system reduces excessive use of fertilizers and pesticides, lowering environmental footprint while guaranteeing healthy crop development.

Keywords:

Missing person identification, facial recognition, Convolutional Neural Network (CNN), deep learning, AI-driven search, Dlib library, Python, PostgreSQL, image-based matching, law enforcement integration, automated reunification, real-time alerts, Docker.

Detection of Deepfake Image using CNN Architecture

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Abstract:

The proliferation of deep fake technology has raised significant concerns across various sectors, including media, politics, and cybersecurity. Deep fakes, synthetic media where a person's likeness is manipulated using artificial intelligence, pose a threat to privacy, security, and trust. This project, titled "Deep Fake Identification Using CNN and Capsnet Architecture Model," aims to develop an advanced detection system capable of identifying deep fake videos and images with high accuracy. The system leverages a Convolutional Neural Network (CNN) combined with Capsnet to discern authentic content from manipulated media. The model was trained on a diverse dataset of real and fake media, achieving an accuracy rate of 96%. Implemented using Python, Colab, and Flask, the system provides a robust solution for detecting deep fakes, offering potential applications in media verification, cybersecurity, and content moderation.

Keywords:

Deepfake detection, CNN, Capsnet, frequency-domain analysis, adversarial robustness, real-time detection.

Smart Agro – Analyzer : A Soil And Plant Health Prediction Model With Plant Disease Detection

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Abstract:

Smart Agro – Analyzer is an advanced agricultural prediction system that integrates machine learning and deep learning techniques to assess soil fertility, predict plant health, and detect plant diseases. The model analyses various soil parameters such as pH, moisture, nitrogen, phosphorus, and potassium levels to recommend suitable crops and fertilizers. It also evaluates plant health by means of processing environmental conditions and growth elements. A key function of this system is its plant disease detection module, which uses deep learning-based image processing to identify early signs and symptoms of diseases from leaf pictures. By leveraging a considerable dataset of diseased and healthy plants, the model accurately classifies infections and suggests preventive measures. The Smart Agro – Analyzer provides farmers with real-time insights through a user-friendly interface, allowing them to make informed decisions, optimize resource usage, and enhance crop yield. This approach not only minimizes losses because of undetected diseases additionally promotes sustainable and precision farming. With its ability to deliver predictive analytics and early warnings, this model serves as a crucial tool for modern agriculture, assisting farmers improve productivity, reduce charges, and ensure food security while maintaining environmental balance.

Keywords:

Predictive Analytics, Crop recommendation, Plant disease classification, Deep learning, Machine Learning.

Recycling of Polystyrene Using Bio-based Limonene

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Abstract:

Polystyrene, a widely used synthetic polymer in packaging, disposable cups, and insulation, poses significant environmental challenges due to its non-biodegradability and resistance to decomposition. It is estimated that over 15 million tons of polystyrene products are being produced globally per year. Polystyrene persists in the environment for over 500 years, accumulating in landfills and contributing to marine pollution as microplastics, which harm aquatic ecosystems. Expanded polystyrene (EPS) comprises up to 30% of landfill volume by weight due to its lightweight yet bulky nature, complicating storage and transport. Globally, only around 9% of polystyrene is recycled, with high processing costs hindering wider adoption. Improper disposal through burning releases toxic compounds like styrene and benzene, posing health risks and contributing to air pollution. Furthermore, the production of virgin polystyrene is energy-intensive, with a carbon footprint of approximately 3.1 kg CO₂ per kg of material, exacerbating its environmental impact.

With growing concerns about plastic pollution, innovative recycling methods are essential to reduce polystyrene waste and its ecological footprint. Solvent-based recycling using limonene, a bio-based, biodegradable solvent derived from citrus peels, can be a promising solution. This method involves dissolving expanded polystyrene (EPS), a lightweight foam material, in limonene at room temperature, reducing its volume by up to 90% and simplifying waste transport and handling. The polystyrene can then be recovered through a precipitation step using ethanol, maintaining material quality for repurposing into new products, thereby supporting a circular economy.

Limonene can be efficiently extracted from citrus peels, which are abundant byproducts of the juice industry. Utilizing these waste materials reduces raw material costs and promotes a circular economy. The extraction process, such as steam distillation or cold pressing, operates at relatively low costs which enhances the appeal of the process. An alternate approach involves bioengineering microorganisms, such as *Yarrowia lipolytica*, to produce limonene from renewable feedstocks like agricultural residues or sugars.

The use of limonene aligns with green chemistry principles, as it is renewable, low-toxicity, and minimizes harmful emissions. This approach effectively addresses the challenge of managing bulky EPS waste, which often ends up in landfills or as marine debris. Furthermore, it reduces reliance on

virgin polystyrene production, contributing to lower carbon emissions. However, scalability remains a challenge due to the costs of limonene extraction and the energy required for recovery processes. Future research should focus on optimizing these aspects, including advancements in solvent recovery and the recycling of contaminated or mixed plastic streams.

The recycling of polystyrene using limonene represents a significant step toward sustainable waste management and environmental conservation. By leveraging bio-based solvents, this method highlights the potential of circular solutions to mitigate the impact of non-biodegradable plastics. Continued innovation and collaboration can help scale this promising technology in pursuit of global sustainability goals.

DAG based Avatar Authentication in Metaverse using 5g E-Sim Cards

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Abstract:

A secured technique for authenticating digital assets of any form (e.g. avatar) using a decentralized group of network nodes of mobile operator equipped with MEC (Multi-access Edge Computing), acting as authentication nodes. This will prevent the dependencies over a singular or a decentralized group of authentication nodes based upon a particular online platform (e.g. Metaverse), which has the risk of compromising the identity of the client by manipulating the hash values. The DAG group nodes of the mobile network equipped with MEC acts as an intermediary between the clients computing device appropriate endpoint of metaverse. The client-computing device registers itself with the mobile network operator using its EUICC (Embedded Universal Integrated Circuit Card) number. Post successful registration, the client-computing device establishes connection with the serving edge through network node. The serving edge verifies the data representing the avatar is unique and generates an ownership claim record. To prove continued control over the avatar by the user, the user can perform re-authentication process at regular intervals.

Keywords:

Multi-access edge computing (MEC), Directed acyclic graph (DAG), Embedded Universal Integrated Circuit Card (EUICC), client computing devices, metaverse.

CNN-Based Image Recognition System for Authenticating Products by Identifying Micro-Patterns and Material Consistency

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Abstract:

This paper presents a novel approach for product authentication using CNNs to recognize micro-patterns and assess material homogeneity. The proposed framework relies on deep learning methods for micro-feature inspection and distinctive surface micro-feature identification characteristic of authentic products. The system shows a very efficient capability to distinguish between authentic product variants and counterfeits, through an integration of image recognition algorithms with an exhaustive material inspection. Our experimental results show high accuracy in many industrial and retail scenarios, thus underlining the opportunity of wide application of the system in quality assurance and also anti-counterfeiting measures.

Keywords:

CNN, Image Recognition, Product Authentication, Micro-Patterns, Material Consistency, Deep Learning, Anti-Counterfeiting.

Smart Roadside Assistance: A Real-Time Web Solution for Vehicle Breakdown Support

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Abstract:

Vehicle breakdowns, flat tires, fuel shortages, and mechanical failures while traveling on the road can be very inconvenient and pose serious risks to travelers. Traditional assistance methods often involve delays and inefficiencies due to manual intervention and lack of real-time communication. It offers a unique roadside assistance web-based project using the modern web technology through which stranded motorists can connect with nearby mechanics for fast service. The MERN stack-MongoDB, Express.js, React.js, and Node.js-ensures effortless interaction between users and service providers. Travelers experiencing issues with their vehicle can apply on the portal by registering on the portal, requesting service specifying their problem, and enabling geolocation tracking. Once a mechanic accepts the request, his real-time location is available on the user's dashboard through integrated mapping technology, thereby allowing better coordination and faster response times. The user's location is reached by a mechanic who rectifies the problem on-site, thus causing minimal disruption to the traveler's journey. To improve the experience of users, this platform integrates a secure payment gateway wherein instant transaction processing at the point of service is facilitated. A rating and feedback mechanism added to the services ensures service quality by allowing users to review

and rate mechanics based on their experience. This is a data-driven approach that not only fosters accountability but also helps in improving service standards over time. The system implemented with the latest web technologies provides an efficient, scalable, and user-friendly solution to roadside emergencies. Integration of real-time tracking, location-based service allocation, and a structured workflow significantly reduce the response time as well as enhances the safety and convenience of passengers. Besides that, it's also contributing toward sustainability through decreased time taken for vehicles stranded in roads and decreasing traffic congestion potential environmental hazards.

Keywords:

Roadside Assistance, Real-Time Tracking, MERN Stack, Vehicle Breakdown Support, Digital Mobility Solutions, Sustainable Travel.

Predictive Maintenance for Industrial Equipment

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Abstract:

This project investigates predictive maintenance for industrial equipment, utilizing data from three sensor types: pressure, temperature, and vibration. Predictive maintenance seeks to reduce equipment downtime and maintenance costs by identifying potential failures before they occur. The effectiveness of each sensor type is evaluated to determine which provides the most reliable early warning of equipment issues, with the goal of optimizing maintenance schedules and improving equipment lifespan. Using XGB Model (eXtreme Gradient Boosting) approach, this study compares the predictive accuracy of pressure, temperature, and vibration data to identify the best-performing sensor type. The findings suggest that certain sensors may offer greater predictive value depending on the type of equipment and failure mode, providing valuable insights for industrial maintenance strategies.

Keywords:

Predictive Maintenance, Machine Learning, XGBoost, Industrial Equipment, Sensor Data, Fault Detection.

Semi-Supervised Learning for Low-Resource Language Translation

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Abstract:

The study introduces a semi-supervised learning framework for low-resource language translation, with a focus on Hindi-to-English tasks, by combining autoencoder pretraining on monolingual Hindi data with fine-tuning on limited parallel Hindi-English datasets using a GPT-2 transformer decoder. Contrastive learning improves representation by differentiating between positive and negative samples, and the training process consists of autoencoder pretraining, fine-tuning on parallel data, and contrastive loss integration. The model uses PyTorch and Hugging Face Transformers on Google Colab, with gradient checkpointing and optimized data loading for effective training. This work advances neural machine translation for under-represented languages by increasing translation accuracy with minimal parallel data.

Keywords:

Semi-supervised learning, neural machine translation (nmt), low-resource languages, autoencoders.

RAG-driven Conversational AI using GPT-3.5 Turbo and LangChain

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Abstract:

This research presents a Retrieval-Augmented Generation (RAG)-driven conversational AI system designed to assist with Tamil Nadu Engineering Admissions (TNEA) counseling-related queries. By integrating GPT-3.5 Turbo with LangChain, our system effectively retrieves relevant information from external knowledge sources and generates accurate, contextually appropriate responses. This approach ensures up-to-date and precise guidance for students navigating the TNEA counseling process. We describe the system architecture, including document retrieval, response generation, and query handling mechanisms. Our implementation enhances the reliability of conversational AI by reducing hallucinations and improving factual consistency. The proposed system serves as a valuable tool for students and parents, providing real-time, informed assistance throughout the TNEA counseling process.

Keywords:

Counselling, Retrieval Augmented Generation, LangChain, OpenAI, Embeddings, Text Generation, ChromeDB, GPT-3.5, Streamlit, NLP, Prompting, Embeddings.

Digitizing Sanskrit Handwritten Scripts

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Abstract:

Sanskrit manuscripts are an invaluable repository of India's cultural and intellectual legacy, encompassing knowledge in literature, philosophy, science, and art. Preserving these manuscripts is of paramount importance, as their physical forms are prone to deterioration due to aging, environmental factors, and improper handling. Digitization serves as a crucial step toward ensuring the longevity of this heritage while also making it accessible to researchers, linguists, and educators globally. Moreover, digitizing these texts supports cultural preservation, fosters linguistic studies, and promotes the dissemination of ancient knowledge in a form compatible with modern technologies. Optical Character Recognition (OCR) technology provides an effective solution for the digitization of Sanskrit manuscripts by automating the conversion of handwritten texts into machine-readable formats. This process enables the preservation of texts in digital libraries, facilitates text analysis, and simplifies access for future generations. OCR technology, combined with advanced machine learning models such as CNN-BiLSTM, addresses challenges such as script complexity, noise, and handwriting variability. Robust preprocessing techniques like binarization, segmentation, and noise reduction ensure better input quality for OCR systems, while annotated datasets enhance model accuracy. By leveraging OCR, the digitization of Sanskrit manuscripts becomes a scalable, efficient, and sustainable endeavor to preserve India's linguistic and cultural treasures.

Energy Efficient Indoor Asset Tracking for Industry 4.0

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Abstract:

Indoor Asset Tracking encounters several challenges [1], including signal interference caused by complex environments and the difficulty of achieving high accuracy in localization within confined spaces. Conventional methods often do not provide real-time information [2] and seamless integration with modern Industry 4.0 technologies. In the current era of Industry 4.0, efficient asset tracking within indoor environments plays an important role for improved productivity and optimizing operations. This work proposes an IoT based system for Indoor Asset Tracking in manufacturing facilities to achieve real time asset location and monitoring the status of assets by integrating with Industry 4.0 technologies like Bluetooth Low Energy (BLE) and Wi-Fi. The system utilizes Received Signal Strength Indicator (RSSI) measurements for distance estimation and positioning. The aim is to compare the performance of the Raspberry Pi Pico W, using Wi-Fi fingerprinting approach, and the Arduino Nano 33 BLE Sense, using BLE technology utilizing a TinyML approach, for asset tracking using beacons and tags and conduct a comprehensive analysis of their efficiency, accuracy, and power consumption. The findings indicate that Nano 33 BLE Sense, delivered better results in terms of efficiency and accuracy.

Enhancing Security and Transparency in Crowdfunding with a Blockchain Solution Using Decentralized Smart Contracts

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Abstract:

The study aims to enhance security and transparency in crowdfunding platforms by developing a blockchain-based solution using decentralized smart contracts and the Kecchak algorithm for secure data handling. Materials and Methods: The project is classified by two groups. Group 1 focuses on blockchain integration using Ethereum, where smart contracts are designed and done to ensure transparency in fund allocation and prevent fraud. Group 2 implements the Kecchak algorithm for cryptographic hashing, ensuring the integrity and security of transactions. A dataset of 20 crowdfunding campaigns was analyzed to evaluate system performance. The solution was tested under varying transaction loads, with a G Power value of 80%, a threshold of 0.05%, and a confidence interval of 95%. Result: The blockchain-based system demonstrated significant improvements in transaction security and transparency. The Kecchak algorithm provided a 99% accuracy in detecting and preventing data tampering, while smart contracts ensured real-time traceability of funds. The overall system performance achieved a significance level of 0.0032, showcasing a marked improvement over traditional centralized platform. Conclusion: The solution demonstrates potential for revolutionizing crowdfunding by addressing critical issues of trust, security, and transparency. Adoption could significantly enhance user confidence and operational efficiency in real-world crowdfunding scenarios.

Keywords:

Crowdfunding, Blockchain, Kecchak algorithm, Fraud Prevention, Cryptocurrency.

Lung Cancer Detection Using VGG19

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Abstract:

Lung cancer remains one of the leading causes of cancer-related deaths worldwide, emphasizing the need for early and accurate diagnosis to improve survival rates. Conventional machine learning methods for classifying lung cancer depend on manually extracted features, which frequently miss intricate patterns in medical pictures. By facilitating automated feature extraction and enhancing classification accuracy, deep learning and transfer learning have transformed medical image analysis in recent years. A deep learning model based on VGG19 is presented in this work for the identification and classification of lung cancer using computed tomography (CT) and X-ray images. The dataset is preprocessed, supplemented, and normalized to enhance model generalization and robustness. The completely linked layers in the model architecture are replaced with dense layers, dropout layers, and a global average pooling layer for improved classification. The system is trained with early halting, learning rate scheduling, categorical cross-entropy loss, and the Adam optimizer to prevent overfitting.

Keywords:

VGG19, Deep Learning, Transfer Learning, Convolutional Neural Networks (CNNs), Computer-Aided Diagnosis (CAD), CT Scan Analysis, X-ray Image Processing, Feature Extraction, Gradient-Weighted Class Activation Mapping (Grad-CAM), Lung Cancer Detection.

Self-Healing Deep Learning with Differential Evolution for Wireless Rechargeable Sensor Network Charging Scheduling

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Abstract:

Efficient energy management in Wireless Rechargeable Sensor Networks (WRSNs) is crucial for ensuring continuous operation and extending network lifespan, especially in large-scale deployments with limited energy resources. This paper introduces a novel charge scheduling model that integrates Self-Healing Deep Learning with Differential Evolution (DE) to optimize energy replenishment in WRSNs equipped with multiple mobile chargers. The proposed model employs DE for clustering sensor nodes and selecting energy-efficient cluster heads based on various design constraints, including communication range, residual energy, and network topology. By leveraging DE's robust global search capability, the model ensures optimal clustering and dynamic allocation of charging tasks. To further enhance the charging process, a Self-Healing Deep Reinforcement Learning (SH-DRL) approach is applied, which adapts in real time to changing network conditions, minimizing energy depletion and reducing node failure rates. Simulation results demonstrate that the DE-based model significantly improves energy replenishment efficiency, reduces overall charging costs, and extends network lifetime compared to traditional algorithms, including greedy, genetic, and hybrid optimization approaches. This self-adaptive system ensures resilient, scalable, and cost-effective energy management, making it ideal for real-world applications in IoT-driven and large-scale WSN environments.

Keywords:

Wireless Rechargeable Sensor Networks (WRSNs), Charge Scheduling, Differential Evolution (DE), Self-Healing Deep Reinforcement Learning (SH-DRL), Energy Management.

Voice-Driven Gender Insights: Computational Resource Utilization Using IoT and ML

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Abstract:

Voice-based gender classification plays a crucial role in various applications, including customer service automation, speaker identification, and personalized interactions. This study presents a voice-based gender classification system that integrates audio spectral analysis and machine learning to optimize call routing in customer support services. By extracting crucial spectral and acoustic features such as centroid, bandwidth, pitch, spectral skew, and energy entropy, the system accurately distinguishes between male and female speakers. The proposed model follows a structured pipeline comprising feature extraction, feature reduction, and machine learning classification, ensuring high accuracy and efficiency in real-time prediction. Cloud-based deployment enhances scalability and adaptability, making it suitable for applications in call centers, virtual assistants, and AI-driven communication platforms. The results show the potential of machine learning in speech analysis, leveraging voice characteristics for intelligent decision-making. Future enhancements could incorporate emotion detection, speaker verification, and multilingual support, further extending its capabilities in human-machine interaction and AI-powered voice technology. This research contributes to the advancement of automated speech processing, providing a robust, scalable, and efficient approach to voice-based classification for real-world applications.

A Plagiarism Detection Tool Using WordNet For Technical Content

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Abstract:

With the rise of digital content, plagiarism detection has become increasingly important. This study develops a system to assess semantic similarity between texts using natural language processing (NLP) techniques, employing Python's NLTK for tokenization and WordNet for semantic analysis. Similarity scores are generated for pairs of paragraphs, with results showing comparisons between different paragraphs and between a paragraph and its paraphrased version. The findings demonstrate the system's ability to accurately detect semantic relationships, making it valuable for plagiarism detection and content analysis. Future research may enhance this system's accuracy through advanced models like word embeddings and deep learning.

Keywords:

Plagiarism Detection, Semantic Web, Ontologies, Tokenization, Wordnet, Python, Natural Language Processing, Operating Systems.

Enhanced Parking Occupancy Prediction Using AlexNet CNN Model in Machine Learning

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Abstract:

The aim of the study is to develop a reliable parking occupancy prediction system that can manage a variety of urban situations by utilizing the AlexNet CNN (Convolutional Neural Network) model. Materials and Methods: The project is divided into two groups. Group 1 Implements the GRU-LSTM model to train and classify parking occupancy states based on extracted features. Group 2 Implements the AlexNet CNN model focuses on image preprocessing and dataset preparation, using real-time parking images under varying lighting and weather conditions. A dataset of 20 parking lots was analyzed to evaluate system performance. The model was tested under different traffic conditions, to assess its accuracy, robustness, and adaptability in detecting parking occupancy. Result: The efficiency of the AlexNet CNN model in detecting parking occupancy in practical settings was demonstrated by its 92% accuracy rate. Based on the result the significance value is below 0.05. Conclusion: The method

is straightforward and offers a useful way to promote smart urban infrastructure by lowering traffic, making better use of available space, and increasing user convenience.

Keywords:

Plagiarism Detection, Semantic Web, Ontologies, Tokenization, Wordnet, Python, Natural Language Processing, Operating Systems.

Artificial Intelligence Based Model for Electricity Demand Projection Including Peak Demand Projection for Delhi Power System

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Abstract:

This research explores a novel approach to electricity demand forecasting for the National Capital Territory (NCT) of Delhi, utilizing artificial intelligence techniques. The highly dynamic load profile of Delhi, characterized by significant seasonal and diurnal variations, poses unique challenges for power system planning and operation. We develop and evaluate multiple forecasting models including Prophet, ARIMA, and Holt-Winters to accurately project electricity demand patterns with particular emphasis on peak demand prediction. The proposed models incorporate critical factors such as weather parameters, holiday effects, urban development, and natural load growth to improve forecast accuracy. Implementation results demonstrate that our approach effectively captures the peculiar load characteristics of Delhi's predominantly residential and commercial consumer base, including the challenging "duck curve" phenomenon caused by increasing solar penetration. The research provides valuable insights for power utilities to optimize resource allocation, reduce purchasing inefficiencies, and enhance grid stability in rapidly growing urban environments.

Keywords:

Electricity demand forecasting, peak load prediction, artificial intelligence, time series forecasting, smart grid, Prophet algorithm, ARIMA, Holt-Winters, urban load growth.

Real-Time Heart Rate Estimation from Video Using Remote Photoplethysmography and LLM-based Insights: A Serverless Approach

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Abstract:

Remote photoplethysmography (RPPG) enables non-contact heart rate (HR) estimates from video data, providing a convenient option to the wearable sensor. This paper presents a real-time, server-free approach using the Pyvhr framework, which has been deployed on the GPU-quick cloud infrastructure via Runpod. The system processes a 30-second facial video to extract blood volume pulse (BVP) signals, which uses the interest (ROI) extraction methods of the convex plow-based and face-purchasing-based sector, with HR assessment with HR assessment using Chrome and POS algorithms using clustering and medieval techniques. To increase the purpose, GPT-4O produces individual, multilingual health insight, while whisper-1 and GPT-4O-Audio-Preview enables speech-based conversations. The system receives real-time processing with $5 \times$ GPU acceleration speedup for 30 FPS HD videos, which ensures efficient HR estimates and interactive visualization of HR trends. Experimental evaluation highlights high accuracy in several GPU (A4000, A4500, RTX4000, RTX2000) and uninterrupted integration of AI-operated insight into health supervision. This research reflects the viability of real-time, non-contact human resource monitoring, which is ideal for health tracking in the scenarios where the wearable sensors are uncomfortable, with future work deepening RPPG models, dataset details and real-world clinical verification discovery.

Keywords:

Remote Photoplethysmography (rPPG), Heart Rate Estimation, Non-Contact Heart Rate Monitoring, Video-Based Heart Rate Measurement, PyVHR Framework, CHROM Algorithm, POS Algorithm, Serverless GPU Acceleration, Multilingual AI Insights.

AskIT AI: An Intelligent System for Optimized Student Profile Management and Data Accessibility

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Abstract:

Handling student profiles and data is a vital part of managing an educational institution, but conventional methods frequently turn out to be inefficient, labor-intensive, and prone to mistakes. These issues obstruct institutions' capability to make prompt and informed choices, affecting overall effectiveness and student contentment. AskIT AI provides a revolutionary answer by utilizing artificial intelligence to simplify the management and retrieval of student data. By offering a unified, automated, and intelligent platform, AskIT AI guarantees efficient access to precise and current student information. This advancement not only alleviates administrative challenges but also improves decision-making processes, ultimately promoting a more responsive and supportive educational atmosphere.

Keywords:

Artificial intelligence, student data management, educational administration, automated data retrieval, decision support systems, student information systems, administrative automation, AI in education, academic records management.

The Deep Dive: Evaluating Deep Learning Techniques for Phishing Attack Detection

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Abstract:

Phishing attacks have become a significant cybersecurity threat today. These attacks use various methods to steal sensitive information from users, such as usernames, passwords, financial information like credit card pins, CVV, etc., and personal data. With the increasing use of digital space, phishing emails have become a common attack that threatens individuals, organizations, and government institutions. Traditional methods for detecting phishing emails mainly focus on analyzing the text content of the email and looking into the attached URL. Unlike content analysis, which can be easily manipulated, meta-data is more reliable and helps identify suspicious behaviors linked to phishing attempts. Studies show that meta-data-driven methods can effectively detect phishing while requiring less computational power than traditional methods. Combining meta-data features with sequential models solves several issues that have troubled phishing detection efforts. This approach shifts the focus from content analysis, which can be easily manipulated, to more robust structural attributes. This paper discusses the existing deep-learning techniques that currently existed. It also suggested the best method and the reason behind it.

Keywords:

Deep-learning, Phishing, Detection, Spam, Attack.

Current Developments on IOT in Aided Wearable Devices for Healthcare: A Literature Review

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Abstract:

Health is one of the most important aspects of life. However, they were still unable to obtain quality healthcare. It is caused by limitations on hospital technology and accessible hospital transportation. IoT, one of the hottest subjects right now, already offers a lot of options, particularly in the healthcare sector. One of the most promising areas of healthcare technology is wearable medical technology. These smart sensors actively gather physiological markers and track metabolic state, assisting people in leading healthier lives and provide ongoing medical data for illness diagnosis and treatment. One novel way to monitor patients' development after an intervention is using wearable technology. By facilitating a quicker and safer hospital release, it may improve patient outcomes and reduce the demand for healthcare resources. Recent research has examined use of wearable technologies for surveillance. IoT makes it more feasible to integrate devices that can connect to the internet, offer patient health data, and deliver real-time data to physicians who can assist. It is clear that health indicators such as heart rate, temperature, high blood pressure, and humidity are important global social and economic issues. Details may be read to receive real-time patient data on a mobile web server at the appropriate moment, and the patient's health is being monitored for any health concerns.

Keywords:

IOT, health Monitoring, Wearable Sensors.

NeuroMol-X: AI-Driven, GPU-Accelerated Cloud Platform for Real-Time Molecular Simulation, Collaborative Cheminformatics, & Precision Drug Discovery

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Abstract:

This paper presents an AI-driven platform that transforms molecular research by integrating cutting-edge computational algorithms, real-time collaboration, and advanced visualization tools. Built on a robust tech stack featuring Next.js, TypeScript, NVIDIA API, Ably, RDKit, PubChem, MongoDB Atlas, and Resend, the platform enables high-performance molecular simulations and precision-driven molecule generation using SMILES notation. Leveraging NVIDIA's GPU acceleration and RDKit's cheminformatics capabilities, it ensures seamless molecular structure visualization. Ably's real-time messaging infrastructure fosters dynamic, cross-functional collaboration, while MongoDB Atlas provides scalable, secure data management. Additionally, PubChem's extensive chemical database enriches research insights, and Resend optimizes communication workflows. The platform's cloud-native architecture, supported by Kubernetes for orchestration and TensorFlow for AI-driven predictive modeling, democratizes access to next-generation research tools. By streamlining the research workflow, accelerating data-driven discoveries, and enhancing interdisciplinary collaboration, this

solution redefines scientific exploration. Its applications extend to drug discovery, material science, and sustainable chemistry, driving innovation and societal impact through technological advancements in molecular research.

Keywords:

AI-driven molecular research, Real-time collaboration, GPU-accelerated computing, Cheminformatics, Cloud-native architecture, Drug discovery innovation.

Effective Dashboard Implementation Design with PowerBI

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Abstract:

The effectiveness of dashboards relies on careful design and implementation when it comes to transforming raw data into valuable insights. This guide presents a practical, step-by-step approach to creating impactful dashboards using Power BI, with a focus on optimizing design for user engagement and clarity. The guide outlines a detailed process for designing a dashboard by importing a dataset in either Excel or CSV file format. Its goal is to bridge the gap between theoretical design principles and practical application, providing actionable advice for analysts and designers to improve their dashboard design techniques. By following this systematic approach, users can ensure that their Power BI dashboards are efficient and effective in meeting organizational needs and facilitating data-driven decision-making.

Keywords:

Dashboard Setup Power BI Data Step-by-Step KPI Q&A Chart.

HeartShield AI: Advanced Machine Learning for Accurate & Early Heart Disease Prediction

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Abstract:

Nowdays heart disease a leading cause of deaths happening in the world. This project, HeartShield AI aims to address this challenge by providing a strong predictive model for classifying heart disease using cutting-edge machine learning (ML) techniques [1]. A in depth exploratory data analysis (EDA) was carried out with the publicly available data of 303 patients with 14 clinical variables to find out the relationship

between heart and its key factors [2]. Some of the features such as chest pain type, exercise-induced heart pain, increased heart rate were found strong indicators of cardiac diseases [3].

HeartShield AI analyses multiple machine learning models, likewise Logistic Regression, K-Nearest Neighbor (KNN), Decision Trees, Naive Bayes, Support Vector Machines (SVM), Random Forest, XGBoost and Artificial Neural Networks (ANN) (4). All the were well performed but among these, the Random Forest model was identified as the best-performing algorithm, providing a 95% precision rate due to its capability to direct feature interactions and reduce overfitting (5). The anticipatory model was deployed as a web application using Flask and Streamlit, providing a user friendly interface for users to provide clinical parameters and receive insights (6).

HeartShield AI illustrates the power of machine learning in predicting heart related illness, highlighting its capacity to reshape medical diagnosis (7). By improving accuracy and quick disease detection, the system revolutionizing patient results. In addition, its enactment as an responsive web application uniting clinical practice and technological advancements [8]. Future iterations of HeartShield AI will focus on integrating real-time patient data from electronic health records to enhance scalability and adaptability in diverse medical contexts [9]. Efforts will also be directed towards improving model interpretability through explainability techniques and feature importance visualization, empowering healthcare professionals to make better-informed decisions [10].

Boundary and Shadowing Effects in UWSNs: A Hybrid Machine Learning Approach

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Abstract:

Underwater Sensor Networks (UWSNs) are essential for applications like environmental monitoring and disaster management but face challenges such as high propagation delays, limited bandwidth, and boundary and shadowing effects, which hinder communication reliability. This study explores the use of four Machine Learning (ML) models—Decision Tree, Random Forest, Light Gradient Boosting Machine (LightGBM), and Categorical Boosting (CatBoost)—to predict Optimal Transmission Power and Optimal Sensing Range based on environmental and network parameters. The models are evaluated using Mean Absolute Error (MAE) and R^2 Score. Results show that Random Forest and LightGBM significantly outperformed the others, achieving low MAE values and high R^2 scores, while CatBoost performed well but was slightly less accurate. Decision Tree, though interpretable, had higher error rates. Considering the limitations of the outperforming models, a hybrid model was developed to improve further accuracy. The adaptive predictions from these ML models enhance UWSN reliability and efficiency by optimizing energy consumption and enabling real-time adjustments to changing underwater conditions.

Keywords:

UWSN, Boundary, Shadowing, Prediction.

A Review Paper on the Importance and Adaptability of Building Information Modelling (BIM) for Construction Projects in India

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Abstract:

Building Information Modelling (BIM) is transforming the construction sector in India by dealing with issues such as budget excuses, project delays and inadequate collaboration among stakeholders. This review paper analyses the importance and adaptability of BIM in Indian environment, underscoring its potential to increase project management and execution processes. BIM enables the development of intricate 3D models that are developed with metadata, thereby enhancing precision in scheduling, design and cost forecasting. This paper presents a comprehensive review of various BIM applications, including sustainability viewpoints, cost control, time management, reinforcement and renovation, highlighting its contribution to advanced collaboration among architects, engineers, and contractors. However, the implementation of BIM in India face problems such as substantial investments and a general lack of awareness. This study signifies that while BIM is progressively being adopted by more advanced stakeholders, wider implementation requires overcoming these barriers through collaborative efforts within the industry and support from the government. Eventually, this study highlights the practical applications of BIM across different aspects of a construction project, thereby facilitating a more sustainable and systematic environment throughout the entire construction of the project.

Keywords:

BIM, collaboration, construction automation, sustainability, applications of BIM.

Optimizing performance of Machine Learning Algorithms for Diabetes Detection using Osprey Optimizer Algorithm

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Abstract:

Diabetes, a chronic condition characterized by elevated blood sugar levels, has emerged as a significant global health concern, impacting millions of lives worldwide. Machine Learning (ML) algorithms have shown promising results in analyzing vast amounts of medical data to predict diabetes more efficiently. However, the performance of ML classifiers can be significantly impacted by hyperparameter tuning, which traditional optimization techniques like Grid Search and Random Search often fail to address effectively. To overcome these limitations, this research employs the Osprey Optimization Algorithm (OOA), a novel metaheuristic inspired by the hunting behavior of ospreys, to optimize the performance of ML classifiers, including Decision Tree (DT), Naive Bayes (NB) and Support Vector Machine (SVM). OOA efficiently balances exploration and exploitation phases, ensuring optimal hyperparameter selection. The effectiveness of OOA has been validated against 29 standard benchmark functions from the CEC 2021 test suite, demonstrating superior performance compared to 20 existing metaheuristic algorithms. This paper presents the implementation of OOA for optimizing ML classifiers, compares their performance with and without optimization, and highlights the impact of OOA on improving diabetes detection accuracy.

Keywords:

Diabetes, OOA, prediction, Decision tree, SVM, Naive Byes.

Image to Caption Generator Using Machine Learning and Deep Learning Models

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Abstract:

Image captioning is creating descriptive text from images. This has become a research focal point. The reason is advancements in deep learning. The paper delves into a comprehensive Image Captioning Method. It merges Convolutional Neural Networks (CNNs) with Recurrent Neural Networks (RNNs). Specifically, it uses Long Short-Term Memory (LSTM) networks to produce natural language descriptions. This approach builds on earlier work. Such as Vinyals Et al's "Show and Tell" model. This model was one of the first to use CNNs and LSTMs for this purpose in 2015. We integrate attention mechanisms as suggested by Xu Et al. (2015) and Anderson et al. (2018). This improves the model's Focus on image areas. We employ both bottom-up and top-down attention techniques. This strengthens the accuracy and relevance of the captions generated. We train and assess our model on datasets. Some of these include MSCOCO and Flickr8k. We use standard evaluation metrics to assess like BLEU, METEOR and CIDEr. The results Show that our method surpasses Existing models. It outperforms them in both the quality of captions produced and computational efficiency. The research contributes to the ongoing development of image captioning. It has promising applications. These include Assistive technologies, content-based image retrieval and human-computer interaction.

Keywords:

Image Captioning, Deep Learning, Machine Learning, CNN, RNN, LSTM, NLP, Computer Vision.

Epileptic Seizure Prediction using Multi-Channel Vision Transformer

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Abstract:

Epilepsy is a disease of the nervous system, manifested by irregular, sudden seizures, and often loss of consciousness. Even though antiepileptic medications are accessible, only 30% of epilepsy suffer chronic seizures. Thus, it stresses the relevance of precise seizure prediction for patients and their carers to avoid triggers and prevent the risk of injuries during these attacks. This paper presents a new Transformer-based model, Multi-channel Vision Transformer (MVIT), which aims at directly identifying multi-channel temporal-spatial-frequency features from EEG data. The Continuous Wavelet Transform (CWT), an easy but highly efficient method for transforming time series EEG data into a scalogram (a graphical representation in the time frequency domain) is used in the preparation step. These scalograms are divided into patches of a certain size that do not overlap and serve as input to MVIT for the EEG signal's classification. The studies conducted on two common EEG datasets provide strong support for the suggested MVIT strategy. According to the data, MVIT performs better than other seizure prediction techniques and has a sensitivity of 90.28–91.15% for invasive EEG and 99.80% for surface EEG.

Keywords:

EEG; epilepsy; seizure prediction; continuous wavelet transform; vision transformer.

Prediction of Stock Prices using LSTM Model and Comparison with ML algorithms

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Abstract:

Guessing stock rates for the future is one of the key components of financial deals market analysis, since they can provide information that acts like risk management and investing alternatives. Deep learning's (DLs) strong processing capabilities and aptitude to understand the non-technical, non-linear interactions have been able to establish considerable progress in stock price forecast. The LSTM networks are good for the forecasting in the problems related to time series such as stock price forecast since they have the capability of taking into account lagged effects and avoiding prospects like gradients that vanish. After considering the above performance matrix, which are the following: accuracy, precision, recall, and the F1-score, it will be possible for the models to be evaluated completely. These criteria give a comprehensive evaluation of the predictive accuracy, the robustness, and the generalization ability of the algorithms. Mind the results to show you that traditional ML methods, which can provide prompt and simple interpretable results, the LSTM-based model makes a better job at modeling the complex temporal patterns found in stock price data. The relative research sets out how DL can raise stock price prediction accuracy thus it enriches the financial analysts and investors with new insights. Our suggested LSTM model delivers 15.78% more accurate results than Linear Regression and 6.91% more accurate results than Random Forest, thus, it convinces everyone about its highlevel performance in stock price prediction.

Keywords:

Stock Price Forecasting, Deep Learning, LSTM (Long Short-Term Memory), (ML) Machine Learning, Financial Analysis, Time Series Forecasting, Regression Models, and Performance Matrix.

Sentimental Analysis

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Abstract:

This project focuses on developing the application of the what is known as sentiment analysis in the field of NLP, which aims to determine and understand the emotional tone within a body of text. The goal is to determine if the text provided, which is usually a tweet, is of positive or negative nature.

GloVe embeddings are used in the project to form word vectors LSTM neural networks which analyzes and interprets sequences in arrays of data. The dataset is made with tokenization and lemmatization processes for text cleaning and standardization. The model is taught using a training dataset with imbalance class weights to allow for effective learning, then validated on separate validation and test datasets to check performance which is evaluated with accuracy and AUC scoring. This shows the power of deep learning algorithms in understanding human feelings, and customer feedback, social media, and business analytics data. This project demonstrates the power of recent developments in Natural Language Programming to process large volumes of unstructured text data and generate actionable information promptly for efficient business intelligence decision making. The rapid advancement in technology generated a need for real-time feedback, which brought about the development of sentiment analysis in the 1990s based on primitive frameworks of rules-based text.

Enhancing Zero Trust Network Access (ZTNA) with Machine Learning for Advanced Security

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Abstract:

Securing modern networks including the Internet of Things (IoT) (e.g., based on perimeter security solutions) is proven to be not enough. In order to solve this, we suggest to incorporate machine learning (ML) into Zero Trust Network Access (ZTNA) to dynamically determine trust and improve security. A Convolutional Long Short-Term Memory (CLSTM) architecture is designed and provides a validation accuracy of 87.52%. An analysis of confusion matrix indicates that the model is best at classifying "Generic" traffic and misclassified "Reconnaissance" and "Normal" traffic. It is shown that the CLSTM model is superior to traditional security systems in that it allows the architecture to be more adaptable and scalable in large and complex networks. By combining ML, the model becomes tuned and adjusted to new network traffic trends and offers a more efficient and secure strategy to network security. The applicability of ML based ZTNA solution is emphasized in securing highly dynamic and high traffic network effectively overcoming the conventional security architecture to cater to the requirements of modern network environments.

Keywords:

Zero Trust Network Access (ZTNA), Convolutional Long Short-Term Memory (CLSTM), Machine Learning, security.

Recent trends in Rotary Kiln and Refractory Material Patterns in Cement Production: A Review Approach

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Abstract:

The manufacturing of cement and other industrial operations depend heavily on rotary kilns, which use refractory materials to endure high temperatures and challenging chemical conditions. With an emphasis on their effects on durability and operating efficiency, this paper looks at the most recent developments in rotary kiln technology and refractory material choices. Various rotary kiln designs, typical refractory material patterns, and the difficulties posed by kiln failures are all covered. The research emphasises how crucial it is to maximise the performance of refractory linings in order to improve chemical resistance, reduce wear, and increase heat transmission. Additionally, simulation methods and mathematical modelling methodologies for rotary kiln process analysis are investigated, providing insights into energy optimisation and efficiency enhancements. The potential of emerging technologies to enhance process sustainability is also examined, including digital twin models and microwave-assisted calcination. This article offers helpful advice for choosing suitable refractory materials and optimising rotary kiln operation to achieve increased efficiency, lifespan, and environmental sustainability in cement production by examining important research and industry practices.

Keywords:

Rotary Kiln, Refractory Material, Patterns.

Stock Price Prediction Using Machine Learning

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Abstract:

Predicting stock prices has been an important focus among the research in the field of financial markets; however, traditional statistical methods are often not enough to identify the nonlinear and volatile movements of shares. Here we investigate how forecast prices of stocks using machine learning (ML) methods, making use of the market data available for this purpose. To evaluate the effectiveness of stock trend prediction in this paper, we conduct a comparative analysis of various ML models viz. Linear Regression, SVM, Random Forest, and LSTM networks. In this study, the process is structured and involves steps such as data preprocessing, feature selection, functioning with hyper-parameters for achieving optimum model performance. To measure the predictive ability of each model, evaluation metrics like Mean Squared Error (MSE), Root Mean Squared Error (RMSE) and R-squared (R^2) are calculated. It concludes that the deep learning-based classification model is superior, and in particular that LSTM outperforms the standard machine learning methods by capturing temporal dependencies in sequential financial data, with some issues like overfitting, noise in data and anomalies, indicate the necessity of hybrid models using economic and sentiment analysis information for better predictions of stock prices. Such promising results may open new avenues for the field of algorithmic trading and financial forecasting and have implications for investors, analysts, and policymakers alike regarding the potential for artificial intelligence-driven strategies in the stock market predictive tasks.

Keywords:

Stock price prediction, machine learning, financial forecasting, LSTM, algorithmic trading, market trends, predictive analytic etc.

Comparative Analysis of ANN, RNN, and GRU for Online Payment Fraud Detection

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Abstract:

With the ever growing presence of online payment transactions, online payment fraud becomes a major risk both for financial institutions and for the consumers. Rogue transaction detection is performed through a comparative analysis of Three artificial neural network (ANN) machine learning models, recurrent neural networks (RNNs), and gate recurrence units (GRUs) through this study. Four key performance indicators are evaluated using Error rate, sensitivity, specificity, and accuracy as methods of evaluating the model. The results also indicates good performance of the GRU model in comparison to the ANN and RNN GRU models as well as having the best accuracy of 99.9%. This insight depicts the performance of GRU for utilization in a robust online fraud detection mechanism.

Keywords:

The secure online transactions, fraudulent payment detection, ANN vs RNN vs GRU, the advanced machine learning models, deep learning for financial security, high accuracy fraud detection, error rate optimization, sequential data classification, digital payment risk assessment, AI driven anomaly detection, transactional fraud prevention and online financial monitoring are the areas covered in the index terms.

Next Word Prediction using LSTM

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Abstract:

Knowing how to predict the next word in a sequence is an essential job in the field of natural language processing (NLP), which has applications in chatbots, virtual assistants, autocomplete, and text generation. In the present investigation, the use of recurrent neural networks (RNNs) of the Long Short-Term Memory (LSTM) type to the next-word prediction problem is investigated. Because LSTM networks are particularly well-suited to processing sequential input and identifying long-term dependencies, it makes them appropriate for tasks that demand language and text.

With the goal to predict the most likely next word given an input word sequence, we recommend another approach that uses an LSTM model trained on a sizable text corpus. To enable the LSTM model to process the data efficiently, the dataset is preprocessed to produce sequences and the text is transformed into numerical form using a tokenizer. The model's accuracy in predicting the following word in a variety of test sequences is used to assess its performance after it has been trained to minimise the categorical cross-entropy loss.

Our analyses' conclusions emphasise that the LSTM-based model is effective at predicting the following word, which qualifies it for real-time uses such intelligent text-based systems and predictive typing. The difficulties in training these models are also discussed in this study, such as the quality of the dataset, adjusting model parameters, and avoiding overfitting. Our research advances the creation of more complex NLP programs that are able to produce and comprehend human language in real time.

Keywords:

Next-word prediction, LSTM, Natural Language Processing (NLP), deep learning, text prediction, tokenization, recurrent neural networks (RNNs).

Virtual Trail Room: Real-World Path Exploration Through Webcam Interface

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Abstract:

A virtual trial room system is what this paper intends to introduce. Using this, digital and real-time clothing try-on will be made possible through computer vision integrated with webcam functionality. Advanced computer vision algorithms will be used for detecting and tracking landmarks in a body, allowing for a precise overlaying of virtual garments, whose fitting would indeed be dynamic with the actual movement of the person making the purchase. Unlike specialized hardware-dependent systems, this solution is accessible at a wide range of levels and works effectively with a standard webcam. The innovation addresses some of the biggest online retailing problems, such as uncertainty about clothing fit, by providing an interactive and accurate visualization of garments. The real-time system's ability to simulate fit will also lead to increased customer satisfaction but will also have the potential to reduce product returns as well as improve the overall efficiency of e-commerce platforms. The proposed solution leverages readily available technology to effectively bridge the chasm between a world of physical shopping and online-based shopping, therefore opening up opportunities for improved consumer engagement in the fashion retail sector.

Keywords:

Real-time try-on, Body landmark detection, Online retail Solutions, Digital fashion retail, Accessible Technology, Consumer Engagement, Shopping Experience Innovation.

Efficient Cyber Threat Monitoring and Response Solution using Machine Learning

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Abstract:

Wireless communication technologies are developing rapidly, and network security threats have become sophisticated over time and are challenging to counter. Intrusion detection systems play an essential role in identifying intrusion threats and reacting to them. Recent advances in machine learning have enhanced the efficiency and accuracy of IDS tremendously, which allows for better attack detection. This paper suggests a practical IDS framework integrated with various ML methods. These are PCA, Random Forest, SVM, and Naïve Bayes algorithms. This paper uses PCA to reduce the dimensionality of the data so that the computational technique is efficient and the remaining three algorithms collectively contribute towards accurate and precise intrusion detection. These findings reflect the model's performance in improving network security, thus promising a safe future for wireless communication systems against upcoming cyber attacks.

Keywords:

Artificial Intelligence, Cybersecurity, Network Security, Intrusion Detection System, PCA, Random Forest, Machine Learning.

Smart Agriculture: AI Techniques for Detecting and Classifying Plant Diseases

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Abstract:

Early identification and categorization of plant diseases are crucial for improving agricultural productivity and maintaining food security. Conventional methods for disease identification are often labor-intensive, time-consuming, and require domain expertise, highlighting the need for this research explores the efficiency utilization of machine learning (ML) and deep learning (DL) techniques, particularly Convolutional Neural Networks (CNNs), plays a key role in creating automated solutions and advanced architectures such as Dense Net, Res Net, and MobileNetV2, in diagnosing plant diseases. Utilizing the Plant Pathology 2020 dataset, we conduct comprehensive Exploratory Data Analysis (EDA) to examine data distribution and implement preprocessing techniques to optimize effectiveness of the models is evaluated using essential performance metrics, including accuracy, precision, recall, and F1-score, with an emphasis on optimizing computational efficiency while maintaining high classification accuracy. Experimental results demonstrate that deep learning-based approaches outperform traditional ML models, achieving significant improvements in disease identification. The findings highlight the potential of AI-driven solutions in modern agriculture, enabling real-time disease detection and effective crop management strategies.

Keywords:

Identifying Plant Diseases, AI in Agriculture, Machine Learning for Crops, Deep Learning Applications, Convolutional Neural Networks in Farming, Dense Net, Res Net, MobileNetV2, Exploratory Data Analysis (EDA), Image Classification, Precision Agriculture, Computational Efficiency, Accuracy, Precision, Recall, F1-score.

Android Malware Detection using Autoencoders and Particle Swarm Optimization

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Abstract:

The study proposes a hybrid Android malware detection system that uses Autoencoders for feature extraction and Particle Swarm Optimization (PSO) for feature selection. A Random Forest classifier is then used for classification. PSO successfully decreased the feature set from 42 to 9 in the study's use of the CICInvesAndMal2019 dataset, improving computing efficiency while maintaining important information. With a weighted F1-score of 0.98 and a test accuracy of 98.08%, the Autoencoder showed high feature representation learning after being trained for 100 epochs with a batch size of 32. The Random Forest classifier achieved good precision and recall scores across several malware families, achieving 93.70% accuracy after being trained on the optimized feature subset. The findings confirm the effectiveness of PSO-driven feature selection and Autoencoder-based feature extraction in improving detection accuracy and scalability, making this approach highly suitable for real-world Android malware detection and cybersecurity applications.

Keywords:

android malware detection, autoencoders, particle swarm optimization, machine learning, deep learning.

Green Synthesis of Metal Nanoparticles for Aseptic Applications

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Abstract:

The growing need for sustainable and biocompatible antimicrobial materials has prompted researchers to investigate green synthesis methods for metal nanoparticles. The current research concerns green and chemical synthesis of iron oxide (Fe_2O_3) and gold (Au) nanoparticles and assesses their antimicrobial activity against *Aspergillus niger*, *Aspergillus oryzae*, *Penicillium* spp., and *E. coli*. Chemically synthesized Fe oxide nanoparticles were obtained from FeCl_3 and NaBH_4 , whereas green synthesis used *Murraya Koenigii* leaf extract as a reducing as well as stabilizing agent. Likewise, gold nanoparticles were synthesized chemically by using HAuCl_4 , BSA, and ascorbic acid, while green synthesis was carried out using plant extracts. Synthesized nanoparticles were characterized by employing UV-Vis spectroscopy to validate their formation and stability. Fourier-transform infrared spectroscopy (FTIR) was used to scan functional groups that stabilize, whereas X-ray diffraction (XRD) gave information about their crystalline nature. The size distribution and morphology were also investigated using scanning electron microscopy (SEM) and transmission electron microscopy (TEM). Antimicrobial activity of both green and chemically prepared nanoparticles is currently being screened, with minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) as critical assessment factors. The results of this study will assist in establishing whether green synthesis offers a more sustainable and efficient option for antiseptic use, especially in biomedical treatments, antiseptic coatings, and infection control.

Real-Time Human Emotion Recognition through Transfer Learning for Enhanced Sensory Interaction

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Abstract:

Presently human with technology interaction necessitates accurate emotion perception alongside responsive actions especially within healthcare and customer service alongside other personal assistance roles to create superior outcomes for users. The presented research introduces an emotional state recognition method which relies on facial expressions together with audio contents and written texts for accurate user emotion detection. The system obtains data inputs from multiple sources which include Toronto Emotion Speech Set (TESS) and FER datasets using its workflow composed of data cleaning steps followed by pre-processing operations and feature extraction operations. The system combines MobileNetV2 with FER data-set and CNN facial processing along with MLP with Librosa and TESS data-set audio processing and NLP using Linear Regression for text analysis. Data preprocessing maintains the attribute and dependability of the information as it divide the information into training and examination sections. Training combines MobileNetV2 along with MLP and NLP algorithms that build an ensemble model for uniting facial and audio and textual analysis results into one emotion prediction model. The model compilation precedes training phases allowing an optimized performance through weight and parameter saving. A user-friendly interface lets the trained model process real-time inputs which include facial images together with audio clips as well as text messages to achieve effective emotion recognition. This project develops an efficient solution for period of time emotion detection using machine learning model to improve user interaction between people.

Keywords:

Facial Emotion Recognition, Multimodal Emotion Detection, Deep Learning, ensemble model, Librosa, multi emotion, Natural Language Processing, MobileNetV2.

IOT Based Damaged Street Light Fault Notification & Intensity Control System

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Abstract:

As cities expand, streetlights are essential for keeping people safe and helping them move around freely. Unfortunately, broken or malfunctioning streetlights often go unnoticed for a long period of time because traditional maintenance methods depend on regular checks or reports from the public. Both of these methods can be slow, expensive, and inefficient. To tackle this problem, an IoT-based fault detection system provides a smarter and more efficient way to manage streetlights. This system uses sensors in the streetlights to keep track of their working status in real time. If a streetlight has a problem, it automatically sends the exact location of faulty streetlights, so maintenance teams can quickly take action. This automated method cuts down on costs, reduces the time lights are out, and improves safety and sustainability in cities by making sure streets are well-lit and resources are used wisely.

Keywords:

IoT-based Fault Detection, Real-time Monitoring, Streetlight Maintenance, Automated Alerts, Urban Infrastructure.

Design of Dual-Band H Shaped Microstrip Patch Antenna and Optimizing By Machine Learning

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Abstract:

In this study, machine learning algorithms are utilized to optimize a dual band H-shaped microstrip patch antenna which is initially designed in HFSS, operating on the frequencies of 1.7–2.7 GHz and 4.7–5.2 GHz. The design process aims to achieve identical upper and lower slots to the geometric center of the antenna symmetric structure. The systematic effects of slot length and width and variation on antenna performance is examined. A comprehensive set of shape optimized data obtained from simulation experiments are used to develop a predictive SVM model. The same dataset is further utilized to create an initial machine learning model for comparison. The findings indicate that SVM based solution performs significantly better than HFSS Simulated results in accuracy as well as reliability in prediction.

Keywords:

Support Vector Machine, dual band, microstrip antenna, Slots.

Violence Detection System for Automated Video Surveillance Applications

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Abstract:

The widespread adoption of surveillance cameras worldwide is fueled by advancements in digital video capture, storage, and processing technologies. However, the sheer amount of video data produced presents significant challenges for real-time human analysis, often resulting in delays in detecting critical events. To overcome these limitations, automated violence detection in surveillance footage has emerged as a key research focus. Modern developments in deep learning has made video recognition tasks like violence detection more Practical and effective. This research explores advanced networks that employ 3D CNN layers to analyze the dynamic interactions between entities in video footage, enabling the extraction of both Dynamic spatial and temporal relationships. We further optimize the process by integrating knowledge from a pre-trained action recognition model, improving both the speed and accuracy of violence detection. By testing our approach on widely available datasets with diverse and complex video scenarios, we achieved a significant improvement in accuracy over existing methods. What's more, our method uses fewer parameters, making it both efficient and effective. Our findings also show that the model performs reliably even in real-world challenges, like handling low-quality, compressed videos typically processed on remote servers.

Keywords:

Automated violence detection, 3D CNN layers, deep learning, Spatial and temporal relationships.

Early Detection of Parkinson's Disease through Gait Analysis

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Abstract:

Parkinson's disease (PD) is a neurodegenerative disorder characterized by motor impairments such as tremors, bradykinesia, and postural instability. Early detection is crucial for effective intervention and patient management. This project leverages AI and IoT-based sensor technology to analyze gait patterns and predict PD severity using the Unified Parkinson's Disease Rating Scale (UPDRS). Motion sensors collect real-time gait and tremor data, which is processed using a hybrid machine learning model to accurately assess motor abnormalities. By providing an objective and scalable approach to PD diagnosis, this system enables remote healthcare applications, offering clinicians real-time insights for personalized treatment and improved patient outcomes.

Keywords:

Parkinson's disease, Gait analysis, Artificial Intelligence, Motion sensors, Remote healthcare.

Optimizing Credit Card Fraud Detection with Cost-Sensitive Thresholding and Explainable AI

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Abstract:

Credit card fraud detection is a critical challenge in financial security, requiring accurate and cost-effective solutions to prevent unauthorized transactions while minimizing disruptions to legitimate users. Traditional fraud detection systems rely on rule-based and machine learning approaches but often fail to handle the inherent class imbalance, leading to high false positive rates (legitimate transactions flagged as fraud) or false negatives (missed fraudulent transactions). This research presents a cost-sensitive, machine learning-based fraud detection framework that dynamically optimizes the fraud classification threshold based on financial impact analysis. By integrating Logistic Regression and XGBoost, the model balances fraud detection accuracy and operational costs. A cost function-based threshold optimization strategy is implemented to minimize overall financial loss. The methodology incorporates Synthetic Minority Over-sampling (SMOTE), Explainable AI (SHAP values), and real-time transaction monitoring for improved interpretability and reliability. Experimental results demonstrate that cost-aware decision-making reduces financial losses by 23.

Keywords:

SHAP, SMOTE, Deep Learning, and Anomaly Detection.

Human Detection-Based Video Compression for Storage Optimization in Surveillance Videos

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Abstract:

Video data constitutes a significant portion of traffic on internet, so demand is increasing for efficient compression techniques to reduce bandwidth usage and storage requirements. Traditional video codecs exploit temporal and spatial redundancies within the video stream for compression, but lack explicit recognition of semantic objects. This paper proposes a human detection-based video compression framework that makes good use of the recent advances in deep learning for object detection. By detecting and tracking human beings using YOLOv8 across different frames of video, first those frames which contain humans or any significant motion are preserved and rest of the frames are discarded. Then separation of regions containing humans versus background areas takes place. After that, Discrete Wavelet Transform (DWT) compression is applied in which human regions are preserved at same quality to maintain quality of visual information, while background is compressed. This method reduces the storage effectively without compromising much on the visibility of humans. The approach achieved an average PSNR of 33.72 dB and average SSIM of 0.9237 for video from VIRAT Dataset.

Keywords:

Video Compression, Object Detection, Video Compression, Regions of Interest, Background, Coding.

Integration of AI & Machine Learning for Predictive Safety Measures in Blast-Resistant Railway Bridges

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Abstract:

Railway infrastructure faces increasing risks from blast threats, making advanced predictive safety measures essential. This study investigates the integration of Artificial Intelligence (AI) and Machine Learning (ML) in designing and maintaining blast-resistant railway steel girder bridges. AI-driven algorithms enable real-time threat detection, predictive maintenance, and post-blast recovery strategies, enhancing structural resilience and operational efficiency. Deep learning models and sensor-based Structural Health Monitoring (SHM) are used to identify potential damage, optimize maintenance schedules, and minimize downtime. A hybrid AI-Finite Element Modeling (FEM) framework is introduced to enhance structural response analysis under blast loading, improving accuracy while reducing computational demands. Additionally, AI-powered generative models refine blast-resistant bridge designs, ensuring cost-effective and robust structural solutions. The study also examines AI-driven surveillance for anomaly detection and cyber-physical security integration to protect critical transportation infrastructure. A case study validates the effectiveness of the proposed framework, demonstrating significant improvements in predictive accuracy and structural reliability. The findings contribute to advancing smart railway infrastructure by integrating AI-powered automation, real-time monitoring, and data-driven decision-making. Future research will focus on real-time blast event simulations, AI-driven emergency response systems, and enhanced autonomous inspection techniques using UAVs.

FOODGPT: Conversational AI For Personalized Restaurant And Dish Recommendations Using Advanced Machine Learning

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Abstract:

The FOODGPT represents an excellent conversational agent created using AI principles which will reshape the dining experience by recommending traditional restaurants and meals. The chatbot format of FOOD GPT collects customer preferences regarding places along with food kinds, special needs, price range and dining ambiance details. The system uses restaurant review APIs to provide current data which maintains application suggestions relevant and up to date. FOOD GPT uses current NLP methods to understand user questions along with machine learning mechanisms for feature recognition which enables it to both present dining recommendations and present top-rated food choices based on user responses. FOODGPT delivers solutions to restrictive filter-based interface problems by offering customized and interactive service which addresses both specificity and accessibility while providing realistic user interactions. The presented paper examines the design methods along with the system form that demonstrates its ability to boost user satisfaction while transforming traditional approaches to dining recommendations.

Keywords:

Conversational AI, Machine Learning, Natural Language Processing, Personalized Recommendations, Restaurant Discovery, Chatbots.

Empowering Farmers: Real-Time Coconut Tree Disease Detection and Management Using YOLOv8 and Machine Learning Techniques

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Abstract:

In the evolving landscape of agricultural technology, enhancing machine learning applications with Explainable AI (XAI) offers significant advancements in managing crop health, especially for coconut farming. This project introduces a YOLOv8-based system enhanced with Explainable AI, designed for the real-time detection and management of coconut tree diseases. Employing advanced image processing techniques, the system analyzes input from various sources such as uploaded images, live webcam feeds, and RTSP streams to detect diseases with high accuracy and efficiency. The integration of Explainable AI, using EigenCAM, highlights regions of the image where the model detects diseases. It provides visual explanations by displaying the disease name and confidence score directly on the image, fostering greater transparency, fostering greater transparency and trust among users. The system's core, a pre-trained YOLOv8 model, identifies multiple diseases and offers actionable insights and recommendations for each detected issue. Coupled with a user-friendly Streamlit interface, the system ensures accessibility and ease of use for farmers with varying levels of technical skill. Initial deployments have demonstrated impressive results in detection accuracy, processing speed, and user engagement, indicating a substantial impact on improving disease management practices in coconut plantations.

Keywords:

Coconut Disease Detection, YOLOv8, Machine Learning, Agricultural Technology, Real-Time Image Processing, Explainable AI, Streamlit, Crop Health Management.

Petroleum Quality Prediction and its Optimization: Development of Optimized Fuzzy Control Charts for Enhancing the Petroleum Quality

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Abstract:

The petroleum industry requires stringent quality control procedures for conventional Statistical Process Control (SPC) techniques tend to be unsatisfactory in dealing with imprecise and uncertain data and thus cannot provide the optimal solution in intricate petroleum processing scenarios. This paper reviews the enhanced fuzzy control charts for enhancing petroleum quality monitoring through effective control of process variation under uncertainty. Optimization methods such as AI-based tuning, adaptive thresholding, and hybrid machine learning that enhance the accuracy and reliability of control charts. In addition, fuzzy logic is integrated with the conventional SPC techniques in the critical performance metrics like detection sensitivity, false alarm rates, and process condition flexibility. The findings demonstrate that fuzzy control charts optimized using fuzzy logic are superior to conventional methods because they are more accurate, variable, and steady in identifying process anomalies. AI-based fuzzy models also enhance performance by reducing false alarms and control limits adjusted adaptively based on real-time variations. The interaction between evolutionary algorithms and deep learning models improves the forecasting ability, and very effective at optimizing operations, fuel blending, and contamination detection. Further involvement of AI, fuzzy logic, and big data analytics will transform to make it efficient and sustainable for petroleum quality prediction.

Keywords:

Petroleum Quality Control, SPC methods, Fuzzy-control, AI-Based models.

Enhancing Quality of Life: A Comprehensive Review of Assistive Technologies for Diverse Needs

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Abstract:

This study examines how assistive technology (AT) can improve lives of the Elderly, Children & Adults with Disabilities and People with Long-Term Health Conditions. It delves into the global demand for AT, highlighting the projected increase in the need for such technologies, driven by an aging population and the prevalence of noncommunicable diseases. The paper underscores the critical role of AT in supporting cognitive abilities, communication skills, auditory and visual perception, mobility, and self-care capabilities, thereby promoting health, well-being, and active participation in society. It examines the evolution of AT, from simple innovations like eyeglasses and wheelchairs to sophisticated solutions driven by the Internet of Things (IoT), machine learning (ML), and artificial intelligence (AI). These developments have sparked the creation of creative solutions like wearable technology, helpful robots, and smart canes, which provide elderly and disabled people with individualized support and assistance. The paper also addresses the challenges in implementing AT, including design limitations, high costs, and societal acceptance issues, and proposes directions for future research to make AT more accessible and effective. By means of an extensive examination of the effects of AT on the quality of life (QOL) and its potential to address the various requirements of future generations, this paper positions AT as a pivotal tool in healthcare, enabling individuals to live more independently and fulfilling lives.

Keywords:

Assistive Technology, Elderly care, Disabilities, Chronic Illnesses, Smart Devices, Wearable Technology, Artificial Intelligence, Machine Learning, Computer Vision, Robotics, Augmented Reality.

Stroke Prediction Using Deep Learning and Transfer Learning Approaches

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Abstract:

Stroke is one of the top causes of death and disability worldwide. The best approach to tackle the stroke issue is to prevent it by managing metabolic factors, atrial fibrillation, hypertension, smoking, and other related conditions. However, medical professionals often find it challenging to determine if special precautions are needed for a patient based solely on monitoring, especially when physiological indicators appear normal. There is a significant imbalance in the number of stroke patients compared to non-stroke patients, prompting this study to explore various techniques to address the challenges of predicting strokes in an unbalanced dataset. Deep learning models were then employed to assess the likelihood of patients experiencing a stroke. Finally, a classification experiment was conducted using transfer learning to see if the evaluation metrics could be further enhanced. The experimental results indicated that this study successfully reduced both the false negative rate (FNR) and false positive rate (FPR) in stroke predictions, while also improving the overall accuracy through methods addressing category imbalance and deep learning techniques.

Keywords:

Machine learning, deep learning, transfer learning, stroke prediction.

AI-Powered Targeted Spraying Robot for Precision Agriculture

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Abstract:

In this paper, an autonomous robot for precision spraying in agriculture is proposed with the aim of minimizing chemical overuse. The Robot features AI power image processing system for real-time plant detection and classification. Autonomous driving and spraying are enabled by an Arduino microcontroller communicating with a Bluetooth controlled movement system. The hardware setup also include camera for live image capturing, DC Motors for mobility and a precise spraying system for chemicals application. The field testing also showed that it could cut chemical waste by up to 90% a year, make agriculture more sustainable and dramatically reduce farmer exposure to hazardous chemicals.

Keywords:

Precision agriculture, Autonomous robot, Pesticide spraying, Artificial intelligence, Sustainable farming.

Detection of Fraud Transaction using Machine Learning in E-Commerce Industry

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Abstract:

The fast development of e-commerce, exacerbated by the COVID-19 epidemic, has brought about an expansion in digital fraud, presenting impressive monetary and security hardships. Relieving these risks requires the formation of complex and trustworthy fraud detection systems, much of the time upset by inadequate genuine information. This study utilizes the False Fraudulent E-Commerce Transaction Data dataset to further develop fraud detection viability. To redress class irregular characteristics in the dataset, the "Synthetic Minority Oversampling Technique (SMOTE)" is used, ensuring fair portrayal of fraudulent and genuine transactions. An assortment of machine learning models was surveyed to decide the best proficient technique for fraud detection. The "Voting Classifier", which joins "Bagging with Random Forest and Boosted Decision Trees", achieved the best accuracy of 97.2%, representing its viability in distinguishing deceitful movement. The discoveries highlight the meaning of coordinating gathering systems and complex testing procedures to upgrade prescient viability in e-commerce fraud detection, giving a versatile way to deal with address rising dangers.

Keywords:

E-commerce; fraud detection; Machine Learning (ML); systematic review; organized retail fraud".

QPark: Optimized Virtual Queue System for Enhanced Visitor Experience in Amusement Parks

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Abstract:

The increasing challenges faced by amusement parks, including long wait times, overcrowding, and declining visitor satisfaction, negatively impact revenue. Traditional physical queue systems limit visitor engagement in activities such as dining, shopping, and exploring attractions, reducing the park's revenue potential. To address these issues, we propose an advanced Virtual Queue system designed to optimize the visitor experience and operational efficiency. This system enables visitors to join multiple queues simultaneously, allowing them to participate in various park activities while waiting. Real-time updates on queue status are provided through timely notifications, ensuring visitors are informed when their turn approaches, as long as they remain within the park. By allowing visitors to utilize their waiting time more effectively, the system improves overall park satisfaction and contributes to increased revenue streams. The implementation of this innovative queue management solution represents a major shift in how amusement parks handle visitor flow, offering improved experiences and operational efficiency.

Keywords:

Virtual Queue Management, Amusement Parks, Ride Management, User Experience, Admin Panel, GPS, Real-time Notifications, Ticket Management, Visitor Satisfaction.

Lead Mangement System

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Abstract:

A Lead Management System (LMS) is essential for businesses aiming to efficiently capture, track, and convert leads into customers. This abstract provides an overview of a sophisticated LMS designed to streamline the lead management process through automation and data-driven insights. The system is equipped with advanced features for capturing leads from diverse sources, including web forms, email campaigns, and social media channels.

Once captured, leads are automatically categorized and scored based on predefined criteria such as engagement level and demographic information. The LMS uses these insights to prioritize leads, ensuring that high-value opportunities are addressed promptly. Real-time tracking and customizable dashboards allow sales and marketing teams to monitor lead status, track interactions, and manage follow-ups effectively.

The LMS also incorporates robust analytics and reporting tools that generate detailed performance metrics, such as lead conversion rates, source effectiveness, and campaign ROI. These insights facilitate data-driven decision-making and strategic adjustments to improve lead generation efforts.

By automating routine tasks, integrating with existing CRM systems, and providing actionable intelligence, the Lead Management System enhances efficiency, reduces manual errors, and boosts overall sales performance. The system supports a seamless lead-to-customer journey, contributing to increased revenue and improved customer relationship management.

A Hybrid BiLSTM–DNN Approach for Crop Yield Prediction with NDVI Features

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Abstract:

Accurate prediction of crop yield is essential to guarantee food security and optimize agricultural decision-making. Traditional forecasting methods rely on structured parameters like soil properties and climatic data, while vegetation indices such as NDVI (Normalized Difference Vegetation Index) offer additional information about crop health. This paper proposes a new Hybrid BiLSTM–DNN model with an attention mechanism to improve the accuracy of yield estimation. The suggested model efficiently extracts temporal dependencies in multi-year agricultural data through a Bidirectional LSTM (BiLSTM) layer and utilizes deep neural networks (DNNs) for feature extraction and prediction. The dataset was collected from various regions, incorporating NDVI measurements as the primary indicators of vegetation dynamics. Various machine learning and deep learning models were tested, such as XGBoost, CNN–DNN, CNN–LSTM, and our own BiLSTM–DNN hybrid model. Experimental findings proved that our BiLSTM–DNN model with attention performed better than current architectures, yielding an R^2 value of 0.94, which is much higher than conventional models. The findings point out the potential of deep learning-based hybrid architectures in advocating precision agriculture by maximizing yield prediction through sequential modeling and improved feature extraction.

Keywords:

Crop yield prediction, Bidirectional LSTM (BiLSTM), Deep Neural Networks (DNN), Attention Mechanism, Hybrid models, NDVI, Temporal Modeling, Precision Agriculture, XGBoost.

Gesture Mouse Control Using Computer Vision

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Princi

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Abstract:

In recent years, great progress has been made in human-computer interaction; our aim here is to use the hardware mouse and control the mouse content by manipulation and color recognition. By Using camera and color recognition technology, movements are captured. Inspired by the idea that we can communicate with computers, we are trying to eliminate the contact between people and computers by updating with gesture demonstrations. The aim is to move the mouse pointer on the screen without using hardware, but using finger movements, pointing information. In recent years, different technologies have been explored in the creation of virtual mice. The technology strategy of our project focuses on the three main areas: product knowledge, image processing and color recognition. In this project, we have demonstrated a new method for human-computer interaction where the cursor movement is controlled by the real-time camera. This technology has a significant impact on accessibility, allowing people with physical disabilities to interact more effectively with computers. It focuses on providing touchless interaction, which is particularly useful in shared environments. Challenges such as lighting adaptation, background complexity, and computational optimization are areas of ongoing research focus. Gesture based mouse controls have the potential to revolutionize user interaction models and pave the way for more interactive and natural human-computer interfaces. This project aims to represent the forefront of human-computer interaction and offers a non-invasive, intuitive alternative to traditional devices. The technology uses computer vision algorithms to detect movements and make hand gestures, allowing users to control the cursor or perform specific commands without physical contact.

Responsible Adoption of the latest AI Technologies in the Legal Industry

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Founder at Mind Mosaic AI and Engineering leader at Microsoft

Abstract:

The rapid evolution of artificial intelligence (AI) is transforming the legal industry, redefining traditional practices, and enhancing efficiency. Law firms are increasingly integrating AI-powered solutions for contract analysis, legal research, predictive analytics, and case management. AI-driven tools streamline document review processes, reducing time and costs while improving accuracy. Moreover, legal chatbots and virtual assistants enhance client interactions by providing instant legal guidance. Custom AI applications, tailored to specific legal domains, are being developed to optimize workflows and decision-making. However, the adoption of AI in legal practices raises concerns regarding data privacy, ethical implications, and regulatory challenges. This paper explores the current landscape of AI integration in law firms, highlighting key advancements, challenges, and future trends. It examines how AI is reshaping legal roles, the necessity of reskilling legal professionals, and the potential impact on access to justice. By analyzing case studies and industry trends, this study provides insights into the transformative potential of AI in the legal domain and its implications for the future of legal practice.

Keywords:

Artificial Intelligence, Legal Technology, Law Firms, Legal Automation, AI Ethics, Legal Innovation, AI-Powered Solutions.

Mapping of Land Cover Changes Utilizing Multi-temporal Remotely Sensed Data in East Sikkim, India

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Abstract:

In recent years, urban planners and environmental specialists have primarily focused on the expansion of urbanization and the increasing urban populations, especially in developing countries. This is widely acknowledged and has been documented. This research initiative, driven by the identified relevant issue, seeks to conduct a temporal analysis of Landsat satellite datasets from East Sikkim over a decade to ascertain the rate of natural vegetation depletion and urban sprawl expansion, while also identifying underlying patterns and associated causes. The present work uses multi-temporal satellite data in conjunction with statistical models to delineate and monitor land use and land cover change patterns in East Sikkim. Long-term land use and land cover (LULC) and urban spatial change were modelled using Landsat satellite data from 2013 to 2023 in ERDAS Imagine. The evaluation of the results indicated that the expansion of urban built-up areas significantly contributed to a marked reduction in Dense Forest and Barren Land areas from 2013 to 2023. To achieve the research aims, supervised image classification has been conducted to identify several land cover classes, including urban areas, forests, vegetation, and barren terrain. The classification results indicate that dense forest and barren terrain have diminished by roughly 7.5 km² and 0.37 km², respectively, whereas vegetation and urban areas have expanded by approximately 0.29 km² and 24.86 km², respectively. The outcome was achieved with an average classification accuracy of 91.87% and a Kappa value of 0.8529.

Advanced Predictive System for Diagnosing Patient Disease Through Machine(Deep) Learning Techniques

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Abstract:

The aim of this research is to develop a web application that predicts multiple diseases, including Diabetes, Breast Cancer, Heart Disease, Alzheimer disease, brain tumor, Covid-19, and Pneumonia, using machine learning and deep learning models. The models were trained on large datasets sourced from Kaggle. The study includes data collection, preprocessing, model selection, and deployment of the trained models. The application uses Python Flask as the web framework, and models such as CNN (for Covid-19, and Pneumonia) are integrated to ensure accurate predictions. This project achieved prediction accuracies of up to 97% for certain diseases, showing the viability of machine learning in healthcare applications. The findings suggest that the developed system could support early detection of disease and improve healthcare outcomes.

Keywords:

Disease Prediction, Machine Learning, CNN, Deep Learning, Flask, Healthcare, Kaggle.

Sentiment-Based Rating Prediction Using BERT and LSTM

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Abstract:

Sentiment analysis is crucial for understanding opinions expressed in textual data, particularly in the e-commerce sector, where consumer reviews influence purchasing decisions and business strategies. Effective sentiment classification requires capturing contextual meaning and handling large-scale data efficiently. This study proposes a hybrid sentiment analysis framework integrating Bidirectional Encoder Representations from Transformers (BERT) with Bidirectional Long Short-Term Memory (BiLSTM) to enhance sentiment classification accuracy. The framework utilizes BERT for deep contextual feature extraction and BiLSTM to capture sequential dependencies for improved sentiment representation. To validate the effectiveness of the proposed method, an experimental analysis is conducted using a benchmark dataset. The performance of the BERT-BiLSTM model is compared with other traditional sentiment analysis approaches. The experimental results demonstrate that the hybrid BERT-BiLSTM model achieves superior accuracy in sentiment classification, offering valuable insights for businesses and researchers in the field of opinion mining.

Keywords:

BERT, LSTM, NLP, Sentiment Classification, Sentiment Analysis, Neural Networks, RNN, CNN, Prediction, Rating.

Design and Implementation of Phase Locked Loop Using ADS

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Abstract:

The Phase-Locked Loop stands as an important component of contemporary communication systems because it establishes accurate clock timing as well as frequency generation. The paper uses Advanced Design System (ADS) to analyze Phase-Locked Loops through a performance evaluation of phase noise along with locking time assessment and stability investigation and power dissipation measurement. ADS provides better simulation functionalities than CMOS digital tools do since it is specially optimized for high-frequency analog designs targeting RF and microwave scenarios.

This research examines various PLL designs through which it investigates how loop filters interact with VCO characteristics and feedback mechanisms to influence system performance results. Analysis of phase noise elimination together with locking behavior and power efficiency becomes possible through distinct simulation conditions. The research paper shows that PLL operational performance results strongly from design choices while demonstrating ADS capability for optimizing RF and mixed-signal circuits. Including these findings enables developers to optimize PLL strategies that enable high performance operation in wireless communication and signal processing systems.

Keywords:

Phase-Locked Loop (PLL), Advanced Design System (ADS), Phase Noise, Lock Time, VCO (Voltage-Controlled Oscillator), Loop Filter, Frequency Synthesis, Mixed-Signal Circuits, Stability Analysis.

Leveraging Gemini AI for Scalable and Contextual Content Generation

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Abstract:

As the demand for high-quality content continues to surge, traditional content creation methods have become inefficient and unsustainable. This paper presents Gemini, an AI-powered content generation system designed to automate and streamline content creation. By utilizing natural language processing (NLP) and machine learning (ML) technologies, Gemini addresses key challenges such as resource limitations, content overload, and the need for personalized content. The integration of the system with existing operations provides scalability, efficiency, and adaptability, providing great benefits to both businesses and content creators. The main problems that this work aims to solve are the inefficiency and scalability issues inherent in traditional content creation processes. These processes often require significant human input, resulting in reduced efficiency and conflicts.

Identification of medicine using OCR and pharmacy locator

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Abstract:

The rapid evolution of technology in healthcare has enabled innovative solutions for enhancing medication identification and accessibility. This project focuses on the development of a system that utilizes Optical Character Recognition (OCR) for accurate identification of medicine details and integrates a pharmacy locator for streamlined user assistance. The proposed system leverages advanced OCR techniques and machine learning to recognize text from medicine labels, ensuring high accuracy despite variations in fonts, lighting, and packaging. Furthermore, the pharmacy locator employs geo marketing and location-based services to identify nearby pharmacies, improving access to essential medications. This dual-function system not only addresses challenges like misidentification, language barriers, and real-time responsiveness but also enhances patient safety, minimizes medication errors, and ensures timely access to pharmaceutical resources through an intuitive mobile application interface. By integrating cutting-edge OCR technology, deep learning algorithms, and geolocation services, the system offers a reliable and scalable solution to bridge healthcare gaps in both urban and rural environments.

Keywords:

Optical Character Recognition (OCR), pharmacy locator, medicine identification, machine learning, geo marketing, healthcare technology, text recognition, location-based services.

Enhancing ATM Accessibility: A Dual-Language (Hindi and English) Streamlit Application with Audio Guidance and Voice Command for Visually Impaired Users

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Abstract:

This project focuses on the design of a dual-language ATM system specifically tailored to accommodate visually impaired individuals, enhancing their banking experience through speech recognition and text-to-speech technologies. Functional in both Hindi and English, the system enables voice-based interactions for financial transactions, removing the need for physical or visual interfaces. With the integration of auto-annunciators, the ATM provides auditory feedback throughout the transaction process, ensuring users are aware of each step. The design incorporates enhanced security measures, including voice recognition and authentication, to protect user privacy and prevent fraud. Real-time processing capabilities ensure swift and efficient transactions, improving the overall banking experience. This system aims to provide greater financial independence and security for visually impaired individuals, creating a more inclusive and accessible banking solution. By offering a seamless, secure, and user-friendly platform, the project sets a new standard in accessible banking facilities, promoting financial freedom and inclusion for those with disabilities, particularly those who are blind.

This dual-language ATM system, designed for visually impaired users, enables secure, voice-based transactions in Hindi and English using speech recognition and text-to-speech technology. With real-time processing, voice authentication, and auditory feedback, it ensures accessibility, security, and financial independence.

Keywords:

Accessibility, Visually Impaired, ATM System, Speech Recognition, Text-to-Speech, Financial Independence, Dual-Language Interface, Secure Banking, Inclusive Technology.

A Practical Comparison of Vulnerability Assessment and Penetration Testing

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Abstract:

Vulnerability Assessment (VA) and Penetration Testing (PT) are two Essential methodologies in cybersecurity, each playing a distinct role in identifying and mitigating security risks. This study provides a practical analysis of VA and PT through real-world scenarios, utilizing tools such as OpenVAS, Nessus, Nikto, and Metasploit. The study focuses on both network and web security, conducting controlled experiments on vulnerable systems like Metasploitable 2 and bWAPP to evaluate the effectiveness of these approaches. VA identifies vulnerabilities systematically, while PT actively exploits these weaknesses to assess their real-world impact. By addressing both detection and exploitation, the study underscores the importance of combining VA and PT for building strong cybersecurity defences. The results offer practical insights for professionals and organizations to adopt the most effective security strategies for safeguarding modern digital systems.

Smart Classification of Human Activities through Deep Learning

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Abstract:

Human activity recognition(HAR) is one of the most important video classification tasks, and it is applied to smart surveillance healthcare and fitness monitoring. This paper introduces a hybrid deep learning method for human activity classification from video streams by combining Convolutional Neural Networks (CNN) and Recurrent Neural Networks(RNN). While the RNN, i.e., a Long Short-Term Memory(LSTM) network, is used to capture temporal patterns between frames for enhanced sequential knowledge, the CNN is used to extract spatial features from individual frames, extracting essential visual representations. Yoga, dance, and exercise are employed as three activity classes for the training and testing of the proposed model. Experimental results illustrate the efficacy of the model in classifying between these activities and that accuracy is employed as the only performance measure. The high classification accuracy of our approaches justifies the power of using RNNs for temporal modeling and CNNs for feature extraction in HAR tasks.

Keywords:

Human activity recognition(HAR), Deep learning, Convolution neural network(CNN), LSTM.

Detection of Suicide Risk and Depression on Social Media Using Machine Learning Techniques

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Himanshu

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Abstract:

Numerous research on suicide indicates that there are around 800,000 suicides annually, and it is still challenging to detect suicidal people. The use of social media has grown, and we have seen that people freely share their plans and attempts at suicide on these sites. Through the identification of suicidal profiles on social networks, this study aims to prevent suicide. In order to extract numerous components, including account attributes linked to the profile and features related to social media data, we first analyze social media profiles. Second, we describe our machine learning-based method for using Twitter data to detect suicidal profiles. Next, we employ a profile data collection of people who have previously taken their own lives. The accuracy and recall of our method in detecting suicidal traits are confirmed by experimental results. Lastly, we provide a Python-based prototype that shows how to identify suicidal traits to illustrate our findings.

Keywords:

Machine Learning Algorithms, Suicidal Dataset, Python Based.

Enhancing Peer-To-Peer Networks: The Future of Decentralized File Sharing

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Abstract:

Sharing Files Anonymously and Securely with IPFS presents a comprehensive exploration into leveraging the Inter Planetary File System (IPFS) for anonymous and secure file sharing. In an era where privacy concerns and data breaches are prevalent, decentralized technologies like IPFS offer promising solutions by distributing files across a network of peers, eliminating single points of failure and enhancing user anonymity. This project delves into the technical intricacies of IPFS, elucidating its content addressable storage model, peer-to-peer architecture, and cryptographic protocols. It examines how IPFS enables users to share files without relying on centralized servers, thereby reducing the risk of censorship, surveillance, and unauthorized access. Moreover, the project investigates various privacy-enhancing techniques, such as encryption, onion routing, and zeroknowledge proofs, which can be integrated with IPFS to bolster user privacy and data security. Furthermore, "Sharing Files Anonymously and Securely with IPFS" explores practical implementations and use cases of IPFS in real-world scenarios. It discusses the development of user-friendly applications and platforms that leverage IPFS for anonymous file sharing, catering to diverse needs ranging from whistleblowing and journalism to academic research and disaster recovery.

This project addresses legal and ethical considerations surrounding anonymous file sharing, highlighting the importance of balancing privacy rights with accountability and compliance with regulatory frameworks

Keywords:

Blockchain, IPFS, Decentralized Storage, Peer- to-Peer Network, Cryptographic Hashing, AES-256 Encryption, Distributed Hash Tables, Data Integrity.

Integrating Neural Networks for Enhanced Stock Market Predictions

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Abstract:

The stock market encapsulates a company's ownership, financial performance, and economic contributions through its stock price, which is divided into shares and traded based on market conditions and corporate stability. Analyzing stock market trends is complex, influenced by factors such as market demand, price fluctuations, corporate health, speculative rumors, brand reputation, and venture capital inflows. To enhance decision-making, this study explores machine learning techniques, particularly Long Short-Term Memory networks, for accurate stock price forecasting. For precise stock price predictions, use LSTM networks. Long-term relationships in sequential data are efficiently captured by LSTM networks, a kind of recurrent neural network, addressing challenges like vanishing gradients. By learning patterns from historical stock data, they provide reliable predictions of future market behavior. Additional machine learning models, including regression and decision trees, further refine forecasting accuracy and complement LSTM performance. The methodology involves comprehensive data preprocessing steps such as feature selection, noise reduction, and missing value treatment. To train the LSTM model, historical data is used, sourced from the Yahoo Finance API, using the Mean Squared Error loss function and the Adam optimiser. Performance metrics like Mean Absolute Error and Mean Squared Error validate the model's accuracy. This research demonstrates how LSTM networks, combined with other machine learning models, can improve risk assessment and strategic investment planning.

Movie Suggestion Expert Using Collaborative Filtering

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Abstract:

With the growth of the film industry, movies have become an essential form of entertainment for many people. However, the vast amount of online movie information can overwhelm users, making it challenging to choose films effectively. Browsing and manually selecting movies can also be time-consuming and tedious. To address this issue, a movie recommendation system is essential. Such a system suggests movies users are likely to enjoy by analyzing the similarity between users and movies.

This study employed the collaborative filtering algorithm, a widely utilized technique in recommendation systems. Two problems that current systems have to deal with are data sparsity and the cold start problem. The study used a collaborative filtering technique based on Singular Value Decomposition (SVD) to mitigate these problems. The experiment evaluated two conventional collaborative filtering methods, item-based and user-based, against the SVD-based approach using the MovieLens ML-100K dataset. Evaluation criteria such as RMSE and MAE were employed to measure the effectiveness of these algorithms.

The results demonstrated that SVD outperformed the other methods on this dataset. Additionally, experiments showed that increasing the k-value (number of latent factors) within a certain range improved the recommendation accuracy of the SVD-based system.

Keywords:

collaborative filtering, recommendations, user agreement, expert position.

Stock Market Price Prediction Website using Machine Learning Algorithms

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Abstract:

The predictability of stock market prices is very challenging due to the volatility inherent in the market and the many influences on it. However, the techniques of machine learning and advanced statistical methods have been successful in predicting stock prices based on historical trends, trading volumes, and technical indicators. Stock markets are influenced by global economic conditions, news, and investor sentiment; therefore, a robust system is needed to help traders and investors make informed decisions. This can be addressed by using predictive models that leverage data-driven insights, including external factors such as macroeconomic indicators and sentiment analysis, to provide accurate forecasts. This paper reviews recent advancements in stock price prediction using machine learning, comparing their effectiveness, limitations, and real-world applicability. It highlights key challenges in improving accuracy and scalability and identifies future research opportunities to refine these models for dynamic and complex market conditions.

Keywords:

Stock Market, Machine Learning, Forecasting, Finance, Data Analysis, Predictive Analytics, Volume Analysis, Indicators, Sentiment Analysis, Market Volatility, Decision Making.

Stock Market Price Prediction Website using Machine Learning Algorithms

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Abstract:

The predictability of stock market prices is very challenging due to the volatility inherent in the market and the many influences on it. However, the techniques of machine learning and advanced statistical methods have been successful in predicting stock prices based on historical trends, trading volumes, and technical indicators. Stock markets are influenced by global economic conditions, news, and investor sentiment; therefore, a robust system is needed to help traders and investors make informed decisions. This can be addressed by using predictive models that leverage data-driven insights, including external factors such as macroeconomic indicators and sentiment analysis, to provide accurate forecasts. This paper reviews recent advancements in stock price prediction using machine learning, comparing their effectiveness, limitations, and real-world applicability. It highlights key challenges in improving accuracy and scalability and identifies future research opportunities to refine these models for dynamic and complex market conditions.

Keywords:

Stock Market, Machine Learning, Forecasting, Finance, Data Analysis, Predictive Analytics, Volume Analysis, Indicators, Sentiment Analysis, Market Volatility, Decision Making.

Image Recognition System using Pytorch

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Abstract:

With the improvement of artificial intelligence and deep studying, photograph type era has released new possibilities and challenge. SO-known as photo classification problems are issues that the person takes over with photos, and the pc sends category and description of the photo content. Description and detection of traits as conventional photo classification methods have many drawbacks, including: B. Low accuracy and long-time period troubles. Pytorch is exceptionally powerful underneath existing deep mastering frameworks. Researchers can fast and without difficulty construct foldable models of neural networks the use of the Pytorch framework and teach them on large datasets. this newsletter offers a brief overview of picture category algorithms, neural networks, and Pytorch. The category experiment is done on the style price of modem mode MNIST, with the version accuracy accomplishing 88.39%. we can give an explanation for the directions of future research.

A Blockchain-Based System for Secure Medical Records

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Abstract:

In the traditional healthcare industry, we face a variety of security issues and privacy challenges, like safeguarding patient's medical records, ensuring secure drug tracking, facilitating secure communication, implementing intelligent e- health monitoring and not able to get the health records timely. In addition, a deficiency in expertly designed security protocols leads to the healthcare system to a range of security threats, like issues related to interoperability, data authenticity, secure data sharing, mobile health considerations, and more. In this study, we explore the field of healthcare fraud detection using a large dataset of about 350,000 entries that we downloaded from Kaggle. In the blockchain based healthcare system health records are almost impossible to alter and it also gives us variety of features like smart contracts, digital signature, consensus mechanisms, and chain of hashing to create an immutable ledger, that is highly reliable to the storage capabilities.

In this research paper we are also going to implement the AES (Advanced Encryption Standard) cryptographic algorithm in the blockchain based healthcare system to make the Electronic Health Records more safe and secure.

Keywords:

Blockchain, Smart Contracts, Advanced Encryption Standard, Ethereum, Electronic Health Records.

Strategic Safeguards: Enhancing Static Analysis with Machine Learning for Early Detection of Banking Malware in Windows Environments

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Abstract:

Banking malware poses major cybersecurity danger by seeking out valuable financial information as well as username passwords and electronic payment details. Traditional antivirus systems use static signatures to detect malware through their definitely approach but they fail to detect modern constantly changing malware forms. The research develops an updated static analysis system through combined multi-feature acquisition and heuristic evaluation and machine learning identification methods to forecast unknown malware activities. The security system identifies malware through different classifications which include system-corrupting malware (SCM), information-stealing malware (ISM), and financial-theft malware (FTM). Accurate malware detection becomes possible when analysts analyze the Portable Executable (PE) headers in combination with opcode sequences and API call patterns together with embedded strings. The Random Forest classifier performs detection with 92.5% accuracy based on training with labeled data thus outmatching conventional detection methods. Experimental assessments confirm the methodology decreases false alarms along with enhancing the recognition of undiscovered malicious software. Hybrid static-dynamic analysis together with deep learning-based feature selection will be integrated for real-time security applications during future development.

Keywords:

Banking malware, static analysis, machine learning, malware detection, financial cyber threats, heuristic detection, API call analysis, opcode frequency, zero-day attacks, Windows security.

Digital Real Estate Ownership Platform

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Abstract:

Traditional land registries often suffer from issues such as fraud, inefficiency, and a lack of transparency, leading to frequent disputes and diminished trust in property ownership records. By leveraging the decentralized and immutable nature of blockchain, this study proposes a secure digital ledger for recording all land-related transactions and ownership details. The system facilitates a streamlined registration process, allowing users to securely create and manage their land ownership records. It incorporates an email verification mechanism to authenticate users, ensuring that only legitimate accounts are established. This approach not only improves the security of user data but also enhances user confidence in the system. The use of blockchain ensures that records are transparent, tamper-proof, and reliable. Moreover, integrating smart contracts into this system can automate the enforcement of agreements, thereby reducing the need for intermediaries and minimizing the risk of human error. This approach also emphasizes accessibility, making the system intuitive for both governmental bodies and individual property owners. Ultimately, the study aims to present a scalable solution that could redefine land registry practices globally, enhancing the efficiency, security, and credibility of property rights management.

Keywords:

Blockchain, Decentralized, Consensus, Smart Contract, Ledger, Security.

Tumors Detection in Medical Images using Image Segmentation

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Abstract:

The brain is one of the most complicated organs in the human body, with billions of cells that harmoniously work to facilitate proper functioning. A brain tumor is the development of cell growth gone amiss, which leads to irregular masses of cells in or around the brain. Such a collection can disrupt normal cerebral functions and also destroy health cells. Brain tumors are divided into two major types: benign or noncancerous and malignant or cancerous. Detection and classification of brain tumors is a very complex and time-consuming process in medical image analysis. Computer vision has emerged to be increasingly essential in the field of human medicine. Among a multitude of imaging techniques including CT scans, X-rays, and MRI, MRI is the most trustworthy and safe. According to now, doctors themselves analyze MR scans of the brain to detect the location and size of the tumor. This study applies deep learning, utilizing the CNN architecture precisely, to identify brain cancers. A model using deep learning is trained, tested, and validated on a dataset. Several convolutional layers are combined for better prediction accuracy. Convolutional Neural Networks or CNN are very efficient in applications regarding deep learning applied in various fields of research. Deep learning architecture strengthens typical neural networks by the addition of more hidden layers between input and output. The VGG16 model was used to obtain phenomenal accuracy on the ImageNet dataset. It was implemented in PyCharm, with several modules like Keras and TensorFlow, thus easing the process.

Keywords:

Brain tumor, detection, classification, deep learning, Convolutional Neural Network (CNN), Visual Geometry Group 16 (VGG16), Magnetic Resonance Imaging (MRI).

Heart Disease Prediction by Machine Learning

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Abstract:

These days life continues so fast that people forget how health is important. Due to the fast pace, health is neglected. Because of this busy lifestyle, people are unable to focus on their health. Because of which an increase in diseases is being seen. As per the WHO data, cardiovascular diseases are responsible for about 31% of deaths occurring globally. Due to this busy lifestyle and unawareness regarding health, people are falling sick more often. But it becomes difficult to do analysis manually as health care organizations generate huge amounts of data. In the medical field, machine learning can be useful in making disease predictions and processing data. In this paper we will study heart disease, the risk factors for heart disease and techniques of machine learning. By means of these methods, we predicted the occurrence of heart disease and did a comparison of the machine learning techniques used for the experiment. These research paper aims to enhance the heart disease prediction using machine learning and investigate the efficiencies of different algorithms used.

Keywords:

Supervise Learning, Unsupervise Learning, Reinforce Method; Regression; Python Programming, A Decision Trees, Cardiovascular Diseases (Cvd).

Facial Expression Recognition with RI-LBP

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Abstract:

Imagination plays an important role in communication. Face recognition has become an important part of the interaction between people and computers. In recent years, deep neural networks (DNNs) have become popular in this field, overcoming the limitations of traditional methods. Given the fact that the number of actual devices is small to achieve better results without DNN, this paper presents a combination of directional and rotational summary (RI) for extracting local features of binary patterns (LBPs) using the DNN algorithm. First, each image is guided by a facial recognition algorithm to achieve better match. Second, RI and LBP functions are extracted from unique aspects to improve computational speed. Regional partitions are newly developed with normal RI to avoid special features designed. These properties are not compatible with scales and grayscales during conversion. Finally, the combined functions are classified by the Support Vector Machine (SVM). Experimental results show that this method is effective and accurate.

Brain Tumor Detection from MRI Images by Using Deep Learning CNN

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Abstract:

Brain tumors are an important health concern that must be diagnosed early and accurately to be effectively treated. The most accurate imaging technique for detecting brain tumors is magnetic resonance imaging (MRI); nonetheless, manual diagnosis is laborious and prone to human error. This work suggests a Convolutional Neural Network (CNN) model created on deep learning for automatically identifying brain cancers from MRI pictures. Glioma, meningioma, pituitary tumor, along with no tumor are the four conditions used to train the model. A CNN architecture optimized through the Adamax optimizer, a category cross-entropy loss function, was trained using a preprocessed dataset [1] of MRI images. Integrating the trained model into a Flask-based web application made real-time tumour categorisation from uploaded MRI images possible. Experimental results demonstrate high classification accuracy, showcasing the probability of deep learning in automating brain tumour detection. The proposed system provides a reliable and efficient approach to assist radiologists in medical diagnosis, reducing the chances of misdiagnosis and expediting the decision-making process. Future enhancements may include incorporating more tumor types, improving model robustness, and integrating explainability techniques to increase model interpretability.

Efficient Deepfake Detection System using Advanced Deep Learning Models

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Abstract:

Deepfake technology, which leverages artificial intelligence to create highly realistic but fabricated videos and images, poses significant risks to digital security, privacy, and information integrity. This project presents a comprehensive approach to detecting deepfake media using deep learning techniques. We utilized the Deepfake Detection Dataset (DFDV) from Kaggle, containing both authentic and manipulated video footage. Our methodology involved extracting frames from videos, isolating facial regions using Haarcascade, and organizing these face images into a structured dataset. To combat overfitting, we employed image augmentation techniques, generating diverse face images for training. We then split the dataset into training, validation, and test sets, followed by applying transfer learning with models like VGG16, ResNet50, EfficientNet, and a hybrid model combining EfficientNet and ResNet50. After fine-tuning these models, we evaluated their performance, producing accuracy and classification reports for comparison. Finally, we developed a web-based interface using HTML, CSS, JavaScript, and Flask to allow users to upload images or videos, which are processed to detect deepfakes in real-time. Our deepfake detection system demonstrates strong performance, offering an accessible and reliable tool for identifying manipulated media and supporting broader efforts to combat digital misinformation.

Keywords:

Myocardial Infarction, Cardiovascular disease, Deep Learning, Convolutional Neural Network, Recurrent Neural Network, Deep Neural Network, Long Short-Term Memory.

IoT Based Smart Framework To Predict Air Quality Using KNN Imputation Model

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Abstract:

Air pollution is one of the most dangerous thing that harms human. Air quality is very important in many aspects in human life like growth of human body in proper ways. The research focuses on air quality, which is essential for human and environmental health. However, air pollution has become a serious global problem, affecting millions of lives and the environment. Many air quality prediction methods struggle with accuracy due to missing data. This study introduces a smart system using Internet of Things (IoT) technology to predict air quality more accurately. The key innovation is the use of a method called KNN Imputation to handle missing data in datasets. The system uses machine learning models, particularly a combination of Support Vector Machine (SVM) and Convolutional Neural Network (CNN), to classify air quality as safe or unsafe. Monitoring air quality is crucial, but many current methods struggle to deliver accurate results due to missing data in their datasets. Missing data makes it harder for machine learning models to perform effectively. This research proposes an automated system using Internet of Things (IoT) technology to monitor and classify air quality. The system addresses the issue of missing data and achieves high accuracy in its predictions, offering a more reliable solution to this global problem. In essence, the study presents a modern, automated approach to monitor and predict air quality using IoT and advanced machine learning techniques, overcoming the limitations of existing methods.

Keywords:

Prediction of air quality Control of air quality using IoT Controlling air quality in cities KNN Imputer.

Hello History: AI Chatbot for Real-Time Interaction With Historical Personalities

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Abstract:

History was like a window into what happened before, but gaining knowledge about it may seem quite non-participating. This important project greatly revives the history by creating an interactive platform where users can conduct authentic real-time interviews with simulated historical characters. To guarantee information, it is accurate and well organized, the system uses an accurate algorithm corresponding to the chain to pull the responses from the JSON structured data set, unlike the use of difficult NLP or external API models. The system allows people to choose someone from the past, ask questions and get answers that fit. For this reason, learning seems to be more individual and more interesting. The platform is made to be easy to use and also safe, and has a login system that uses the flask encryption and PBKDF2 to ensure the user's login data. To make interactions more engaging, more historical characters react synthesized, adding voice to history and conversation will be more life. Thanks to their somewhat simple and easy-to-use design, people from different areas of life can look into the past through methods that seem quite typical and generally engaging. The project plans to expand the data file, change it to a more capable database, improve answers to chatbot and include more multimedia to improve the experience later. This platform uses technology and stories to change how people see the past, transform history into something more than just as an object, but something they feel.

Keywords:

Chatbot, Historical Figures, JSON, Web-based Platform, User Authentication, PBKDF2.

Study on the Effectiveness of Menstrual Cycle Prediction Algorithms in Mobile Menstrual Trackers

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Abstract:

In 2023, the World Bank reported that women constitute nearly 49.7% of the global population, with over a quarter being of reproductive age. Menstruation, a regular biological phenomenon lasting two to seven days each month, is an integral part of women's lives. Period tracking practices have transitioned from traditional handwritten records to modern digital platforms that utilize algorithms to monitor cycles, predict future periods, and provide actionable health insights. This paper offers a comprehensive comparison of menstrual cycle prediction algorithms, focusing on their precision, effectiveness, and adaptability. It explores various approaches, including statistical techniques, machine learning models, and hybrid methods, while considering critical aspects such as data integrity and biological diversity. The research aims to evaluate how these digital solutions influence women's health management and contribute to advancements in reproductive health care.

Keywords:

Menstrual Tracking, Women's Health, Digital Health Tools, Traditional Methods, Algorithm Analysis, Reproductive Health.

Effects of Rice Husk biochar and Sugarcane bagasse biochar on Soil Properties and Rice growth

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Abstract:

The application of biochar is an effective means to enhance soil quality, increase plant growth and productivity, and thereby enhance carbon storage. The present study has attempted to assess the effects of Rice husk biochar (RHB) and Sugarcane bagasse biochar (SBB) on the physicochemical properties of soil and thereby on the growth of rice plants.

Biochar (RHB and SBB) was applied to the soil at varying concentrations (0.5%, 1%, and 2%). Pot experiments were conducted for 135 days (up to harvest condition) using the “Uma” rice variety. Experimental sets without biochar are considered as controls.

Results showed that the application of biochar increased soil pH, organic carbon, and cation exchange capacity for various treatments than the control. The application of biochar at 2% level improved plant height, culm length, number of tillers, and biomass yield. The positive effect of biochar on plant growth is attributed to the changes in the soil properties owing to its application.

The addition of biochar is also attributed to the increase in the concentration of carbohydrates, protein, starch, and sugar in the rice plant. The total chlorophyll and carotenoid content increased steadily up to 90 days and thereafter showed a decrease. The weight of the panicle and the weight of the filled grains increased with an increase in the concentration of RHB and SBB. An optimum of 2% SBB and 2% RHB application yielded maximum values for panicle weight and filled grains weight. It can be concluded that biochar obtained from the rice husk and sugarcane bagasse can improve soil quality, and the growth of rice plants, thereby bringing considerable reduction in carbon emission from agroecosystems.

Keywords:

Biochar, Rice husk, Sugarcane bagasse, Rice variety.

SAR-to-Optical Image Translation Using GAN

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Abstract:

Synthetic Aperture Radar (SAR) and optical imagery are both crucial for remote sensing, each offering unique benefits. SAR is particularly robust in challenging weather and low-light conditions, whereas optical imagery provides superior visual detail. Combining these two modalities through image translation can enhance applications such as disaster management and land use analysis. This study proposes a framework using Generative Adversarial Networks (GANs) for translating SAR images into high-quality optical images. The model features a generator based on the UNet architecture, paired with a PatchGAN discriminator, and incorporates both adversarial loss and L1 loss functions to improve visual and structural accuracy. In experimental tests, the model achieved a peak Structural Similarity Index (SSIM) of 0.92 and a Mean Absolute Error (MAE) of 0.15, demonstrating its ability to generate detailed optical imagery. These findings highlight the potential of GANs in advancing remote sensing by facilitating effective SAR-to-optical image conversion.

Keywords:

Synthetic Aperture Radar (SAR), optical imagery, remote sensing, image translation, Generative Adversarial Networks (GANs), UNet, PatchGAN, Structural Similarity Index (SSIM), Mean Absolute Error (MAE).

Fuzzy Logic Control Architecture for Advanced Energy Management in Hybrid Electric Vehicles

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Abstract:

This research work introduces an advanced energy management strategy for Hybrid Electric Vehicles (HEVs) using a Cascaded Fuzzy Logic Controller (CFLC) approach. HEVs are a promising alternative to conventional internal combustion engine vehicles, and effective energy management is critical for enhancing their global adoption. Efficient energy utilization is essential to improve the autonomy of HEVs and reduce operational costs. This study focuses on optimizing battery performance in HEVs by integrating a PV system as an additional energy source. A SEPIC-based boost converter is employed to maximize power extraction from the PV system, and the converter's output is fed into the grid via a single-phase Voltage Source Inverter (VSI), which converts DC to AC power. An LC filter is incorporated to improve the quality of the inverter's output. The proposed system is modeled and simulated in the MATLAB/Simulink environment, demonstrating its potential for enhanced energy management and performance in HEVs.

Keywords:

PV system, SEPIC integrated Boost converter, Cascaded CFLC, PI controller, 1ϕ VSI.

Sentimental Analysis on Social Media Posts Using Machine Learning

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Abstract:

As the demand for understanding user sentiment within text data grows across industries, there is the need for advanced AI techniques, including context-aware processing and sarcasm detection, to interpret emotions with high accuracy. Through this paper we present an artificial intelligence-based sentiment analysis system with the integration of VADER and Support Vector Classifier (SVC) models within a structured pipeline. The system effectively categorize sentiments—positive, negative, or neutral—while handling complex language nuances, such as irony and intensifiers. Extensive testing demonstrates the system’s robustness in delivering reliable sentiment predictions, providing valuable insights for applications in customer feedback analysis, product sentiment evaluation, and brand monitoring. The scalable and modular design of the system allows for future enhancements, making it adaptable to a variety of real-world scenarios where understanding user sentiment is critical.

Multi Criteria Decision Making for Superior Text Summarization

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Abstract:

Despite notable progress in text summarization models, selecting the most effective summaries from multiple generated options continues to be a challenging endeavor. This research seeks to bridge this gap by incorporating Multi-Criteria Decision Making (MCDM) into the evaluation process, offering an improvement over [2] traditional methods often restricted to single metrics such as ROUGE scores, which fail to encompass the multidimensional aspects of summary quality. While contemporary summarization methods are advanced, [4] they lack a holistic evaluation framework that considers multiple factors, including relevance, informativeness, readability, and brevity. By utilizing MCDM approaches, particularly the Analytic Hierarchy Process (AHP) and the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), this study will evaluate summaries based on a broader set of criteria, resulting in a more balanced and thorough assessment process. This methodology aims to produce higher-quality, user-oriented summaries that effectively cater to diverse needs in information retrieval and understanding. This study's outcomes are noteworthy in that they are significant as they propose a detailed and equitable approach for evaluating summaries, with the ability to improve the efficiency and reliability of summarization tools across various fields, including academia, industry, and media. Addressing these challenges is crucial for advancing [8] text summarization technology, making information retrieval more streamlined and summaries more comprehensive and valuable to users.

Keywords:

Text Summarization; MCDM; AHP; TOPSIS; NLP; Conciseness.

Automatic Solar Panel Cleaning System

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Abstract:

The efficient operation of solar panels is crucial for maximizing energy output. But their performance is decreased by dust particles. The solar PV modules are generally employed in dusty environments which are the case in tropical countries like India. The dust gets accumulated on the front surface of the module and blocks the incident light from the sun. It reduces the power generation capacity of the module. The power output reduces by as much as 50% if the module is not cleaned for a month[4]. This model presents an innovative automatic solar panel cleaning system utilizing a microcontroller-based approach. The project developed includes the design and implementation of a microcontroller-based dust cleaning system. An "Automatic Solar Panel Cleaning System" is a technology designed to keep solar panels clean without human help. Solar panels work best when they're free of dirt, dust, but cleaning them manually can be difficult and time-consuming. This system uses automated tools, like brushes or water, to clean the panels on a regular schedule or when sensors detect dirt. The automatic solar panel cleaning system has the potential to boost efficiency by 32 percent [4]. PV panels may be cleaned with or without water using this system. The design incorporates weather-resistant materials to ensure durability and features a user-friendly interface for monitoring and control. This development not only optimizes solar panel performance but also contributes to the sustainability of renewable energy technologies.

Keywords:

Solar panels, cleaning system, automation, energy conservation, photovoltaic, efficiency improvement, dust removal, robotics.

User's Cart Based Nutritious Recipe Recommendation

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Abstract:

This research presents an innovative e-commerce recipe recommendation system powered by TensorFlow.js, designed to enhance the grocery shopping experience. The system employs a neural network model that analyzes users' shopping cart contents in real-time to suggest relevant recipes. Built with a comprehensive database of 100+ ingredients across categories like fruits, vegetables, spices, herbs, grains, dairy, meat, and legumes, the system provides intelligent recipe matching based on available ingredients. The neural network architecture, consisting of two dense layers (128 and 64 units) with dropout regularization, processes ingredient combinations to generate recipe recommendations with matching scores and nutritional information. The implementation achieves an 85% recommendation accuracy while maintaining user privacy through client-side processing, demonstrating its effectiveness in bridging the gap between grocery shopping and meal planning.

Keywords:

Recipe Recommendation, TensorFlow.js, Neural Networks, E-commerce, Real-time Processing.

Intelligence Video Surveillance System using Machine Learning and AI

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Abstract:

Abnormal activity detection plays a crucial role in surveillance applications. This can be achieved by automatically capturing video footage without manual intervention to identify unusual human activities. Key applications include human fall detection and sudden movements, which are vital for safety and security purposes.

The proposed system focuses on detecting roadside human activities and behaviors using the Probabilistic Neural Network (PNN) method. This approach classifies activities and behaviors by comparing training datasets with testing videos. Additionally, multi-PNNs are utilized to learn the distinctions between classes of normal activities.

Human activity recognition has become a prominent trend in smart surveillance, presenting several challenges such as effectively analyzing large video data streams while maintaining low computational complexity. Existing activity recognition techniques often rely on convolutional neural network (CNN) models paired with complex classifiers, which can hinder quick detection of abnormal activities.

To address these challenges, this paper proposes a new framework for activity detection. Initially, abnormal human activities in surveillance streams are identified using an efficient CNN model. The detected individuals are then tracked throughout the video stream using an ultra-fast object tracker known as the 'Minimum Output Sum of Squared Error' (MOSSE) filter.

Keywords:

Recognition, Video cameras, surveillance systems.

Tab-Based Chatting Application: Enhancing Communication Efficiency Through Innovative Design

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Abstract:

The Tab-based chatting application is a groundbreaking messaging approach in the face of traditional chat applications' limitations. The application categorizes conversations for users using customizable tabs, improving productivity, user satisfaction, and data privacy. This paper presents the development and implementation of the application, emphasizing its tab-based interface, real-time messaging, robust security, and user-centric design. The application is designed to deliver a seamless, scalable, and secure communication experience by leveraging advanced technologies such as Django, ReactJS, and MongoDB. This paper discusses the methodology, results, and future potential of the application, positioning it as a groundbreaking solution for modern digital communication.

Keywords:

Tab-Based Messaging, Real-Time Communication, User Experience, Privacy, Security, Cross-Platform Compatibility.

IoT-Based Labour Monitoring System for Industrial Applications

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Abstract:

In sectors that depend on manual labour, real-time labourer monitoring is a crucial challenge because current systems frequently fall short of providing precise and effective classification in dynamic circumstances. Prior methods have mostly depended on antiquated machine learning models or traditional image processing, which are neither accurate, scalable, or able to function in real-world situations with a variety of datasets. We suggest a novel approach to overcome these constraints by utilizing the YOLOv8 object detection model, the ESP32-CAM module, and Roboflow for data annotation. To maximize training, our method starts with gathering a varied dataset of labourer photos using ESP32-CAM with Arduino IDE that are methodically annotated. We solve the drawbacks of earlier systems by utilizing YOLOv8, which is renowned for its exceptional accuracy and computational efficiency, and combining it with hardware. Significant gains in classification performance are shown by experimental findings, demonstrating the model's capacity to reliably and effectively identify different worker types in real-time situations. This study demonstrates how well cutting-edge machine learning methods may be combined with reasonably priced technology to improve staff management and monitoring.

Keywords:

Real-time laborer classification, workforce monitoring, ESP32-CAM, Arduino IDE, YOLOv8, object detection, data annotation, Roboflow, machine learning in workforce management, low-cost hardware integration, laborer identification .component.

Next-Gen Home Automation Security Based on Face and Voice Recognition Embedded with Iot

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Abstract:

With technology becoming more and more advanced, the future of our lives lies in how we utilize technology to make our lives more convenient. But as technology advances, the security problems become more acute. The current technology is to be applied to solving domestic security. Hence, the advantage of the home automation system This is a face-recognition system running on consumer-level hardware. It can either detect intruders and restrict (or provide) high-security areas in your home. [2][3] This system contains two parts -The hardware part includes a camera, GPS, Raspberry Pie and microphone, buzzer; the software part includes face detection recognition software with algorithms home speech and voice recognition capability. [1][4] Whenever a person's face is captured by the camera, it is compared with the existing database. Authorized users can update the library to provide access for unregistered individuals. When a person's face is captured by the camera, its image is compared with the existing database. The authority user may update the database to grant access to the premises to someone who has not registered yet. if the authorized user has not up-to-date the database; if someone who has not been registered enters premises. Photo snapshot in a sequence with the camera and then sent on to software for analysis and compared with the existing trusted people databases. When a user is unknown, an alarm goes off. This system offers an inexpensive way to monitor and control the house security.

Keywords:

Face Detection, Face Recognition, Voice Recognition, GPS System, GPRS, Raspberry pi.

Safe Harvest: IoT-Based Fruits and Vegetables Freshness Detection

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Abstract:

In agriculture and the food industry, there is still an important challenge with food improvement, which results in economic losses and environmental considerations. In order to provide real-time insight into cooking conditions, this study introduces a smart IoT-powered system that combines sensor-based monitoring, a network interface and machine learning. The proposed PH sensor, methane sensor (MQ-4 or MQ-135), temperature and humidity sensors (DHT22 or DS18B20), and analog sensor interface with ESP8266. These sensors continuously acquire environmental data and send them with a python flask based web interface. A lightweight web dashboard shows real-time sensor, warns users of unsafe conditions and provides historical insight into cooking trends in the web interfaces, built with MUI and response. In addition, a random forest regression learning model has been used to predict the durability of malfunctions, enabled users to take active measures to reduce food waste. This system provides a more comprehensive approach to controlling cooking by combining real-time data collection, cloud integration and future indicative analysis, as opposed to traditional monitoring strategies. This study has conducted a scalable, cost-effective solution for homes, supermarkets and cooking facilities, which shows the importance of IoT and machine learning under monitoring food quality. The model's accuracy will be improved, additional environmental factors will be included, and the adaptability of the system for different storage environments in the latter work will be increased. By integrating IoT, machine learning, and cloud computing, this research lays the foundation for a smarter and more efficient approach to food preservation and waste reduction.

Keywords:

IoT-Based Monitoring, Random Forest Regression(RFR), Wireless Sensor Network(WSN), ESP8266 NodeMCU, Smart Agriculture.

Development of Web based Spatial Decision Support System (SDSS) for Flood Assessment in Lakhimpur District, Assam

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Abstract:

Flooding is one of the most devastating natural disasters affecting the Lakhimpur district of Assam, causing significant loss of life, property, and infrastructure annually. This paper presents the development of a web-based Spatial Decision Support System (SDSS) for flood assessment and prediction in the region. The system integrates Geographic Information Systems (GIS) with machine learning techniques to provide an interactive platform for visualizing flood data and predicting potential flood events. Users can register on the platform, select specific date ranges (2018-2024) and months (May-September) for analysis, and access satellite imagery of the area. The system employs a Random Forest classification algorithm trained on historical data including wind speed,

rainfall intensity, and humidity to predict flood occurrences. Data preprocessing techniques ensure high-quality inputs for the machine learning models, while performance is evaluated using accuracy, precision, recall, and F1-score metrics. The platform includes a real-time alert system that notifies users via email about predicted floods, providing essential details about flood levels and affected areas. An interactive GIS map allows exploration of flood-prone regions and assessment of risk patterns. The system's user-friendly interface makes it accessible to both technical and non-technical users, serving as a comprehensive tool for flood risk management and disaster preparedness in the Lakhimpur district. This research demonstrates how the integration of spatial data, machine learning, and web technologies can enhance flood assessment capabilities and support proactive disaster management strategies.

Keywords:

Spatial Decision Support System, GIS, flood assessment, machine learning, Random Forest, web-based application, disaster management, Lakhimpur.

Crypto-voting: Blockchain Based e-voting System

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Abstract:

As we know that voting is veritably essential for ultramodern republic as it's one of the abecedarian pillars of ultramodern republic. As per now traditional system is in veritably demand but the problem that occurs in traditional electoral system where a single association has completely control over the database and the system manages the election process. This centralization of power creates openings for tampering and manipulation. For this Blockchain technology is used to so that it decentralized system and the entire database are possessed by multiple druggies. Blockchain is used ine-voting to increase the translucency, security and integrity. In history, numerous electronic election systems failed because they were n't assuring the total security for the voting, especially in long-medium term. The purpose of this design or study is the donation and define a new e-voting system Crypto- voting. We predicate this by reading 4 or 6 exploration papers and enforced it using blockchain technology. By this technology, the operation procedures of the phases and events of the election were integrated. Crypto- voting is fit for security purpose as it uses data encryption (a system of securing information) and secure data storehouse to make voting more secure and secure. In addition, our system is aimed to ameliorate the styles of traceability and go through voting operations, with no mediator.

Keywords:

Blockchain, Crypto-voting, E-voting, Ethereum, Ganache, MetaMask, Tokenization.

Advancing Real-Time Facial Expression Recognition through Deep Learning

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Abstract:

Facial emotion recognition is a rapidly evolving research area with significant applications across domains such as safety, healthcare, and human-computer interaction. This study aims to develop a facial emotion recognition system that can detect emotions such as anger, fear, happiness, surprise, sadness, and neutrality with high accuracy. In this research, we utilized a deep learning approach by employing an ensemble model consisting of a custom Convolutional Neural Network (CNN), VGG19, and MobileNet architectures. These models are combined to maximize both accuracy and computational efficiency. The FER2013 dataset, a comprehensive collection of grayscale emotion-labelled facial images, serves as the foundation for training and evaluating the system. Advanced preprocessing techniques, including grayscale-to-RGB conversion and normalization, ensure compatibility with all models in the ensemble. By comparing key performance metrics, such as accuracy and inference speed, this research highlights the ensemble model's effectiveness in achieving a classification accuracy of 95.94%.

Keywords:

Emotion Recognition, Ensemble Learning, Deep Learning, Vgg19, Mobilenet, Facial Expression, CNN.

Car Geek: Automated Vehicle Cost Forecasting Using Machine Learning

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Abstract:

This project is about the development of a car price prediction model using machine learning techniques with a focus on linear regression. The aim of this project is to develop an accurate and efficient model that will predict the price of a car based on various features like name, model, year, mileage, engine size, and many more. The process involves data acquisition, preprocessing, feature selection, and applying linear regression algorithms to train the model. Basically, the implementation can be broken down into two major aspects: the machine learning part and the web page aspect. In the machine learning aspect of our study, we first start with acquiring data from credible sources, then clean up and preprocess that data to eliminate missing values, outliers, and factorized variables. Feature engineering techniques improve the model predictive power. With a simple, yet powerful, algorithm called linear regression, establish the relationship that car price forms with the various independent variables for the car features used. The Web Page phase design a user interface friendly page to insert car features which can give live predictions for a price of any car. It's achieved through a web application using modern web development frameworks and libraries. The back-end integrates the trained machine learning model and handles the prediction requests while the front end provides a smooth and intuitive user experience.

Keywords:

Car price prediction, Machine learning, Regression techniques, Linear regression.

Enhancing Breast Cancer Diagnosis Using Modality-Specific Information Disentanglement from MRI

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Abstract:

Breast cancer is still a cause of significant morbidity and mortality in women across the world, highlighting the pressing need for superior diagnostic methods. Magnetic Resonance Imaging (MRI) has emerged as a key modality in the diagnosis of breast cancer because of its high sensitivity as well as imaging of soft tissue structures. However, the challenges associated with MRI, including a higher false-positive rate and variability in performance compared to breast density, necessitate the development of new methods that improve diagnostic accuracy. This paper explores modality-specific information disentanglement from MRI images in a bid to improve the classification of breast lesions into malignant and benign types. By combining state-of-the-art computation methods, including machine learning and artificial intelligence, with MRI scans, we here suggest a model that maximizes the interpretability of high-complexity imaging data. Our method does not only aim at minimizing unwarranted biopsies and anxiety among patients but also tries to maximize patient management plans based on more precise diagnosis. Additionally, there is some mention of merging MRI with the potential to complement or substitute with other imaging methods, and its role is stressed, highlighting multimodality importance in diagnosis against breast cancer. Last but not least, the current work has been directed toward contributing to augmenting better outcomes for detecting as well as treating breast cancer.

Graph Neural Networks for Financial Fraud Detection in Online Transactions

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Abstract:

Financial fraud detection is an important problem in online transactions, and there is a need for sophisticated methods to detect fraud effectively. Most traditional fraud detection techniques are based on rule-based methods and machine learning algorithms that lack the ability to represent high-level transactional relationships. Here, we propose a Graph Neural Network (GNN)-based system for online transaction financial fraud detection. Through graph representation of transactions, where transactions are nodes and users are edges, the GNNs can efficiently identify fraudulent patterns and abnormal behaviors. Experimental results illustrate that the envisioned GNN-based solution has superior precision, recall, and AUC-ROC values compared to existing machine learning models, as well as performs well in fraud ring detection and unusual pattern of transactions detection. It is a flexible, adaptive, and robust fraud detection solution, providing improved security for financial systems.

Magnifying The Farming Data Set to Embed Conceptualized Techniques into Soybean Farming

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Abstract:

Innovative farming technologies support farming under various constraints. The farmer has knowledge that is based on traditional agriculture and a perceptive mindset. The study ensures that the data set variables handle the present condition of the farm. Similarly, concatenate of the data constant variable examines the plant position and facts for decision. The advanced farming conceptualized techniques are injected into soybean farming for precision farming and decision making. The techniques are based on data variables and data constants for examining the soybean plant and making decisions. Here, paper facilitated the farmer's perspectives to identify the plant status, and the farmer must take steps for the growth and production of soybean. The system is traditional, while generative data variables help to embed the conceptualized techniques into soybean farming. This is supported by finding the appropriate answers for the questions of the farmer, especially on soybean farming. The Concept supports data creation and preparation. Also important to embed specific data sets for evaluation based on innovative farming technologies. The supporting of the data variable where many devices based on Internet of things and cloud services and techniques may be evaluated to create the data for decision-making. The Data will further be used for machine training models and various learning of prediction.

Keywords:

Innovative Farming Technologies (IFT), Internet of Things (IoT), Machine Learning (ML), Generative Data Variable (GDV), Data Variable Constant (DVC), Embedded Method (EM).

An Advanced Vision-Driven Gesture Interface for Seamless Human-Computer Interaction Using Computer Vision and Machine Learning

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Abstract:

As artificial intelligence technology advances, there has been a lot of interest in integrating hand gesture detection for virtual interface control. This study presents a brand-new hand gesture-controlled virtual mouse system that uses artificial intelligence (AI) algorithms to understand hand gestures and convert them into accurate mouse movements. The main goal is to provide a different interface, especially for people who have trouble using standard mouse or keyboard configurations. A camera is used in the suggested system to take pictures of the user's hand, which are then processed by an AI algorithm that has been specifically trained on a dataset of various hand motions. When a particular gesture is recognised, it is converted into corresponding mouse motions that are effectively reproduced on the virtual screen. The system is remarkable for its versatility and scalability. This device has a wide range of potential uses, from providing hands-free control in dangerous situations to acting as a substitute interface for conventional hardware mouse. In the end, the hand gesture-controlled virtual mouse system offers an intriguing way to improve accessibility and user experiences in the field of human-computer interaction.

Keywords:

Virtual mouse, Computer Vision, Hand Gesture Recognition, MediaPipe, Human-Computer Interaction.

Sign Language Recognition Using Deep Learning

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Abstract:

A speech impediment is a disability that impairs a person's ability to communicate verbally. One of the most structured languages is employed as a signal language to overcome this difficulty. In order to facilitate communication even in the event that someone is not proficient in sign language, it is practically necessary to have a method or program that can recognize motions in the language. This article goal is to bridge the gap between persons with disabilities, such as the deaf and dumb, and other people. The artwork provided on paper is an attempt (extension) to look at the problems in the Indian Sign Language (ISL) character class For this assessment, the person need to be capable of take pics of hand motions the use of a webcam, and the computer must expect and display the call of the picture that become taken. The obtained image goes via a numerous process, consisting of dilatation, mask operation, and conversion to grayscale, among other pc- imaginative and predictive techniques. The proposed version is trained the use of a Convolutional Neural Network (CNN) to discover the image. At completion, our model's accuracy is more than 95%.

Keywords:

Indian Sign Language (ISL), Deaf persons, hand gestures, system mastering, photograph processing, convolutional neural networks (CNNs).

Full-Stack Web Development With ML Integration

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Abstract:

In today's dynamic digital landscape, businesses and individuals require adaptable solutions that cater to multiple domains. This project introduces a Multipurpose Full-Stack Platform, designed to be highly customizable for various use cases such as education, freelancing, skill exchange, and remote work. Built using the MERN stack (MongoDB, Express.js, React.js, Node.js), the platform ensures scalability, modularity, and security. Key features include real-time chat, WebRTC-based video conferencing, role-based access control (RBAC), and a multi-tenant architecture. The platform's modular design allows seamless integration of new functionalities without disrupting core features. Additionally, it provides an intuitive user interface and a robust backend, ensuring an optimal user experience. Security is. The multi-tenant feature allows different users or organizations to personalize the platform according to their specific requirements, making it a versatile solution for various industries. Unlike traditional monolithic applications, this system is built for flexibility and interoperability, making it easy to adapt to different industry needs. By leveraging modern web technologies, this project aims to provide a scalable, adaptable, and user-friendly web solution that enhances communication, collaboration, and management across different sectors. The modular approach ensures that the platform can be expanded in the future, making it a long-term, sustainable solution for businesses, freelancers, and educators alike.

COCO Human Parts: Instance-Level Detection and Hierarchical Relationships

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Abstract:

Applications such as gesture recognition and keypoint identification rely on accurate instance-level human body part detection. Nevertheless, advancements in this domain are hindered by the dearth of large-scale, thoroughly annotated datasets. To fill this need, we introduce COCO Human Parts, an innovative dataset extracted from COCO 2017 and designed specifically for identification of human parts at the instance level. COCO Human Parts is an assortment of photos that capture complicated situations with a wide range of human body positions. Among the annotations are the following: exact location of bounding boxes, various sorts of parts, creation of subordinate connections, and fine-grained categorization of the sides of hands and feet. For human-centric computer vision research, COCO Human Parts is a great resource with 268,030 person instances spanning 66,808 pictures, average 2.83 parts per person. We provide Hier R-CNN, a powerful model that extends Mask R-CNN, for end-to-end instance-level human parts identification, and offer a statistical analysis that validates the annotation correctness. We encourage study in many applications by making our dataset and code openly available. This will help with gesture recognition and keypoint detection, among others. The advancement of instance-level human parts detection and its numerous applications is greatly enhanced by COCO Human Parts and Hier R-CNN.

A Proposal to Integrate Interactive Simulations, Symbols & Interface into Language & Beyond for Teaching Effectively to First-Year Engineering Students in India

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Abstract:

We are experimenting with a novel approach to redefine the teaching-learning experience among undergraduate engineers. First-year engineering students will easily comprehend and have an apparent understanding of subjects taught in basic sciences in 2030. The goal is to encourage students and educators to actively participate in the teaching-learning process, thereby transforming it into an engaging and flexible learning experience. The experiment also offers great possibilities for cross-departmental research and multidisciplinary cooperation in educational institutions.

Keywords:

Interactive Colours, Dynamic Visual Representations, Leaderboards & Social Sharing, AI-Powered Mentor & Streak Rewards, Real-Time Feedback, Personalized Interface & Content Recommendation, Voice-Activated Assistance & Virtual Tutor Chatbot, AI-Powered Role-Playing Games, Humanizing the Project, Pushing Innovation.

Movie Recommendation System Using Content- Based Filtering and Cosine Similarity

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Abstract:

Recommendation systems are used to increase user appeal by acquiring a deeper understanding of the user's preferences. These systems have gained popularity due to their ability to provide users with customized material that is relevant to the interests of them. Implementation of these systems can be done by collaborative filtering, hybrid models, content-based, and also by neural networks. See to whether machine learning methods that include Content-based filtering, Cosine similarity methods might be employed to capture and suggest content similarities such that related movies can be pointed out. Cosine and Euclidean distance are two modes where similarity of genres could be looked after. For this analysis several the metric commonly used for computing similarities over different products/movies had used.

Keywords:

Content-based filtering ,collaborative filtering and cosine similarity.

DDoS Attack Detection Using Deep Learning Algorithms A Review

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Abstract:

Machine learning techniques have, in fact, made many defense systems smarter and more sophisticated, enabling them to fend off DDoS attacks. However, because DoS/DDoS attackers frequently alter the nature of their attacks and they lack commonalities, it is exceedingly challenging to identify and lessen their effects. These attacks will be very hard to stop or track down. To initiate DoS/DDoS assaults, automated software tools known as botnets are typically used. Numerous defensive strategies have been proposed to stop DoS/DDoS attacks, but since Industry 4.0, the current fourth industrial revolution, is primarily focused on technology-driven “automation, smart, and intelligent systems,” DL technology—which is derived from ANN—has emerged as one of the key technologies to accomplish the objective. In this article recent research on DDoS detection techniques that have adopted both single and hybrid deep learning methodologies in various networking environments are examined. This paper also presents a comprehensive view on DL techniques, including taxonomy considering various types of real-world tasks like supervised or discriminative and unsupervised or generative learning. Also, it analyses recent studies concerning DDoS detection methods that have adapted single and hybrid deep learning approaches in modern networking environments. Overall, the main aim of this article is to provide a broad overview of DL modelling that academics and professionals in the industry can use as a reference manual.

Building a VPN Service with Enhanced Security Features

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Abstract:

This research paper explores the conceptualization, design, and implementation of a Virtual Private Network (VPN) service with enhanced security features tailored for modern cybersecurity challenges. VPNs have become indispensable tools for secure communication in the digital age, ensuring data confidentiality, integrity, and privacy. However, traditional VPN solutions face evolving threats, such as advanced persistent threats, man-in-the-middle attacks, and vulnerabilities in encryption protocols. This study details the design of a VPN solution integrating advanced encryption techniques, multi-layer authentication, and threat detection mechanisms to provide a robust security framework. Comprehensive evaluation demonstrates significant improvements in security and performance compared to traditional VPN solutions.

Keywords:

Virtual Private Network, VPN Security, Encryption, VPN Protocols, Secure Communication, Remote Access, Privacy, Cybersecurity, Network Architecture, Secure Tunneling.

Efficient Inventory Regulation with Adaptive Discounts and Timely Expiry Notifications

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Abstract:

This project applies machine learning techniques to optimize inventory management by forecasting demand, classifying items as perishable or non-perishable, and implementing dynamic discounting strategies based on demand patterns and shelf life. It tackles the challenges of inefficient inventory control and suboptimal pricing by utilizing predictive analytics to drive dynamic discounting and proactive alert systems. By analyzing product attributes such as expiration dates, demand trends, and inventory levels, the system applies higher discounts to items approaching expiration and adjusts prices for non-perishable items based on demand and shelf life. This approach ensures optimal pricing and minimizes waste. Additionally, a simple web-site is designed for users to upload datasets, classify items, and view the discounting outcomes, ultimately improving inventory management and pricing effectiveness in the retail industry.

Keywords:

Dynamic discounting, perishable stock control, inventory optimization, proactive expiry alerts, demand forecasting, real-time monitoring, revenue optimization, popular product insights, inventory management, demand trends.

Smart Inventory Management By Dynamic Discount Pricing and Active Expiry Alerts by using Machine Learning

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Abstract:

Machine learning algorithms are utilized to optimize inventory control by predicting the demand, classifying items as perishable and non-perishable and applying dynamic discounting strategies based on demand and shelf life. This project addresses the issues of inefficient inventory management and suboptimal pricing strategies by leveraging predictive analytics to implement dynamic discounting and proactive alert systems. By analyzing product attributes such as expiry dates, demand patterns, and stock levels, the system provides higher discounts on items nearing expiration and adjusts pricing for non-perishable goods based on their demand and shelf life, ensuring optimal pricing and reduced waste. Additionally, a basic website enables users to upload datasets, classify items, and view discount results, improving inventory management and pricing efficiency in the retail sector.

Keywords:

Dynamic discounting, perishable stock control, inventory optimization, proactive expiry alerts, demand forecasting, real-time monitoring, revenue optimization, popular product insights, inventory management, demand trends.

Precision Monitoring for Sustainable Sericulture

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Abstract:

Silk Hatchery introduces the development of an enhanced silkworm tracking system that employs IoT's into the sericultural sector for tracking growth and development of Bombyx mori silkworm employed in silk production. The rearing environment appropriateness for silk production is determined by the installation of sensors and controllers to gather information about the environmental status. The primary objectives of this model are to enhance both the quality and quantity of servings of silkworms; it provides the farmers with monetary remunerations for production. The silkworm monitoring system is designed to cater for the optimal weaning and standard of the silkworms through the control of environment. The model has an incubator containing controllers to maintain a string environment like heat string and humidity thus creating a conducive environment during the first period of rearing known as the Silkworm Farming. By applying the IoT solution to this system, it is expected that the quality of producing silk and the development of the sericulture business will be improved and thus making the business more sustainable.

Keywords:

Temperature Control, Humidity Control, Artificial Environment, Incubator, and the practicable ways of setting the alert.

Fraud Detection in E-Commerce Transactions through Machine Learning

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Abstract:

E-commerce transactions are experiencing an increasing rate of fraud incidences whereby fraud has remained a major financial and operational risk for businesses and users. In this work, the emphasis is made on designing and analysing various machine learning algorithms for predicting fraudulent transactions. Based on the method, this research uses a real-world e-business transaction dataset measurement where the proposed research experiments on a large number of transactions attack and transforms them through various preprocessing procedures such as outliers' removal, feature construction, normalization, and resampling to rectify the imbalance nature of the fraud detection environment.

The performance of different machine learning models is compared in this study; these models consist of logistic regression, decision tree, random forest, gradient boosting machine, and artificial neural network. These models are evaluated with standard measurements including precision and recall, F1 score, area under curve of receiver operating characteristic (AUC-ROC). Analysing the findings, the researcher finds that compared to the earlier algorithms, the ensemble models including GBMs are beneficial in attaining higher detection accuracy while minimizing the false-positive rate for improving the overall confidence and real functioning of e-commerce platforms.

Further, this paper also looks at the way of enhancing interpretability by including feature importance analysis to assist business people to determine certain measures of fraudulent acts. A comparison with other similar benchmark models also supports the argument about the scalability and stability of the proposed approach. From the study, there is proof that there exists an opportunity whereby through machine learning frameworks can effectively help in reducing fraud in real-time situations. The next studies will concern using deep learning paradigms like recurrent and convolutional neural networks in combination with online learning for taking into consideration the peculiarity of rapidly evolving e-commerce settings and frauds.

Keywords:

Fraud detection, E-commerce transactions, Machine learning, Online payment fraud, Support vector machines (SVM), k-Nearest Neighbours (k-NN).

Inquest Ai

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Abstract:

The rapid development of artificial intelligence (AI) and machine learning (ML) technologies has created opportunities for automating various tasks, including document analysis and comprehension. However, traditional methods for automated question generation and answering from digital documents, particularly PDFs, have struggled with contextual accuracy and relevance. This research paper introduces Inquest AI, a cutting-edge system that employs AI and ML algorithms in conjunction with Large Language Models (LLMs) and the ChatGPT API to process digital documents and generate precise, contextually relevant questions and answers. The paper discusses the development process, evaluation of existing solutions, and design methodology, offering insights into how Inquest AI can be applied across sectors such as education, content management, and professional services. The system's ability to bridge the gap between textual data and intelligent automation offers a robust solution to the challenges of document-based question generation.

Keywords:

Inquest AI, automated document analysis, question generation, artificial intelligence, machine learning, large language models, ChatGPT, PDF processing, contextual relevance.

An IoT-Driven Multi-Sensor System Real-Time Methane Detection and Analysis using AWS Sagemaker

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Abstract:

A major constituent of volatile organic compounds (VOC), methane is one of the dangerous substances present in ambient air that can have serious health effects as per the WHO reports. Industries and moving automobiles are the primary sources of this methane. Long-term exposure to methane causes a number of negative side effects, such as irritation of the skin, eyes, and respiratory system, as well as cancer. It is evident that monitoring and analysing methane levels in ambient air is necessary to ensure public health and safety. By Integrating an ESP32 microcontroller, the Multi Sensor Array (MSA) Detection Module, Internet of Things (IoT) and Amazon Web Services (AWS) cloud services, this system provides a platform for thorough research for the detection and analysis of methane in ambient air.

This study examines the effectiveness of this integrated system in terms of real-time monitoring, precise measurements of methane concentrations, and efficient data processing. The AWS cloud services enable the system to store, analyse, and display methane concentration data. According to the performance study conducted using AWS Sagemaker, the system shows that it is extremely sensitive (RME validation score 97.4) to the measurement of methane content, and that the prediction Power analysis (1.0) is also promising to leverage the system application in multiple domains.

Researchers and environmental groups may use this framework to identify potential pollution sources and get valuable insights about patterns in air quality. This integrated system offers a practical, cost-effective, and scalable solution for methane monitoring while also enhancing safety and health.

Keywords:

Volatile Organic Compounds (VOC), Internet of Things (IoT), ESP32, Multi Sensor Array (MSA), Amazon Web Services (AWS).

Machine Learning Based Obstruction Recognition Using YOLOv5

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Abstract:

Obstruction recognition is a crucial task especially in real time with real world environment for enhancing road safety and navigation. While existing systems has ability to recognise obstruction like animal, vehicles, and pedestrains, but current system face challenge in real time processing and struggle with speed and time. This research examine these limitations and also explore the effectiveness of machine learning algorithms, specially You Only Look Once (YOLOv5) model for real-time obstacle detection on roads. This study delineates and contrasts the performance of YOLOv5 with various algorithms, including Convolutional Neural Networks (CNN) and other yolo versions in the identification of street animals, pedestrians, and cars. The goal is to develop a program capable of detecting and classifying different obstacles in real world scenarious using machine learning techniques, although YOLO provides high accuracy but requires heavy computational power and disk space which make it challenging for deployment. To address this, a less complex YOLO model was chosen which balance the efficiency and perform recognition. We use YOLOv5 small version for program which is less complex and easy to perform on normal laptop, it will scan photos and videos to identify and categorize things that could obstruct the path. This approach allows broader accessibility, making obstruction recognition feasible on standard computing devices like laptops with intel processors and compare the results with other version.

Keywords:

Obstruction recognition, detection, object, YOLO, Machine Learning, Convolutional Neural Networks, Vehicles, Real-time Detection.

Navigating the Threat Landscape: Windows Malware Analysis Techniques

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Abstract:

Windows malware continues becoming more dangerous by using sophisticated methods that evade security measures along with command-control systems and encryption practices. Researchers examine malware detection and prevention solutions which involve three categories: static analysis, dynamic analysis alongside machine learning-based approaches. Fit recognition detects well-known threats effectively but innovative behavioral assessment and ensemble learning systems help detect complicated disguised malware. The study evaluates sophisticated approaches by employing spectral controls on flow diagrams and deep learning extraction methods and defensive adversarial ML practices. The analysis examines three significant security risks which include living-off-the-land (LotL) attacks as well as ransomware-as-a-service (RaaS) difficulties and quantum computing system dangers. Real-world Profiles of WannaCry, TrickBot, and Stuxnet demonstrate the requirement for multiple security layers in defense systems according to this paper. AI-proactive threat hunting combined with zero-trust security architecture and automated malware analysis stands as critical elements which research demonstrates for monitoring new Windows malware threats.

Keywords:

Windows malware, malware detection, static analysis, dynamic analysis, machine learning, behavioral analysis, obfuscation, command-and-control (C2), living-off-the-land (LotL), ransomware, adversarial machine learning, threat intelligence, zero-trust security.

Predicting IPO Listing Prices Beyond Time Series: A Hybrid Transformer Framework for Non-Temporal Valuation

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Abstract:

The Initial Public Offering (IPO) market presents unique challenges in accurately predicting listing prices due to dynamic investor sentiment, economic indicators, and market conditions. So far, the research in IPO listing price prediction has been approached as time-series problem which does not make accurate prediction. This study introduces a novel approach to IPO listing price prediction, recognizing that IPO pricing is a non-time series problem, primarily driven by structured financial data, categorical variables, and market sentiment rather than sequential dependencies. To capture these complex interactions, a hybrid Transformer model was developed, integrating numerical market indicators with textual sentiment analysis. A dataset of 1,805 IPO listings was curated by incorporating the subscription ratios. Additionally, market sentiment from 30 to 90 days preceding the listing date was extracted and transformed into a positive sentiment score, a crucial contextual factor in the model. The Transformer model effectively deciphers market sentiment from financial texts, while feedforward neural network processes structured financial data, resulting in enhanced accuracy, generalization, and interpretability. This research underscores the significance of sentiment-aware financial modeling, demonstrating how the hybrid Transformer architecture effectively fuses structured financial data with unstructured market sentiment, enabling a more context-aware, accurate, and generalizable IPO price forecasting model that surpasses traditional predictive methods.

Keywords:

Non-time series prediction, Deep Learning, Transformer, IPO Prediction, Feedforward Neural Network.

Brain Tumor Detection using Imagenet Model

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Abstract:

Brain tumour are one of the most life-threatening diseases, and early and proper detection is essential for treatment. Deep learning-based techniques, especially convolutional neural networks (CNNs), have shown immense potential in medical image processing. This research investigates using a pre-trained ImageNet model to detect brain tumour s using transfer learning to improve classification performance. The model is trained on a brain MRI scan dataset to distinguish between tumour and non-tumour patients. Experimental outcomes show that the ImageNet-based model performs with high precision, recall, and F1-score compared to traditional machine learning methods. The new method offers a computationally effective and accurate means of automated brain tumour detection, enabling early diagnosis and enhancing patient outcomes.

Keywords:

Brain Tumour Detection, Deep Learning, Convolutional Neural Networks (CNNs), ImageNet, Transfer Learning, MRI Classification, Medical Image Analysis, Tumour Classification, Artificial Intelligence (AI), Computer-Aided Diagnosis (CAD).

Multimodal Detection of Aggressive Behaviour Using CNNs and RNNs: Integrating Audio, Video and Image Analysis

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Abstract:

Aggressive behavior detection is important to maintaining public safety and resolving social issues. In this research, a multimodal method that combines convolutionary neural networks (CNNs) and recurring neural networks (RNNs) is suggested to process audio, video and image data to identify aggressive behaviors. Through the use of CNNs for extracting spatial resources from images and video frames and RNNs for temporal sequence analysis in audio and video streams, the system achieves a holistic understanding of the behavioral trajectories. The use of multiple modalities provides increased robustness, combining visual gestures, facial expressions and vocal tones, enabling accurate classification of aggressive and non-aggressive behavior. Experimental findings indicate the effectiveness of this method in real-world applications, e.g., surveillance systems, conflict resolution, monitoring public spaces, and offering a valid instrument for detection and timely intervention.

Keywords:

Aggression detection, multimodal deep learning, Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), spatial feature extraction, temporal sequence analysis, audio-video fusion, behavioral analysis, surveillance systems, conflict resolution, public safety monitoring.

Next Word Prediction Using LSTM

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Abstract:

Predicting the next word in a sequence is a crucial task in the field of natural language processing (NLP), with applications ranging from autocomplete and text generation to virtual assistants and chatbots.

This study investigates the application of recurrent neural networks (RNNs), specifically Long Short-Term Memory (LSTM) networks, to the next-word prediction task. LSTM networks are perfect for jobs involving text and language since they are specifically designed to handle sequential data and capture long-term dependencies.

In order to predict the most likely next word given an input word sequence, we suggest a method that uses an LSTM model trained on a sizable text corpus. After preprocessing the dataset to produce sequences, the text is transformed into numerical form using a tokenizer, allowing the LSTM model to process it effectively. The model's accuracy in predicting the following word in a variety of test sequences is used to assess its performance after it has been trained to minimize the categorical cross-entropy loss.

Our tests' outcomes demonstrate that the LSTM-based model is effective at predicting the following word, which qualifies it for real-time uses such intelligent text-based systems and predictive typing. The difficulties in training these models are also discussed in this work, such as the quality of the dataset, adjusting model parameters, and avoiding overfitting. Our research advances the creation of increasingly complex NLP programs that are able to produce and comprehend human language in real time.

Keywords:

Next-word prediction, LSTM, Natural Language Processing (NLP), deep learning, text prediction, tokenization, recurrent neural networks (RNNs).

Facial Emotion Recognition using Deep Learning

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Abstract:

Facial emotion recognition, an essential aspect of Artificial Intelligence (AI) and Computer Vision (CV), focuses on detecting and interpreting human emotions through facial expressions. This paper presents an approach utilizing Deep Learning (DL) models, including Convolutional Neural Networks (CNN), Binary-Temporal Scale Convolutional Neural Networks (DTSCNN), Recurrent Neural Networks (RNN), and Residual Networks (ResNet-50), to achieve real-time and accurate emotion recognition. The main goals of the study are real-time recognition, high accuracy, minimal latency, and resilience to diverse conditions. Experiments conducted on benchmark datasets evaluate each model based on accuracy, processing speed, and facial orientations. This paper compares the performance of these models and highlights that the CNN model outperforms others, offering superior precision and robustness. This research contributes to advancing facial emotion recognition with implications for human-computer interaction, psychology, marketing, and healthcare. The CNN ensemble model represents a significant step forward in facial emotion recognition, providing a comprehensive solution with broad applications in various fields. Its effectiveness underscores the importance of continuous research and refinement of deep learning techniques for solving complex tasks in AI and CV.

Over Voltage and Under Voltage Protection of Single Phase Domestic Loads using Arduino

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Abstract:

In the modern electrical systems, maintaining voltage levels within specified limits is crucial to ensure the safety and longevity of electrical appliances and equipment. This project focuses on implementing a reliable over-voltage protection system using Arduino microcontroller. The system employs an Arduino nano along with a ZMPT101b voltage sensor to continuously monitor the voltage levels of an electrical circuit. The core functionality of the system is to detect when the voltage deviates from predefined thresholds specifically, when it falls below under voltages or exceed over voltages. To achieve this, the system interfaces with 16*2 LCD display to provide real time feedback on the voltage status. An integrated relay module is utilized to cut off the power supply when voltage levels are outside the acceptable range, thereby protecting connected devices. Additionally, visual indicators are incorporated using LEDs. A red LED blinks to signal an out of the range voltage condition, while a green LED illuminates when the voltage is within the safe operational range. This dual indicator approach ensures clear and immediate visual feedback. The project demonstrates a practical application of Arduino in enhancing electrical safety and reliability.

Keywords:

Arduino board , Voltage sensor, voltage levels, LED, LCD display.

Optimization of Synthesis Characteristics of Biochar from Palm Kernelshell and Maize Residue

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Abstract:

India produces a substantial amount of agricultural residue, the majority of which is managed unscientifically, leading to a plethora of environmental issues. There are several methods suggested for the sustainable management of agricultural residues, including the production of biochar and their controlled application in agricultural fields. Though it remains a sustainable solution, many standardization studies are required for the synthesis of biochar and its optimal application in agroecosystems. The objective of the present study is to analyze the effect of pyrolysis temperature and retention time on the physico-chemical properties of biochar from palm kernel shells and maize residue. For the study, biochar was produced from the respective feedstocks using an Electrical Muffle furnace at temperatures ranging from 300 to 500°C with a margin of 100°C and residence time from 30 to 60 minutes with a margin of 15 minutes. The optimization of pyrolysis conditions was done using the Response Surface Methodology. The interactions among heating temperature (A), and retention time (B) were designed by Central Composite Design (CCD) experiments.

The respective biochars were subjected to quality assessments using physicochemical parameters like pH, conductivity, porosity, moisture content, loss on ignition, CEC, TOC, WHC, Bulk density, and biochar yield, following standard methods. A consolidation of the results revealed that the optimum conditions for biochar synthesis from both materials were 500/60 with a desirability function (temperature/residence time) of 0.792 for Palm kernel shell and 0.748 for maize residue.

Keywords:

Biochar, Pyrolysis conditions, Palm kernel shell, Maize residue, Temperature, Retention time, Response surface methodology.

Adaptive Virtual Therapist for Mental Health Support

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Abstract:

Mental health problems are a serious plays great impact globally, as millions struggle to access timely and low-cost mental healthcare. This issue is compounded in rural and shortage areas, where mental health providers are limited. To address to bridge this gap, introduce an artificial intelligence (AI) Driven Virtual Therapist, an intelligent mental health support system using advanced AI and ML Approaches It fuses face and voice emotion response based on cognitive-behavioural therapy (CBT) based recognition-enabling empathetic, real-time interactions. The proposed solution using a multi-modal emotion analysis framework and Deep Face decoding of views from facial expression and for voice tone analysis. These insights use ChatGPT AI Application programming interface (API) to create personalized responses based on the emotional condition of the user. The system also provides Mental Health Book and Video Recommendations Powered by 10 of YouTube Data API & Other Mental Health Platforms Mood logs, user interactions, and this includes all of the information that represents a session, such as contexts and events, and these are stored in a PostgreSQL through Supabase. Real-time data management and user authentication. To ensure accessibility and usability, the system is programmed with React js based frontend, giving a natural lang based chat app interface. The project follows an Agile dev methodology with eternal testing and user feedback incorporation across the entire development cycle.

Keywords:

AI-driven Therapy, Mental Health Chatbot, Cognitive Behavioural Therapy (CBT), Emotion Recognition, Voice Sentiment Analysis, Virtual Mental Health Support, Natural Language Processing (NLP), Facial Emotion Detection.

A Novel AI Streamlit-Based Multi-Condition Health Predictor

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Abstract:

This project presents a machine learning- based solution for early prediction of critical diseases such as Diabetes, Heart Disease, Parkinson's Disease, and Breast Cancer. The system integrates multiple machine learning models, including Random Forest, Gradient Boosting, XGBoost, Logistic Regression, and Support Vector Machines, to enhance prediction accuracy. Advanced techniques such as SMOTE for handling class imbalance and Principal Component Analysis (PCA) for dimensionality reduction are employed. A hybrid approach is adopted using ensemble methods like stacking and voting classifiers to ensure robust model performance. The models are evaluated using accuracy metrics and cross-validation, achieving high predictive reliability. Furthermore, a user-friendly interface is developed using Streamlit, allowing individuals to input medical attributes and receive real-time disease predictions. This platform demonstrates the potential of AI-driven healthcare solutions in supporting early diagnosis, thus enabling timely medical intervention and improving patient outcomes. The proposed system is scalable and adaptable for other medical diagnostic applications.

Keywords:

Disease Prediction, Hybrid Model, Stacking Ensemble, Class Imbalance, Streamlit Application, Accuracy Score.

Fake News Detection

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Abstract:

The rise of misinformation and fake news in our digital world has significantly influenced how people understand information and make choices. To address this challenge, we suggest an AI-powered Fake News Detection System that uses advanced natural language processing (NLP) and deep learning methods for real-time news verification. This system leverages Gemini AI to analyze both text and images, employs Supabase for backend authentication and data storage, and incorporates the Google Fact Check API, NewsAPI, and Google Custom Search API to assess the reliability of news stories. Our method incorporates transformer-based models like BERT, RoBERTa, and DistilBERT for text analysis, alongside Gemini AI Vision for conducting reverse image searches. The system is built for scalability, supports multiple languages, and offers real-time analysis, equipping users with a precise and efficient tool for identifying misinformation. Experimental tests on benchmark datasets have shown our system's effectiveness in accurately detecting fake news. Future developments will feature multi-modal analysis, integration with social media platforms, and improved support for a variety of languages. Evaluations on datasets like LIAR, Fake NewsNet, and PolitiFact demonstrate the system's effectiveness in distinguishing between real and fake news. Upcoming improvements will emphasize the analysis of different media types (text, images, videos), real-time social media monitoring, and enhanced multilingual capabilities to increase detection accuracy and adaptability.

Keywords:

BERT, deep learning, fact-checking, fake news detection, Gemini AI, Google Fact Check API, misinformation, NLP.

Secure File Storage on the Cloud using Hybrid Cryptography Algorithm

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Abstract:

Cloud Computing has vastly impacted the field of computing and it is used in different types of industries for different services and storage of large amounts of generated data. Before that storage devices used like CD drivers, hard drives, and floppy drives were depreciating and cost effective. So, the cloud was introduced to solve the storage problem. Due to the quick evolution in technology, a tremendous amount of data is generated daily. Confidentiality becomes difficult when this large amount of data is shared among various cloud servers. To maintain the privacy of clients cryptography techniques are introduced to maintain confidentiality. Cryptographic techniques use DES and AES algorithms to provide Security to the data. For a high level of security hybrid cryptography, Triple Data Encryption Standard (3DES), Advance Encryption Standard (AES), and Data Encryption Standard (DES) algorithms are used.

Keywords:

Cloud Storage, Hybrid Cryptography, Advance Encryption Standard (AES), RSA Algorithm, Triple Data Encryption Standard (3DES).

Fed-IOT: Decentralized Data Privacy Preservation against Adversarial Attacks

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Abstract:

The study presents Fed-IOT as a distributed architecture to protect IoT data privacy while maintaining system security through Federated Learning protocols. IoT devices create large volumes of sensitive data that suffer from severe privacy and security weaknesses primarily because of threats which include Denial-of-Service (DoS) and poisoning attacks. Data privacy is achieved through the Fed-IOT system by allowing devices to process data locally before securing model aggregation and implementing differential privacy methods. Fed-IOT implements adaptable learning methodologies which manage IoT device system differences so devices with various computing resources and network attributes can perform efficiently together. Large IoT networks achieve better network scalability through this framework because of improved communication efficiency. Test results show that Fed-IOT provides excellent capabilities in privacy protection together with robustness against attacks and scalable performance which indicates its potential as a beneficial solution for secure and privacy-protecting IoT applications.

Keywords:

Federated Learning, IoT Security, Data Privacy, Adversarial Resilience, DoS Attacks, Poisoning Attacks, Byzantine Resilience, Heterogeneity Handling, Differential Privacy, Secure Aggregation.

Food Court Web Application

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Abstract:

The food service industry has undergone significant transformations due to technological advancements, driving the need for innovative solutions that enhance customer experience and operational efficiency. This research explores the development of a food court web application with an AI chatbot to streamline the ordering process and provide immediate support. Key features include user registration, menu browsing, order placement, payment processing, and real-time tracking. The chatbot, powered by Dialogue Flow, enables natural user interaction and personalized recommendations.

User testing with 100 participants revealed that 85% found the application intuitive, and 90% appreciated the chatbot's responsiveness. Results showed a 40% reduction in order times and a 30% increase in customer satisfaction. Despite limitations like a small sample size and reliance on pre-defined chatbot data, the findings highlight the potential of AI-driven solutions in addressing inefficiencies in food court operations.

This study underscores the benefits of integrating AI with web applications for enhancing service delivery and customer engagement. Future work should focus on improving chatbot capabilities and leveraging user data for greater personalization. Such advancements can help food courts meet evolving consumer demands and foster satisfaction and loyalty.

Keywords:

Food court web application, AI chatbot, Customer experience, operational efficiency, personalised recommendation.

Intelligent System Design on Thermal Power Plant Efficiency Enhancing

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Abstract:

With the rising cost of fuel prices, industries that use steam boiler for heating or power generation are hard to operate at peak efficiencies.

While steam consumption, leakages and other heat transmission losses can contribute to the overall energy bill, this project article focuses on the heart of the steam generation- the boiler.

There are different ways to improve boiler efficiency using conventional control theory based mathematical models that describe the dynamic behavior of the boiler process control. Due to lack of comprehensibility, conventional controllers are often inferior to the intelligent controller. Soft computing tech provides an ability to make decisions and learning from reliable data.

The main aim of this project work is to achieve optimal operation of thermal power plant, to improve its efficiency and to reduce the consumption of fuel.

Initially several common models of thermal power control are analyzed, which use coordinated control system as well as local equipment. Then the system structure, function and application are described. At the end the structure and function of digital power plant is introduced with support of soft computing tech.

FPGA Implementation of Vedic Multiplier using Carry-Save-Adder and Brent-Kung-Adder

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Abstract:

This paper discusses a 8-bit Vedic multiplier implemented on a Field Programmable Gate Array (FPGA) using two different adder structures: the Carry-Save-Adder (CSA) and the Brent-Kung-Adder (BKA). The Vedic Multiplier is rooted in ancient Indian mathematics, originating from the Vedic Sutras of the Atharva Veda, one of the four sacred Vedas. The Urdhva-Tiryagbhyam Sutra is used for multiplication algorithm. The proposed methodology reduces the partial products as compared to the traditional multiplication algorithm. The parallel execution of operations enables faster processing, making it well-suited for real-time applications. The design is prototyped on Basys 3 Artix 7 board using Xilinx Vivado for simulation and synthesis. The results indicate that the Brent-Kung-Adder improves speed by approximately 21.5% while reducing area by 20.8% compared to the Carry-Save-Adder. The comparison between the two designs evaluates the performance based on area and delay parameters, providing insights into the trade-off between speed and resources in digital systems.

Keywords:

Multiplier, Vedic Multiplier, Full Adder, Carry-Save-Adder, Brent-Kung-Adder.

Friction Stir Processing of Magnesium Alloys: A Comprehensive Review

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Abstract:

This review explores how Friction Stir Processing (FSP) can improve the structure and strength of magnesium alloys. Magnesium alloys are valued for being lightweight and strong, making them useful in industries like automotive, aerospace, and healthcare. However, they have drawbacks such as low flexibility, poor wear resistance, and difficulty forming at room temperature. FSP is an effective method to address these issues by refining the grain structure, distributing phases more evenly, and enhancing mechanical properties. The review discusses key developments in FSP, including grain boundary strengthening, surface composite formation, and the effects of extreme cooling conditions. It also examines how FSP parameters, such as tool rotation and movement speed, influence phase transformations and the redistribution of elements in the alloy. A particular focus is given to the breakdown of secondary phases like $Mg_{12}Nd$ and how this process strengthens the material. Overall, FSP is shown to be a powerful technique for improving magnesium alloys, making them more durable and suitable for demanding industrial applications. The findings highlight its potential to customize material properties for specific engineering needs.

Deepfake Detection Using Deep Learning with a Multimodal Ensemble Approach

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Abstract:

The increasing threat of deepfake media in digital content necessitates robust detection mechanisms. This paper presents a multimodal deepfake detection system integrating deep learning models tailored for image, audio, and video classification. The proposed framework employs CNN + MobileNetV2 for images, CNN + CNN-BiLSTM for audio, and MobileNet + EfficientNet for video deepfake detection, ensuring high accuracy and adaptability. Unlike conventional single-modality detection methods, this system follows a modular ensemble structure, where inputs are processed independently and classified as Real or Fake based on extracted features. A Flask-based web interface allows users to upload media files, ensuring a real-time, user-friendly deepfake detection experience. Experimental evaluations on benchmark datasets demonstrate the system's high accuracy, reliability, and scalability, making it suitable for applications in cybersecurity, media authentication, and forensic analysis. The proposed solution leverages state-of-the-art deep learning models to combat misinformation, enhancing digital media trustworthiness.

Keywords:

Deepfake Detection, Multimodal Ensemble, Image Forgery Analysis, Fake Audio Identification, Video Deepfake Classification, Cybersecurity, Media Authentication, AI-based Digital Forensics.

Development of An Autonomous Drone System for Efficient Goods Delivery in Challenging Environments

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Abstract:

The capability to deliver essential goods quickly and efficiently in emergency and disaster situations is crucial to saving lives and maintaining community resilience. Autonomous drones offer a promising solution for delivering medical supplies, food, and other critical items, especially to areas where traditional logistics fail due to natural disasters like floods or earthquakes. This paper presents the design and development of a sophisticated autonomous drone system tailored for navigating complex environments such as flood-affected regions. The drone integrates a lightweight and durable frame with advanced navigation systems, including Global Positioning System (GPS) modules, Inertial Measurement Units (IMUs), and obstacle avoidance technologies like LiDAR and ultrasonic sensors. The system uses a custom-built flight control algorithm to perform real-time path planning and decision-making. Communication between the drone and ground control is achieved via robust systems, including RF-based voice and data transmission. Experimental evaluations in simulated flood environments demonstrate the system's efficacy in terms of payload delivery, obstacle avoidance, and navigation. The work presented aims to address key challenges in emergency logistics, offering a scalable and reliable solution for rapid, autonomous delivery of critical resources in a range of adverse conditions.

Keywords:

Autonomous Drone, Emergency Logistics, Obstacle Avoidance, Navigation Systems, Disaster Relief, Payload Handling, Communication Systems.

From Correlation to Intervention : Mapping the Parkinson's – Type 2 Diabetes relationship for improved clinical outcomes

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Abstract:

There is a progressive disorder of the brain in Parkinson's Disease (PD), and there seems to be an association, although less clearly defined, with Type 2 Diabetes Mellitus (T2D). There is now mounting evidence that the critical mechanisms common to both diseases include insulin resistance and dysfunction of mitochondria, oxidative stress and chronic inflammation. These can be implied that is intended to play a role in the pathogenesis of neuronal damage in PD, particularly dopaminergic neurons.

The study will use such convergent biological mechanisms for creating predictive models of Parkinson's disease using the approach of machine learning. For example, this model is going to focus on markers like insulin resistance, mitochondrial function, levels of oxidative stress, and among others, while estimating the risk of Parkinson's. It will classify those at a higher risk of neurodegeneration by using clinical data—blood sugar levels, insulin sensitivity, inflammatory protein profiles, oxidative stress markers.

Keywords:

Parkinson's disease, Diabetes, Mellitus.

Quantification based Intensity Estimation of Human Emotions using Facial Expression and Deep Learning

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Abstract:

Human emotion modelling has seen tremendous research in recent years. The state-of-the-art techniques focus on determining the base emotional state of an individual. However, with the evolving landscape of integrating emotion modelling with applications such as healthcare, education, user satisfaction, human-computer interaction etc, the determination of base emotional state is insufficient. This paper proposes a deep-learning based methodology for quantification of emotions from facial expressions. The proposed methodology employs a 3-step process which addresses the challenges of quantifying the basic emotions. In the first step, a deep learning model detects the basic emotion (e.g., happiness, sadness, anger) using facial landmarks extracted with Dlib. The second step categorises the detected emotion into one of low, medium and high categories. Finally, the third step quantifies the emotion by regressing to a continuous value. The models use the spatial information of facial features by partitioning the facial region into polygons based on the Dlib 68-point landmarks. Distances and angles of these polygons are then extracted as features for the deep learning models. The proposed approach provides an excellent framework for emotion quantification, thus enabling the investigation beyond basic emotion recognition.

Keywords:

Emotion detection, Emotion Quantification, Facial Expression, Artificial Neural Network.

Enhancing Glioma Prognosis with Explainable AI: A Transparent Machine Learning Approach

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Abstract:

The primary objective of this research is to create an effective method to diagnose gliomas, a special category of tumor that occurs within the brain in patients, considering a variety of diagnostic markers, utilizing various types of machine and deep learning techniques, and also by using XAI (interpretable artificial intelligence) methods. By incorporating patient information, including genetic information and medical histories, machine learning algorithms can predict how each individual will react to different medical interventions. XAI is incorporated to provide standards compliance and promote trust in AI-driven healthcare solutions. Random Forest, decision trees, logistic regression, KNN, Adaboost, SVM, Catboost, LGBM classifier, and Xgboost are some of the machine learning methods employed in this research, whereas ANN and CNN are instances of deep learning methods.

Keywords:

Glioma, Profound learning, Convolutional neural systems, Machine Learning.

FareHunt Web Application for Cost-effective Ride Booking

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Abstract:

The research work introduces Fare Hunt, a web app designed to provide real-time fare comparisons for ride-booking apps. It addresses the challenge users face in selecting cost-effective rides amid fluctuating prices. By integrating APIs from various ride-booking platforms, the app analyzes fares based on trip distance, ride type, surge pricing, and travel time. The system identifies and displays the most affordable option, promoting transparency and smarter travel decisions. Its responsive design ensures usability across devices. Beyond user convenience, the app also provides insights for ride-booking services to refine pricing strategies. Fare Hunt aims to empower commuters with real-time information, enabling them to save time, reduce costs, and make more informed choices in urban transportation.

Keywords:

Cost comparison, Ride-hailing services, Fare estimation, Dynamic pricing, Real-time comparison, API integration, User decision-making.

Reducing Waste with Mobile App

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Abstract:

The production and subsequent burgeoning offal of child-oriented products creates an environmental and a monetary nuisance. Studies show children get tired of products after only 36 days, and 1 in 3 parents throws away toys and gadgets that still function perfectly well [1]. This leads to 1.6 million tons of plastic waste being dumped every year [2] which is quite alarming actually. While the storage of pricey, unused kids when products is also a waste disposal problem in and of itself — and generally doomed to landfills. Although the waste and space suck are real, it is ultimately a matter of finding environmentally-friendly solutions for used or unwanted kids items that ease the load on parents and keeps landfill waste to a minimum.

Keywords:

Children's product disposal, early product disinterest, plastic waste, environmental impact, parental consumption habits, sustainable solutions, toy disposal, economic strain, landfill waste, product lifecycle management.

Enhanced ANN-Driven Metaheuristic Optimization for BLDC Motor Control: A Review

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Abstract:

This paper presents a comprehensive review of ANN-driven metaheuristic optimization techniques for Brushless DC (BLDC) motor control, focusing on their application in electric vehicles (EVs). BLDC motors are increasingly favoured in EVs due to their high efficiency, low maintenance, and superior performance characteristics. However, challenges such as torque ripple, speed regulation, and dynamic load adaptability persist. This study systematically evaluates advanced control strategies, including PID, ANFIS, PSO, and hybrid AI-based methods, highlighting their efficacy in minimizing losses and enhancing motor efficiency. Comparative analysis reveals that ANN-integrated metaheuristic approaches, such as the Emperor Penguin Optimizer and Enhanced Gravitational Search Algorithm, achieve efficiencies exceeding 97%, outperforming conventional techniques. The paper also discusses mathematical modelling, control hierarchies, and future directions, emphasizing the need for hybridized AI-optimization systems and renewable energy integration. The findings underscore the potential of intelligent control systems to address current limitations and pave the way for next-generation BLDC motor applications in sustainable transportation.

Advancements in Metaheuristic Algorithms for Efficient Noise Minimization in Signal Processing

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Abstract:

Noise minimization is a critical challenge in signal processing applications, including communications, sensor networks, and audio processing. Metaheuristic optimization techniques have emerged as efficient solutions due to their adaptability and computational effectiveness. This study evaluates the performance of Grey Wolf Optimization (GWO) in comparison to seven widely used optimization algorithms: Particle Swarm Optimization (PSO), Genetic Algorithm (GA), Simulated Annealing (SA), Ant Colony Optimization (ACO), Firefly Algorithm (FA), Differential Evolution (DE), and Whale Optimization Algorithm (WOA). The comparative analysis is conducted based on key performance metrics such as Signal-to-Noise Ratio (SNR) improvement, convergence speed, and computational efficiency. Results indicate that GWO achieves a strong balance between exploration and exploitation, making it highly effective for adaptive noise reduction. PSO offers rapid convergence, making it ideal for real-time applications, whereas GA provides flexibility but struggles with slow convergence in high-dimensional problems. DE and WOA excel in handling complex optimization tasks, though DE requires precise parameter tuning and WOA demands a high iteration count for effective convergence. ACO and FA demonstrate efficient noise minimization capabilities, yet ACO is highly sensitive to problem complexity, and FA suffers from slow convergence in noisy conditions. Future advancements should focus on hybrid models and deep learning integration to enhance adaptive filtering, accelerate convergence, and improve real-time performance. Combining metaheuristics with AI-driven techniques can significantly improve noise reduction efficiency, making these algorithms highly applicable in smart healthcare, wearable medical devices, and real-time communication systems. This review provides critical insights into selecting effective optimization techniques for noise suppression across diverse domains.

Resume Sorting & Filtering System Using Integrated IOT

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Abstract:

As requirements for training and placements grow, data science has shown to be playing a huge role in the revolutionization of TPO. In this research paper, we talk about our project- a Resume Sorting and Filtering System Using Integrated IoT, which integrates IoT and ML to automate resume screening. Using a camera module, the system scans physical and digital resumes, extracts key information through NLP, and classifies them based on job requirements. This reduces manual effort, enhances accuracy, and ensures efficient job and candidate matching. By modernising hiring, the project seeks to benefit recruiters and job seekers, making the process faster, smarter, and more effective to battle modern workforce needs.

Keywords:

TPO (Training and Placement Office), IoT (Internet of Things, Machine Learning, Natural Language Processing, Job Requirements, Automated Screening.

Ai Driven Autonomous Rover For Weed Detection And Removal In Fields

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Abstract:

The paper introduces an AI-Driven autonomous rover to detect and remove weeds from agricultural fields. Weeds pose a significant challenge for farmers in agriculture. They are also one of the main causes of crop yield reduction and increased resource utilization. The weeds are very labor intensive to remove from agriculture fields for the farmer making the process expensive. The paper proposes a solution for these challenges by integrating CNN architecture which uses RGB imaging as input to detect weeds. The detected weeds are then removed after classifying as chemically removable or physically removable weeds. The paper discusses the effective use of this solution to reduce chemical utilization on fields and promoting sustainable farming practices.

Keywords:

CNN, Autonomous Rover, Farming Practices, Crop Vs Weed, Weed Detection, Weed Removal, RGB Imaging.

Internet of Things and Deep Learning Integrated Crop Recommendation System

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Abstract:

The integration between the Internet of Things (IoT) and deep learning is revolutionizing agriculture through the provision of accurate, real-time crop recommendation systems. This article presents an innovative IoT-based deep learning system that collects essential soil and environmental information through a network of connected sensors. Sensors such as the DHT22 temperature and humidity sensor, YL-83 rain sensor, pH sensors, NPK soil sensors, and soil moisture sensors continuously monitor field conditions and send data to an ESP 8266 microcontroller, which serves as the main edge computing device. The ESP 8266 filters raw sensor data, performs preliminary filtering, and sends processed data to a cloud system through Wi-Fi or LoRaWAN. To ensure efficient communication, protocols such as MQTT are utilized to enable secure and efficient data transfer. Collected data is analysed by a hybrid deep learning architecture consisting of Convolutional Neural Networks (CNN) and Bidirectional Long Short-Term Memory (BiLSTM) networks. CNNs are employed to detect spatial patterns of soil content, while BiLSTMs record temporal variations in environmental conditions, providing an adaptive and responsive crop recommendation system. The application of IoT with AI-based analytics greatly enhances agricultural decision-making, optimizing resource allocation and maximizing the efficiency of yield. This article highlights the benefits of real-time data harvesting, eliminating human error and ensuring maximum crop suitability estimates accuracy. The proposed system reaches a prediction rate of 98%, outperforming traditional methods, and can potentially revolutionize modern precision agriculture through automated data-driven suggestions.

Keywords:

IoT, Deep Learning, Convolutional neural network, ESP 8266, Sensors, Bi-directional long short term memory, Message Queuing Telemetry Transport.

Comparative Evaluation of Battery Technologies for Electric Vehicle Applications

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Abstract:

The rising environmental concern is driving the shift from internal combustion engine (ICE) to hybrid and electric vehicles. The primary factor influencing electric vehicle performance, alongside the propulsion system, is the battery. When selecting a battery for electric vehicles, key considerations include energy density, power density, shelf life, temperature, weight, and cost. Generally the above factors are considered for battery selection for electric vehicle but as the pre-dominant reason for automobile sector to look for Electric vehicles is concern about the growing environmental pollution. This research paper innovatively examines battery technologies through a comprehensive analysis that incorporates considerations beyond conventional factors. Specifically, it investigates the impact of material availability, environmental pollution resulting from battery material extraction processes, and the effects of residual materials upon battery disposal.

Keywords:

Lead Acid, Nickel-Zinc, Nickel- Metal Hydride, Lithium ion.

Credit Card Fraud Detection Through Time – Aware Behavioral Representation Learning

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Abstract:

Detection of credit card fraud is increasingly becoming a pressing task for banks with the need for advanced methodologies that can effectively distinguish fraudulent from authentic activity amidst billions of legitimate transactions. This presents a general methodology to identify credit card fraud with the application of robust machine learning algorithms—Random Forest, Convolutional Neural Networks (CNN), Logistic Regression, Support Vector Machine (SVM), and XGBoost—is provided. From an extensive database of over 5 million transactions, we select and identify key features describing user behaviour patterns and transaction features. The random forest classifier serves as an initial classifier with feature importance feedback, while the CNN learns subtle patterns from mapped transactions. Logistic regression, SVM, and XGBoost also provide alternative methods that enhance overall model robustness. Experimental findings demonstrate that our hybrid method greatly enhances detection accuracy and attains higher performance measures — such as precision, recall, F1 measure, and AUC — than conventional methods. The findings are a testament to the efficiency of synergistic integration of ensemble learning and deep learning techniques in effective credit card fraud detection and open the door to more effective fraud prevention strategies in the banking sector.

Optimized Multiclass Image Classification using SVM for high Performance

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Abstract:

Image classification with efficiency is important for applications in medical imaging, security systems, and autonomous object recognition. This work proposes a multi-class classification system where features are drawn by the Histogram of Oriented Gradients (HOG) and classified by SVM algorithms, simulated in a Xilinx environment. The system uses the One-vs-Rest approach, reducing its computation overhead when compared to the One-vs-One method, making it scalable for multi-class tasks. Hence, parallel processing of HOG features ensures high speed and accurate classification even for big datasets. During training, it extracts HOG features, and in simulation, applies trained weights and biases to a linear decision function of the SVM model to produce class scores. Simulation results show that OvR has an accuracy of 98% compared to the 95% accuracy of OvO, with a lower error rate and faster classification times, which make it a better solution for the challenges of real-time image classification.

Keywords:

HOG, SVM, FPGA simulation, image classification, One-vs-Rest, scalability, real-time performance.

Smart Study

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Abstract:

Smart Study is an innovative iOS application designed to help students manage their study schedules efficiently. It offers features such as task management, progress tracking, personalized reminders, an interactive calendar, and a dark mode for enhanced usability. The app is built using Swift and SwiftUI, leveraging Combine for reactive programming and Core Data for efficient local storage. By providing an intuitive user experience and real-time tracking capabilities, Smart Study ensures that students can stay organized, remain consistent with their academic goals, and enhance their overall productivity.

Fraud Detection in Banking Data Using Cyber Security Techniques, AI & ML

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Shanny Kumar Singh

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Abstract:

Fraud detection in financial transactions is a crucial challenge in ensuring the security and integrity of banking systems. This study explores the application of a Random Forestbased machine learning model to detect fraudulent transactions within a highly imbalanced dataset. The dataset, comprising over 4.4 million transactions with only 5,749 labeled as fraudulent, was preprocessed to enhance model performance. Preprocessing steps included label encoding of categorical variables, feature scaling using standardization, and addressing class imbalance through the Synthetic Minority Oversampling Technique (SMOTE). The use of SMOTE balanced the dataset by oversampling the minority class, enabling the model to learn effectively from the imbalanced data. The Random Forest classifier was trained on the resampled dataset and evaluated on the test set. The results demonstrated a high classification accuracy of 100, with a weighted average F1-score of 1.00, indicating the model's ability to correctly classify the majority of transactions. For the minority class, the fraudulent transactions, the model achieved a precision of 63 and a recall of 96, reflecting its effectiveness in identifying fraud despite the inherent complexity of the task. The macro-average F1-score of 0.88 highlights the model's balanced performance across both classes. This work emphasizes the importance of combining ensemble learning methods with data resampling techniques to address challenges in fraud detection. The proposed approach demonstrates the potential for deploying scalable, robust, and accurate fraud detection mechanisms, ensuring enhanced financial security in real-world applications.

Keywords:

Fraud detection, Random Forest, SMOTE, class imbalance, financial transactions, machine learning.

IoT Based Farm Irrigation System

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Abstract:

This paper addresses challenges related to traditional irrigation methods and proposes an IoT-based farm irrigation system. The system utilizes moisture sensors embedded in the soil to collect real-time data, which is then wirelessly transmitted to a NodeMCU microcontroller. The NodeMCU processes this data, considering crop-specific variables, to automatically control irrigation processes by activating water pumps and solenoid valves. Moreover, the system incorporates weather prediction data, dynamically adjusting irrigation schedules based on rainfall and humidity to conserve water. Cloud platforms are used for remote data storage and management, enabling users to access and control the system via mobile or web applications. Additionally, data analysis techniques provide actionable insights for optimizing water management. In conclusion, this IoT-based irrigation system offers an efficient, automated, and intelligent solution to improve water conservation in agriculture.

Keywords:

Farm irrigation, Internet of Things (IoT), Sensors, Cloud computing, Water conservation, User interface.

Fake News Detection Integrated with Multilingual Support

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Abstract:

It is important to have efficient methods for determining fake news in the digital revolution, as misinformation circulates rapidly through numerous mediums. This study showcases a novel process for resolving this issue, utilizing Python in integration with machine learning approaches and conjunction with multilingual support. To improve its applicability in many worldwide scenarios, the method uses a binary classification model that was trained on a diverse dataset that covers multiple languages. An advanced translation module has been used to stand in language gaps, ensuring the right evaluation of news information despite of the language in which it is written. Rather than depending on a dataset in a single language, this module allows the classification process to understand the information in its planned context. This method significantly surpasses traditional single-language models by conjunction with multiple languages, a more comprehensive and efficient way to distinguish false news globally.

Keywords:

artificial intelligence, machine learning, social media, fake news, binary classification, language translator and the internet.

Question Answering System Using NLP

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Abstract:

This paper investigates the development and implementation of an Artificial Intelligence (AI)-based Question Answering (QA) system specifically tailored for computer science queries. As the field of computer science continues to evolve, the demand for efficient information retrieval and knowledge dissemination has increased significantly. Our QA system leverages advanced natural language processing (NLP) techniques, particularly transformer architectures such as BERT and GPT, to enhance comprehension and context understanding in technical queries. The system is trained on a diverse dataset comprising academic papers, textbooks, and online resources, enabling it to cater to various subfields, including algorithms, data structures, and software engineering.

Keywords:

Natural Language Processing (NLP), Question Answering (QA), Machine Learning, Artificial Intelligence, Text Processing, Contextual Embedding, Information Retrieval, Semantic Analysis.

Secure Home: A Privacy Preserving Data Aggregation Framework for Wireless Sensor Networks in Home Automation

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Abstract:

Wireless Sensor Networks (WSN) are widely used in smart homes for home automation but are faced with diverse security threats, including the complexity of data aggregation, vulnerability to eavesdropping, and exposure of sensitive information to unauthorized users. In this study, a methodology is proposed that combines the encryption and decryption process with strong access control to address these security challenges. The system ensures efficient resource allocation, thus preventing the over-allocation of resources by any single device. Complete access rights are reserved for the administrator, while unauthorized users who want to join the network are not allowed to access, control, or modify the system unless they are given explicit permission by the administrator. This methodology greatly enhances the security and privacy of smart home infrastructures by controlling access and safeguarding sensitive information within the WSN environment.

Keywords:

Wireless Sensor Networks, Smart Homes, Home Automation, Security Challenges, Encryption, Access Control, Data Aggregation.

Restaurant Management

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Abstract:

Maa Ki Rasio is a restaurant which is located near Bettiah Bihar. Currently they are offering their services to many customers daily. Their customer base is growing day by day because of their location and the quality of their food. Even though this is a small restaurant, the service they are offering is huge. With the growing customer base, it is difficult to offer services to all of them manually. Therefore, this restaurant requires to move to a computerized solution. This will help them to run their operations smoothly and in a more efficient manner. The suggested system allows MAA RASOI restaurant to increase the scope of the business with the little staff they have. As this is a growing business which is in its first stage, they still cannot go for more staff. Current trend is also going for an online solution. This system allows restaurants to quickly and easily manage online menus and customers can navigate and place orders fast. Restaurant staff also quickly view orders and prepare orders without previous miscommunication. Graphical interfaces are efficient and effective for both customers and restaurant staff for the managers and owners this system is very effective because they can view their requirements in reporting module. In This We Have Used html, JavaScript etc. has used to develop the website. CSS has been used to create Designing for the website. Any web browser such as Edge, Chrome, Firefox can be used to access the website in any environment such as windows or Linux.

QAS(Question Answering System) Using Deep Learning on Contextual Context

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Abstract:

This project focuses on the development of a question answering (QA) system in artificial intelligence (AI) and machine learning (ML). This system is designed to help users by providing accurate answers to questions about artificial intelligence and ML using advanced techniques in these fields. Using natural language processing (NLP), the system can interpret complex technical questions, while AI and ML models increase the accuracy and relevance of answers. The system is trained on a set of data and AI/ML concepts that enable it to provide reliable answers in real time. It also incorporates context-aware changes to adapt to user queries and continuously learn from interactions to improve accuracy.

The QA system includes a user-friendly interface that simplifies interaction and is accessible to those with a high level of expertise. Advanced analytics are included track usage patterns and optimize performance. In addition, the system will have the ability to properly handle the increasing number of queries. The goal of the project is to refine the capabilities of the system through testing and feedback from users, to ensure that the different needs of users are met. This project shows the use of AI and ML to create independent QA systems, which can serve as valuable tools for students, professionals and researchers in AI / ML, in the end increasing the range and depth of knowledge in these now growing fields, for promotion.

The QAS project delineates a streamlined, AI-driven workflow that combines NLP, AI, and ML to deliver accurate, intelligent answers. It initiates its cycle with the input query from the user, where the input message is analyzed by NLP algorithms to tease out intent, meaning, and context. This processed query, through AI models, applies a rich knowledge base, browsing tools, and computing resources to fetch or generate responses relevant to the query.

Keywords:

QAS, Natural Language Processing Machine, Learning, Support NLTK, BERT, Wikipedia, Google.

World Billionaire Analysis: Using Linear Regression

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Abstract:

This study investigates global billionaire wealth trends using machine learning, focusing on linear regression to analyze the 2022–2024 dataset. By modeling relationships between billionaire wealth, stock performance, and economic indicators, this research aims to predict future billionaires and uncover emerging industries and regions driving wealth creation. The study employs optimized linear regression techniques, incorporating regularization methods and feature selection, to enhance prediction accuracy and interpretability. Results highlight key variables influencing wealth trajectories and identify patterns in wealth accumulation. These insights offer valuable tools for investors and policymakers to anticipate shifts in global economic dynamics and emerging opportunities.

Keywords:

Linear regression, Machine learning, Model optimization.

Deep Learning-Based Lane Detection for Autonomous Vehicles

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Abstract:

Modern vehicles increasingly integrate advanced driver-assist features such as automatic lane keeping and object detection. Traditional approaches have relied on hand-crafted features and heuristics that are sensitive to lighting and road conditions. In this paper, we propose a fast and adaptive system that fuses a deep learning-based encoder-decoder convolutional neural network (CNN) for lane detection with classical Haar cascade-based object detection for vehicles. The lane detection module uses Tensor Flow to implement a custom CNN architecture that performs pixel-wise segmentation on down sampled video frames. Simultaneously, object detection is achieved through an Open CV cascade classifier that identifies vehicles on the road. The integrated system processes video streams in near real-time, demonstrating promising results on a custom dataset.

Keywords:

Lane Detection, Object Detection, Convolutional Neural Networks (CNN), Haar Cascade Classifier, Real-time Video Processing, Autonomous Vehicles.

Hate Speech Detection Model

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Abstract:

The increasing influence of hate speech on society has made its detection on social media crucial. In order to detect hate speech in text data, we investigate and contrast the effectiveness of three machine learning algorithms: Decision Tree, Support Vector Machine (SVM), and Naive Bayes. To improve feature extraction, we pre-process a publicly accessible twitter dataset using stemming, stopword removal, and tokenization. The Count Vectorizer is used to vectorize the processed data, and measures like accuracy, precision, recall, and F1-score are used to train and assess the models. The results of experiments show the advantages and disadvantages of each model, with SVM obtaining the maximum accuracy because of its capacity to handle high-dimensional data. This study demonstrates how conventional machine learning techniques can be used to detect hate speech and recommends investigating more sophisticated techniques, such as deep learning, for further research.

Keywords:

Hate Speech Detection (HSD), Machine Learning (ML), Text Classification, Decision Tree (DT), Support Vector Machine (SVM), Naive Bayes (NB), Natural Language Processing (NLP), Text Preprocessing, Count Vectorizer (CV).

Yoga Pose Detection using Swin Transformer

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Abstract:

Yoga, a centuries-old practice originating in India, is widely recognized for its comprehensive health benefits. It not only enhances physical features like flexibility, strength, and balance but also supports mental well-being by reducing stress, improving focus, and emotional stability. Human Activity Recognition (HAR) plays a crucial role in computer vision, particularly in healthcare, fitness. Accurate identification of yoga postures is essential for various applications such as injury prevention, performance tracking, and customized training, especially in remote or virtual settings where direct supervision is limited. The Yoga82 dataset offers an extensive collection of images and videos showcasing various yoga poses performed by individuals across different environments. This dataset serves as a valuable resource for training and evaluating machine learning models capable of recognizing yoga poses across diverse body types and backgrounds. Utilizing this dataset, deep learning architectures like CNNs, ResNet, MobileNet, Swin Transformer, and ViT have achieved significant accuracy in yoga pose classification, enabling advancements in virtual coaching, fitness assessment, and healthcare applications.

Keywords:

HAR, Yoga82, Swin Transformer, ResNet.

An AI Powered Mobile Application for Early Skin Cancer Detection

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Abstract:

The research paper here describes the development of an iOS application which aimed at early detection of skin cancer by using Apple's Create ML framework. The project uses image classification techniques to provide real-time and on-device predictions to classify skin lesions as benign or malignant. There is a lack of accessible, user-friendly diagnostic tools in healthcare, which drove the motivation behind this project. By integrating machine learning into a mobile platform, the app seeks to deliver early cancer detection, making diagnostic technology more widely available and affordable. It was the aim of the project to reflect both innovation and social impact in healthcare.

Keywords:

Create ML, Image Classification, iOS App, Skin Cancer Detection using Machine Learning.

Using machine Learning to Detect Epileptic Seizures in EEG Signals

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Abstract:

Epilepsy is a chronic brain disorder that causes seizures, which are brief episodes of abnormal electrical activity in the brain. Medical professionals commonly diagnose it using an Electroencephalogram (EEG), a device that measures brain activity by placing electrodes on the scalp. However, interpreting the data from an EEG can be challenging due to its complex and nonlinear nature, which generates a significant amount of information to analyze. In this research study, we present an innovative approach that employs machine learning techniques to address this issue. Our study utilized data from Boston Children's Hospital, involving a cohort of 23 individuals for testing. Through a process known as ten-fold cross-validation, we found that the Random Forest algorithm achieved an impressive accuracy rate of 86.191%, significantly outperforming the Support Vector Machine, which recorded an accuracy of 68.13%. These findings indicate that the Random Forest algorithm holds promise for improving seizure detection and could serve as a valuable focus for future research initiatives.

Keywords:

Epilepsy, Electroencephalogram, Machine Learning, EEG data analysis, Random Forest algorithm, Healthcare technology.

AI Driven Driver Behavior Monitoring System

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Abstract:

The increasing risk of accidents due to driver fatigue and distraction necessitates the development of driver behavior monitoring systems (DBMS). This article provides an overview of AI-driven approaches to real-time monitoring of driving behavior, focusing on the integration of deep learning and computer technology. The main goal is to improve road safety by detecting signs of fatigue and distraction, which are important in preventing accidents. Various driving tests, including facial expressions, eye movements, and head movements. These machines use a convolutional neural network (CNN) to process videos in real time, showing important events such as microsleep and distraction. The preparation system is designed to work well in different conditions, including lighting, racing, competition changes, and is designed to monitor traffic lights and traffic signals in the pit in real time. This information is then incorporated into a model that shows whether the driver's actions are disruptive or normal. If any interference is detected, an alarm is activated to help the driver return to normal, ensuring accuracy and reliability. The analysis is explicitly stated as a way to improve the overall and comprehensive understanding of driver rights. Using machine learning algorithms, the system can adapt from the data and improve its predictive capabilities over time. This paper also discusses the challenges of developing complex, real-time algorithms that can run efficiently on signature platforms without requiring significant computational resources. Monitoring the process by employees can increase safety and reduce the risk of injury. By providing timely alerts to drivers who report bad behavior. These findings form the basis for future research and development in this area with the aim of improving driver monitoring and supporting its widespread use in the automotive industry.

Keywords:

Driver Behavior Monitoring System, Safety Technologies, Machine Learning, Drowsiness Detection, Image processing, Yawn Detection, Real Time Systems, Eye Movement Analysis, Roadhole Detection.

Developing an Effective Text Summarizer Using Natural Language Processing Techniques

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Abstract:

In today's digital age, the overwhelming abundance of information presents a challenge: how to quickly distill essential insights from vast textual data. This project introduces an innovative text summarizer designed to transform lengthy documents into succinct, coherent summaries, enhancing the efficiency of information retrieval and consumption. By employing cutting-edge natural language processing techniques, our system seamlessly integrates extractive and abstractive summarization approaches. Utilizing advanced machine learning algorithms and state-of-the-art deep learning models like transformers, our solution achieves superior performance in summary accuracy and coherence. Evaluations on benchmark datasets reveal our text summarizer's ability to outperform existing solutions, offering a significant leap in delivering precise and readable content. By making data more accessible and actionable, our project paves the way for smarter decision-making and improved productivity across various domains. As we continue to innovate, our text summarizer promises to be an indispensable tool in navigating the complexities of the information-rich world, ultimately transforming how we understand and utilize text. Although there have been so many achievements in the acquisition of datasets, methods, and techniques published, there are not many papers that can provide a broad picture of the current state of research in this field. Developing an effective text summarizer using Natural Language Processing (NLP) techniques is crucial in managing the ever-growing amount of textual information. This research focuses on creating a sophisticated summarization system that can accurately condense large documents into coherent and informative summaries. The study explores various NLP techniques, including extractive and abstractive methods, to achieve this goal. Extractive summarization involves selecting key sentences directly from the source text, while abstractive summarization generates new sentences that convey the essential information in a more concise form. The research leverages advanced machine learning algorithms, such as transformer models and sequence-to-sequence architectures, to enhance the summarization process. Additionally, the integration of attention mechanisms helps in identifying the most relevant parts of the text, ensuring that the generated summaries maintain context and meaning. Evaluation metrics like ROUGE (Recall-Oriented Understudy for

Gisting Evaluation) are employed to measure the performance and accuracy of the summarizer against humangenerated summaries. By combining cutting-edge NLP techniques with rigorous evaluation and optimization, this research aims to develop a text summarization system that is both efficient and reliable, ultimately contributing to the field of automated text processing and knowledge management.

Keywords:

Text Summarization, NLP, Natural Language Processing, Statistical Approach.

Artificial Intelligence Search Engine using NLP and Cloud

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Abstract:

The convergence of Artificial Intelligence (AI), Natural Language Processing (NLP), and cloud computing is reshaping industries by empowering machines to comprehend, process, and generate human language with remarkable efficiency and scale. AI, driven by innovations in machine learning and deep learning, serves as the foundation for NLP, which facilitates seamless interaction between humans and computers through natural language. Meanwhile, cloud computing provides the essential infrastructure to train, deploy, and globally scale these AI models. By utilizing cloud platforms, developers and businesses gain access to extensive computational resources and pretrained NLP models, enabling the creation of intelligent solutions such as virtual assistants, chatbots, sentiment analysis systems, and automated translators. This paper investigates the advantages of combining cloud computing with AI-driven NLP, focusing on its scalability, efficiency, and accessibility. It also explores the concept of NLP-as-a-Service (NLPaaS), which empowers organizations to implement advanced language models without requiring specialized hardware or expertise. Additionally, the paper examines how cloud platforms optimize the handling and processing of large datasets essential for NLP and AI, offering a cost-effective and scalable approach for businesses of all sizes.

Keywords:

“Artificial Intelligence (AI)”, “Natural Language Processing (NLP)”, “Cloud Computing”, “Search Engine”.

Diabetes Disease Prediction Using Machine Learning

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Abstract:

The emergence of machine learning (ML) has revolutionized a number of sectors, including healthcare. In project, we developed ML-based disease prediction system aimed at improving accuracy and efficiency of early diabetes disease detection. The system leverages patient data, such as Glucose level, Blood Pressure, BMI, Insulin, Pregnancies, Skin Thickness to predict the diabetes disease. By employing advanced like K – Nearest Neighbour algorithm, the model demonstrates significant improvements over traditional diagnostic techniques. This report outlines the design, development, and validation of the model, highlight its application potential in real-world clinical settings. The project also discusses challenges, including data quality and ethical considerations, and proposes future improvements such as expanding the dataset and incorporating real-time data. With its ability to predict diseases accurately, this machine learning model aims to assist healthcare professionals in making faster, data driven decisions, ultimately improving patient outcomes.

Keywords:

Machine Learning, Disease Prediction, Healthcare Analysis, Data Privacy.

Hate speech detection using ALBERT+CNN algorithm

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Abstract:

One of the forms of discriminatory communication that harms other individuals is hate speech, crosses boundaries, and sometimes leads to cyberbullying. Hate speech propagates hatred for an individual or a specific group on the basis of a variety of attributes, such as gender, race, or religion. Researchers are fighting to offer a safe internet by applying machine learning and natural language processing methods in the offensive speech detection system. There are several methods that have already been introduced for automating online hate speech detection. Two steps of this process are identifying the characteristics that these words utilize in order to target a particular person or group and labelling textual content as non-hate speech, disrespectful speech, or hate speech. Detection of hate speech is harder because our analysis of language in common datasets shows that hate speech has no unique, discriminatory characteristics. As deep neural network topologies are extremely proficient at encoding the semantics of hate speech, they are suggested as feature extractors. Social media websites such as Twitter provide data used to determine the efficacy of these processes. Incorporating CNN and Albert, we have utilized them in this project to better detect hate speech.

Keywords:

Hate speech, Cyberbullying, Offensive speech detection, Deep neural networks, Discriminatory communication, Machine learning, Albert.

Optimizing Home Environment safety- IOT based Freon Gas Detection and Automation

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Abstract:

Numerous sensors to create an IoT-based system that, in the event of a gas leak, triggers immediate alerts and safety measures like alarms and warnings to users. Furthermore, an easy-to-use web application enables for home automation remote control, encouraging convenience and energy efficiency. The information derived will be subject to review, to result in greater security regulations. TheThe project aim is to increase safety in homes through IoT automation and gas detection. Utilizing an Arduino Uno R3 microcontroller, the system incorporates the project will, at the end, generate a smart home environment that is safety-minded and sustainable.

Leaf Classification using Various Machine Learning Algorithm

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Abstract:

Growing demand for species identification and environmental monitoring has attracted substantial attention toward Advancements in machine learning techniques for classifying leaves. This work presents a novel machine learning-based strategy for accurate and effective leaf classification. The purpose of the study is to utilize a database of diverse leaf photographs representing various plant species. Preprocessing techniques such as feature extraction and image normalization is employed to fortify the classification model. Identification of relevant features: To know the feature of the leaf images like shape, texture, colour etc., finding and removing the relevant properties from the leaf images. SVM, Random Forest, and CNN algorithms are among the modern machine learning algorithms whose leaf classification performance is assessed and contrasted. These algorithms were selected due to their proven performance in image classification contests and their capacity to manage intricate, non-linear relationships within the data. Plant species identification, image classification, machine learning, botanical research, leaf classification, environmental management, and support vector machines (SVM).

Keywords:

Leaf Classification, Machine Learning, Support Vector Machines(SVM), Convolutional Neural Network(CNN), Artificial Neural Network(ANN).

Real-Time Sign Language Detection System Using Machine Learning

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Abstract:

This paper develops a real-time sign language recognition system using Convolutional Neural Networks (CNN), OpenCV, and CVZone to assist individuals with speech or hearing impairments. The CNN architecture extracts spatial features using convolutional and pooling layers, while fully connected layers classify gestures into 11 predefined categories. Data preprocessing includes normalizing hand gesture images, augmenting the dataset, and applying enhancements for improved model generalization and robustness. The system integrates the CVZone Hand Tracking Module for efficient real-time hand detection, ensuring accurate region-of-interest extraction. The CNN, trained using TensorFlow/Keras, achieves 95% accuracy with minimal latency (<100ms), making it highly responsive. The model's adaptability is validated under various lighting and background conditions, demonstrating its reliability in real-world scenarios. The system's lightweight and efficient implementation make it accessible for deployment on different computing platforms. This scalable approach contributes to assistive technology advancements, with future enhancements focusing on expanding datasets, improving classification accuracy, and optimizing deployment on edge devices. The proposed system facilitates seamless communication for individuals with hearing and speech disabilities, promoting greater accessibility and inclusivity.

Keywords:

Object detection, sign language, OpenCV, CVZone, CNN, TensorFlow.

Helment Ditection using AI

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Abstract:

Safety of people crossing roads is a fundamental concern, especially in the context of motorcycles and bicycles being the broader way of transport. The act of wearing a helmet serves as a concrete demonstration of rider's involvement for personal security and compliance with established security protocols. Include a variety of scenarios that occur on the street, including when the driver carries the helmet correctly and situations where the helmet is prominent. This data record serves as the basis for the development of advanced algorithms. It aims to recognize helmet consumption with accuracy and accuracy. By integrating Yolox State-of-the-art skills,

allows you to quickly identify photos or helmets in a variety of street environments recorded in a variety of street environments. The use of the Bild path provided as a command line argument means that the model meticulously checks all models to determine whether a helmet is worn. When helmets are prominent, our algorithm takes proactive measures by automatically issuing challan messages to drivers, increasing the importance of helmet consumption and promoting a culture of security awareness on the streets. Reduced risk of head trauma and promote a safer environment for all street consumers. Through continuous improvements and innovation, we have an obligation to improve road traffic safety limits in order to ensure wells and safety for people sailing on roads around the world.

Python-Based Forecasting and Visualization for Construction Project Monitoring and Reporting

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Abstract:

Construction project management choices often depend on how effectively the project status can be monitored in real time and how quickly the team can respond to delays or cost problems. While the market commonly employs applications like MS Project and Primavera P6, they are not flexible during field-level changes and are not conducive to forecasting or auto-reporting. This paper introduces a light Python-based solution with the aim of reducing manual intervention and improving visibility and control. The system is developed using Python packages like pandas, matplotlib, and scikit-learn to handle and analyze planning data. It makes predictions of potential cost overruns from current task progress and produces graphical summaries like progress charts and cost distribution plots. These can be utilized by project managers to identify delays, overruns, or inefficiencies at an early stage. The system also exports forecast data and results into Excel directly, reducing the time for documentation. The demonstration by Python was done on a sample building project. It was successful in identifying potential risk tasks and reducing manual report time by around eight hours per project stage. Compared to common tools, the Python model provides increased transparency, flexibility, and potential integration with BIM and real-time dashboards in the future.

Keywords:

Construction management, Python, forecasting, machine learning, delay prediction, data visualization, project reporting.

Smart Diagnostics: Leveraging Machine Learning For Precise Diabetes Risk

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Abstract:

Diabetes, a chronic disease marked by elevated blood glucose levels, poses severe health risks such as cardiovascular complications, kidney failure, and vision impairment if untreated. Early diagnosis is essential for effective management and risk mitigation. This study leverages machine learning algorithms to enhance the accuracy of diabetes prediction using diverse patient datasets. By applying methods like K-Nearest Neighbor (KNN), Logistic Regression (LR), Decision Tree (DT), Support Vector Machine (SVM), Gradient Boosting (GB), and Random Forest (RF), the study evaluates their predictive performance. Among the tested algorithms, Random Forest exhibited the highest accuracy, demonstrating its potential as a robust tool for early diabetes detection and management.

Enhancing Creativity and Efficiency in Content Creation through AI: A SaaS-Based Approach

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Abstract:

Artificial Intelligence (AI) has permeated into content creation across various industries such as media, marketing, education, among others. This paper describes an AI powered content generator application that is SaaS oriented, estimating the efficiency of the content generated. Using Next.js, React, Tailwind CSS, TypeScript, and Gemini AI model, the developed application produces content that meets quality standards while also being ethical, regarding issues such as plagiarism and bias. The application improves the users' experience by including a simple interface, real-time editing, version control, and customization of output for users. Google's AI model Gemini will be used for the content generation, it will be integrated in the webapp via the use of Api. With this AI technology, writers can simply set up the parameters for writing and will create all the repetitive elements taking away those mundane aspects, which leads to the enhancement of productivity, hence, it does not overshadow the creative input of humans, which results in improved efficiency and better rate of content generation. This application considers ethical aspects including fairness and truth-telling as part of core features of the application. Due to the nature of the cloud-based architecture, the features are offered competitively across different firms regardless of their size, thus democratizing the use of advanced AI technologies without investing in costly systems. This flexible approach will be positively influential for the broader adoption of generative artificial intelligence.

Keywords:

Artificial intelligence, content generation, SaaS, Gemini, creativity, machine learning, Next.js, React, Tailwind CSS, TypeScript.

Comparative Analysis of ANN, RNN, and GRU for Online Payment Fraud Detection

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Abstract:

With the ever growing presence of online payment transactions, online payment fraud becomes a major risk both for financial institutions and for the consumers. Rogue transaction detection is performed through a comparative analysis of Three artificial neural network (ANN) machine learning models, recurrent neural networks (RNNs), and gate recurrence units (GRUs) through this study. Four key performance indicators are evaluated using Error rate, sensitivity, specificity, and accuracy as methods of evaluating the model. The results also indicates good performance of the GRU model in comparison to the ANN and RNN GRU models as well as having the best accuracy of 99.9%. This insight depicts the performance of GRU for utilization in a robust online fraud detection mechanism.

Keywords:

The secure online transactions, fraudulent payment detection, ANN vs RNN vs GRU, the advanced machine learning models, deep learning for financial security, high accuracy fraud detection, error rate optimization, sequential data classification, digital payment risk assessment, AI driven anomaly detection, transactional fraud prevention and online financial monitoring are the areas covered in the index terms.

Gesture-Based Communication: YOLOv5 for Sign Language Recognition

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Abstract:

The researches investigate sign language translation from video through YOLOv5, works as strong object detection framework and enhance accessibility of sign language. The main goal of this research is detecting hand gestures through frames using YOLOv5 and translating them into sign language. The research estimates the aspects like accuracy of detection, frame processing speed, and gesture interpretation performance. Data is collected from datasets along with preprocessing tasks like frame extraction and augmentation. YOLOv5 reduces classification errors, provides accurate detection and mapping gestures for to the meanings, furthering communication solutions for hearing disability.

Keywords:

Frame processing speed, Sign Language, YOLOv5, Tensor Board.

P2P Communication System

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Abstract:

Peer-to-Peer Communication System Using the MERN Stack presents a comprehensive exploration into leveraging peer-to-peer (P2P) architecture for secure and efficient real-time communication. In an era where privacy concerns and data breaches are prevalent, decentralized technologies like P2P offer promising solutions by establishing direct communication channels between users, eliminating single points of failure, and enhancing user anonymity. This project delves into the technical intricacies of P2P communication, elucidating its decentralized message delivery model, peer-to-peer architecture, and computational costs. As a solution, this system leverages WebRTC and WebSocket protocols to enable direct peer-to-peer connections. MongoDB is used for efficient content storage and offline message archiving by assigning unique identifiers to messages, ensuring that they remain accessible without relying on any central authority. The project examines how P2P communication enables users to exchange messages without relying on centralized servers, thereby reducing the risk of censorship, surveillance, and unauthorized access. Moreover, the project investigates various privacy-enhancing techniques, such as end-to-end encryption and secure key exchanges, which are integrated with P2P architecture to bolster user privacy and data security. It discusses the development of user-friendly applications and platforms that leverage P2P for secure messaging, catering to diverse needs ranging from personal communication and corporate collaboration to privacy-focused messaging. This project addresses legal and ethical considerations surrounding peer-to-peer communication, highlighting the importance of balancing privacy rights with accountability and compliance with regulatory frameworks.

Keywords:

Peer-to-Peer Network, MERN Stack, Decentralized Messaging, WebRTC, WebSockets, End-to-End Encryption, Real-Time Communication, Data Integrity.

Quokka-Inspired Optimization Algorithm for Efficient VM Migration in Edge Computing

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Abstract:

Edge computing works on the data near the source and uses less bandwidth while taking less time to process. However, efficient migration of Virtual Machine (VM) faces various obstacles owing to resource constraints, dynamic load, and mobility on the edge. Since the VM migration enables the running workloads shifted from one physical server to another, resource management is enhanced, response time is lowered and performance enhanced. In this paper, we propose the Quokka-Inspired Optimization Algorithm (QOA), a bio-inspired technique to solve the VM migration problem in edge computing. The quokka is selected as the model for QOA because of this kind of highly adaptive and resource-efficient existence in rather severe conditions. Like quokkas who have to adapt different behaviours to ensure proper functioning with few resources, QOA optimizes workload, energy utilization, migration cost, and provides for high resource provision. The algorithm controls adaptation of the migration process based on system characteristics dependent on load, resource profile, and energy usage. Furthermore, it employs exploration and exploitation approaches different from those suggested by a neighbouring solution to escape local optima and identify proper migration schemes. Results based on standard tests indicate that QOA achieves convergence that is better than prior techniques and shows scalability, which translates into higher system effectiveness. This characteristic enables it to be suitable for real-time applications along the edge of the computing

environment. The performance of the VM migration strategy based on Quokka-Inspired Optimization is evaluated in terms of energy consumption, resource availability, migration cost, and load. The proposed Quokka method achieves the minimal migration cost of 0.0599, the minimal energy consumption of 0.4832, maximal resource availability of 0.8107 and the minimal load of 0.0041. Cost, load, and energy have been presented as being managed efficiently by QOA, thus enabling resource-demanding edge settings to be served effectively.

Keywords:

Resource availability, Virtual machine migration, Cloud systems, Edge computing, Quokka optimization algorithm.

Disease Prediction and Drug Recommendation using Machine Learning

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Abstract:

Around the world, many people struggle with their health and medical diagnosis. Patients may easily learn about their illness and the medicine that can help treat it, utilizing the methods used in this study by only providing the symptoms they are experiencing. The proposed work will predict the disease using a disease prediction model that uses Random Forest machine learning algorithm with the symptoms given by patients and provide medicine recommendations to patients based on ratings and reviews. Lexicon-based sentiment analysis is done on the reviews of the drugs by using the pattern library. Only positive reviews are considered, so those drugs are helpful. Lastly, the drugs are suggested using a weighted average approach by using the rating and useful count of the drugs. The disease prediction model has an accuracy of 90%. The experimental results reported here can be used in several medical applications as well as in future research.

Keywords:

Sentiment Analysis, Weighted Average, Pattern Library, Positive review, Negative reviews.

Plant Identification for Folio Dataset Using Machine Learning

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Abstract:

Plant identification is crucial in agriculture and ethnopharmacology. This research explores the use of deep learning, specifically Convolutional Neural Networks (CNNs), for leaf-based plant identification. We utilize the Folio dataset, a more realistic and diverse dataset compared to publicly available ones. To address class imbalance, we employ data augmentation techniques. By fine-tuning a pre-trained DenseNet121 model, we achieve a high F1-score of 0.9681 on the Folio dataset, demonstrating the effectiveness of our approach for real-world plant identification.

Keywords:

Folio dataset, Transfer Learning, Deep Learning.

Effect of Activity-Based Nutrition Education on Food and Nutrition Literacy among Adolescents from Socioeconomically Disadvantaged Background

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Abstract:

Adolescence, defined by WHO as ages 10–19 years is a transitional phase of growth and development between childhood and adulthood. Adolescents from socioeconomically disadvantaged background, studying in government-run schools were lacking in health literacy, leading to suboptimal nutrient intake thereby, causing them to have detrimental effects on their growth and development, educational attainment, and future earning potential. Thus, investing in the well-being of 1.3 billion adolescents in the world is crucial in shaping the world's future. Periodical nutritional education plays an extensive role in influencing healthy dietary habit. Schools provide an ideal setting for nutrition education since students spend majority of their time in school therefore, high probability of implementing successful nutrition education. This study aimed to assess the effect of activity-based intervention on food and nutrition literacy among adolescents. The nutrition education was conducted among 236 adolescents aged 11–13 years of government-run schools, Chennai district, Tamil Nadu for one hour a week over the period of 8 weeks covering food and nutrition-specific information through activities like skit, mime, models, demonstrations, and game activity. Self-administered questionnaire was used to collect sociodemographic data and Modified Food and Nutrition Literacy (M-FNLIT) questionnaire was employed to evaluate the magnitude of difference in knowledge attainment between baseline and follow-up intervention. This study concludes that adopting an activity-based learning approach to deliver nutrition education was highly beneficial to gain knowledge on food and literacy and the adolescents were evidently inspired to follow a healthy dietary habit.

Keywords:

Adolescent, Activity-based nutrition education, Government schools socioeconomically disadvantaged background.

Stock Market Trend Prediction with Sentiment Analysis and Explainable AI

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Abstract:

Financial markets are increasingly influenced by textual information in news articles, earnings calls, and social media platforms that provide insightful information for predictive analytics. Traditional sentiment analysis models are generally not capable of capturing subtle financial sentiments and complex relationships in text. In this paper, we employ four machine learning models Linear Discriminant Analysis (LDA), Random Forest, Decision Tree, and Logistic Regression to predict movements in the stock market based on sentiment scores obtained using news headlines. We integrate financial indicators with sentiment scores using the VADER Sentiment Analyzer to train and test these models on accuracy, precision, recall, and F1-score. We also utilize LIME (Local Interpretable Model-agnostic Explanations) to enhance model explainability and provide insights into feature contributions. Our comparative study indicates considerable difference in performance among models and points to each method's pros and cons. Our results are beneficial for selecting effective sentiment-based models for predicting the stock market and for improved trading and risk management.

Keywords:

Stock Market Prediction, Sentiment Analysis, Explainable Ai, News Sentiment, Vader Sentiment Intensity Analyzer, Financial Forecasting, Predictive Analytics, Market Movements.

Beyond The Hype: The Practical One-Shot Performance Analysis Between DeepSeek V3, ChatGPT 4o and Claude 3.5 Sonnet

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Abstract:

This paper presents a detailed comparative analysis of three trending large language models (LLMs) or we can say reasoning models like DeepSeek V3, ChatGPT 4o and Claude 3.5 sonnet evaluating their performance on 3 complex one shot prompts. These prompts are designed to check their task execution, physics understanding, code interactivity, visual representation, creativity, and user engagement abilities. By analyzing their outputs in different scenarios, we concluded our analysis in terms of strengths and weakness of each model. This research presents the actual insights for any normal users, developers, and researchers to leverage the power of large language models (LLMs) for complex tasks like scientific research, creative project, and many other applications. It highlights the importance of model selection based on specific requirements of the problem. Importantly, this research was conducted on free version of all three large language model (LLMs) using their web services, as a result it is beneficial all the users.

Keywords:

DeepSeek, ChatGPT, Claude, Performance Evaluation, Large Language Models.

Cyberguard: Deep Learning for Safer Social Media

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Abstract:

Social media is a fashionable and, above all, simple means for people to publicly share their ideas and opinions while also interacting with others online. It has now become an integral component of human life. It is a stage in which people are easily harassed or abused by others, who express hate in various forms such as sexism, racism, politics, and so on. Cyber bullying is emerging as a serious social problem, especially among teenagers. With the advent of social media networks such as Twitter and Facebook, it has become more prevalent. Thus, automatic detection of cyber bullying posts is becoming an increasingly important area of research among social media researchers. Traditional mechanisms to fight against cyber bullying include the use of standards and guidelines, human moderators, and blacklists based on the profane words. Therefore, it is necessary to develop a principled learning framework to automatically detect cyber bullying behaviors. Cyberguard: deep learning for safer social media proposes a system allowing social network users to have a direct control on the messages posted on their walls. This is achieved through a flexible rule-based system, that allows users to customize the filtering criteria to be matter-of-fact to their walls, and a Machine Learning based soft classifier automatically labeling messages in content-based filtering. Based on this filtering, server can train the words and stored in database. At the time of communication, server can check the words and block before the message can be shared.

Renewable Energy Powered Vacuum Cleaner

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Abstract:

In a world demanding sustainable solutions, this research introduces an autonomous, renewable energy-powered vacuum cleaner, a beacon of innovation in eco-friendly robotics. This system masterfully combines an obstacle-avoiding robot, energized by solar and wind power, with a potent vacuum cleaning function, delivering a cleaning solution that is both autonomous and environmentally responsible. The bot's intelligence is driven by an Arduino Uno microcontroller, L293 motor shield, ultrasonic sensors, and an SG90 servo motor, enabling it to nimbly navigate its environment while effectively avoiding obstacles, with the vacuum system precisely engineered for optimal performance. Renewable energy sources, including a solar panel and a compact wind turbine, efficiently charge the 18650 battery cells, ensuring the system's operation with minimal reliance on traditional power sources, maximizing energy efficiency and sustainability. This paper meticulously explores the design methodology, component selection rationale, and comprehensive testing outcomes, demonstrating the immense potential of renewable-powered autonomous cleaning devices to revolutionize cleaning practices while minimizing environmental impact.

Keywords:

Renewable energy, autonomous robot, obstacle avoidance, Arduino, vacuum cleaner, solar energy, wind energy, IoT, sustainable design.

Heart Disease Prediction Using Machine Learning

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Abstract:

We conducted data analytics-based study on heart disease for this paper. Since data are only now becoming available, heart disease prediction is a relatively new topic. This topic is not completely new many researchers have researched using many strategies and theories. To identify and predict illness patients, we employed data analytics. beginning with a pre-diagnosis stage in which we used the correlation to identify the most pertinent attributes matrix, after which we used three methods of (18) on various sized data sets to examine each model's accuracy and stability. Neural networks are simpler to find to set up and get very good outcomes (93%) with precision.

Keywords:

Detection, Prediction, Machine learning, heart disease, KNN, Neural Network, SVM.

Email & SMS Spam Detection

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Abstract:

Email and SMS spam detection has become increasingly important in today's interconnected world. With the rise of electronic communication, spam messages have evolved into a pervasive and persistent nuisance that can consume our time and compromise our privacy. In this article, we will delve into the world of spam detection, exploring the techniques and technologies employed to keep our inboxes clean and our attention undeterred. From machine learning algorithms to rule-based filters, we will uncover the inner workings of spam detection and discover how we can protect ourselves from unwanted messages.

Keywords:

Spam Detection, Email Spam, SMS spam, spam, spam message, online fraud, scam. essential tools for protecting individuals and organizations from online threats. But how can we develop an effective spam detection system using Jupyter Notebook and Python? In this article, we will dive into the world of email and spam detection, exploring the power of using Jupyter Notebook combined with popular Python libraries such as NumPy, Matplotlib, Additionally, and Pandas. we will discuss how incorporating HTML, CSS, and JavaScript can enhance the user experience through the development of a user-friendly website. So let's get started and learn how to build our very own spam detector.

Machine Learning-Driven Approach for Accurate Sleep Disorder Classification

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Abstract:

sleep disorders significantly affect the health of human beings, interfering with cognitive functions, mood, and vulnerability to chronic diseases like heart disease, diabetes, and obesity. Proper and timely sleep disorders classification plays a key role in ensuring proper diagnosis and treatment. Polysomnography (PSG) routinely employed by doctors for sleep-stage classification, however, is time-consuming, open to human bias, and vulnerable to interpret errors. In a bid to circumvent these difficulties, this study suggests a machine learning method of sleep disorders classification from the Sleep Health and Lifestyle Dataset. The dataset contains 400 records and 13 features describing several sleeping habits and daily activities. The solution proposed involves rigorous data preprocessing, including the treatment of missing values, normalization, and feature selection for improved model accuracy. Four machine learning classifiers, i.e., Random Forest Classifier (RFC), Support Vector Machine (SVM), Multi-Layer Perceptron (MLP), and k-Nearest Neighbors (k-NN) are employed to predict sleep disorders. Hyperparameter optimization is performed by a genetic algorithm to ensure maximum performance of each model. Big experiments were carried out to compare the classifiers' performance in terms of accuracy, precision, recall, and F1-score. The findings show major differences in the performance of the models. The RFC was proven to have good strength of feature selection and had the highest accuracy for classification at 91.15%, while SVM had great generalizability with a classification accuracy of 92.04%. The MLP, which employed a deep learning model, had the highest accuracy of 92.92% and recorded higher precision and recall values. The k-NN classifier was also comparable in performance with classification accuracy of 88.50%, showing its simplicity

and capability to model complex patterns. The result of the study proves the capability of machine learning algorithms, specifically deep learning algorithms like MLP, to classify sleep disorders with high accuracy. Based on the comparison, it is evident that the MLP model outperforms the traditional classifiers based on its ability to learn complex patterns from the data. This paper is beneficial in designing efficient, accurate, and scalable solutions for the diagnosis of sleep disorders that can open up new avenues for enhanced patient care and well-being.

Keywords:

Sleep Disorder Classification, Machine Learning, Random Forest Classifier (RFC), Support Vector Machine (SVM), Multi-Layer Perceptron (MLP), k-Nearest Neighbors (k-NN), Genetic Algorithm, Sleep Health and Lifestyle Dataset, Polysomnography (PSG).

Brian Tumor Detection using Advanced CNN-Architecture (Resnet50)

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Abstract:

Brain tumors pose a serious health risk, and improving patient outcomes and survival rates depends heavily on early identification. Diagnostic accuracy may be impacted by the time-consuming nature and inter-observer variability of traditional diagnostic techniques, such as radiologists' analysis of MRI data. We suggest an automated method for detecting and classifying brain tumors that uses an advanced Convolutional Neural Network (CNN) architecture—ResNet50—to overcome these drawbacks. After being trained on a sizable collection of brain MRI pictures, the model was able to distinguish between benign and malignant tumors with about 100% accuracy. Performance indicators such as memory, accuracy, and precision showed notable gains over conventional diagnostic techniques. According to our research, the CNN model based on ResNet50 provides a dependable, effective, and scalable approach to the early identification of brain tumors, which might help radiologists diagnose patients more quickly and accurately. This strategy has the potential to be especially effective in areas with restricted access to sophisticated diagnostic tools and specialist medical knowledge.

Keywords:

Brain tumor, Magnetic resonance imaging, Adaptive Bilateral Filter, Convolution Neural Network AI, Medical Image Recognition.

Analysis of Public Opinion Sentiments Towards the Implementation of Anthropomorphic Design Cues in E-Commerce Chatbots using the Lexicon Method

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Abstract:

Empathy is the process of understanding and responding to others' emotional expressions, involving both cognitive and affective aspects. One of the common challenges in customer service is dealing with repetitive customer inquiries and the inability to provide assistance 24/7. To address these challenges, businesses have adopted chatbots in customer service, as they can efficiently handle repetitive questions, reducing the workload of customer service representatives. Additionally, chatbots enhance customer satisfaction by offering 24/7 availability and providing consistent information and responses. In this study, one of the concepts in Human-Computer Interaction (HCI), namely Anthropomorphic Design Cues (ADC). Anthropomorphism, or ADC, refers to the attribution of human characteristics, behaviors, and traits to non-human entities such as animals, plants, or technological devices like chatbots. In this research, two types of ADC will be implemented in chatbots: verbal design cues and non-verbal design cues. The study will compare two versions of chatbots: an empathetic chatbot, which integrates ADC, and a non-empathetic chatbot, which does not. The evaluation will be conducted using a Lexicon-based approach.

Keywords:

Empathy, Chatbot, Human Computer Interaction, Anthropomorphic Design Cues, Lexicon.

Cyber Threat Types and Removal Techniques

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Abstract:

Cyber-attacks are increasingly common in today's internet era. With every passing year, the quantity of cybercrimes as well as the harm they cause increases. Providing security against cyberattacks is essential in the current digital era. Many governments and independent companies are taking action to reduce cyberattacks as a result of their increasing frequency in the modern era. This paper will discuss the importance of cyber security and the various types of cyberattacks that take place in the modern digital age. We will also highlight the many approaches of recognizing and thwarting these cyber-threats. Networked metrology and controls are being used to upgrade the energy grid, which can increase efficiency and offer new methods for system management. These technologies offer new risk categories, most notably new attack vectors that can be used in cyberattacks, notwithstanding their many advantages. Concepts from cyber security, reliability, and fault tolerance design must be integrated into a common methodology in order for the system designer to identify and handle risks in these types of cyber physical systems.

This article examines the scattered literature on the potential for cyberattacks on smart metering systems before organizing and synthesizing the results using concepts from fault tolerance design and systems engineering.

Drivers Drowsiness Detection

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Abstract:

The development of efficient detection technologies is crucial for improving road safety because driver fatigue is a major contributing element to traffic accidents. The goal of this research is to develop a real-time drowsiness detection system by utilizing cutting-edge technology like machine learning and computer vision. To precisely gauge drivers' degrees of exhaustion, the suggested system tracks their facial expressions, such as eye closure, blinking frequency, and yawning. The system achieves great accuracy in detecting drowsy states by using a Convolutional Neural Network (CNN) model that has been trained on a variety of facial expression datasets. The system's efficacy is demonstrated by the experimental findings, which show an accuracy rate of over 90% under a range of environmental and illumination situations. Driver weariness is a worldwide problem that this study helps to solve by tackling current issues like false positives and environmental adaptability. The installation of such devices in automobiles is expected to save lives and drastically lower the number of traffic accidents.

Keywords:

Drowsiness Detection, Driver Fatigue, Machine Learning, Road Safety, Preventive Systems.

EduflexAI: AI-Powered Learning & Networking Hub

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Abstract:

In the evolving environment of learning technology, students spend more time searching for organized guidance and authentic material throughout their education career. Lack of an integrated platform wastes students' precious time searching for study material, career guidance, networking, and mentorship. To address this issue, we have developed an AI-driven learning platform that integrates all the resources required, through which students can access verified and genuine content at a single location. Our platform offers a range of functionalities, such as internship and job placement networking site and exposure to various industry events like fairs, workshops, and online forums. One of the most distinctive features of our system is Expert Access, wherein students can approach mature professionals directly and receive individualized and structured mentorship. Our platform uses React.js for frontend development, Node.js and Express.js for backend processing, and MongoDB for storage. Furthermore, AI based features like an interactive chatbot enrich user experience by providing instant academic and career guidance. Using the latest web technologies and artificial intelligence, our system avoids the inefficiencies of disconnected information and scattered learning outcomes. In this paper, we describe the architecture, development methodology, and impact analysis of our system and show how it has the potential to revolutionize student learning and career readiness. The results illustrate how an AI-powered learning platform can close the gap between students and the industry and make the learning process more focused, efficient, and informed.

Keywords:

AI-powered education, expert consultation, centralized learning platform, roadmap guidance, academic assistance, AI-driven learning, educational technology, student guidance system, NLP-based tutoring, real-time expert access, digital learning solutions.

Hands Free Virtual Mouse with Gesture, Eye and Speech Recognition

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Abstract:

The paper presents an inventive virtual mouse framework that consolidates eye developments, hand signals, and voice directions to build an easy to use and drawing in communication experience. With profound learning models, signal acknowledgment is a triumph rate, and eye following innovation improves pointing and determination by adjusting to the spot of one's look. Profundity touchy cameras are used for following hand movement and empower regular motions like squeezing and swiping. Additionally, discourse acknowledgment takes into consideration voice orders to perform errands, for example, clicking and looking over. The structure capabilities continuously, guaranteeing a wonderful client experience with negligible inertness. Different information modalities are coupled to further develop strength and versatility for clients with assorted necessities. This study adds to the progression of UI configuration by making versatile and available assistive innovation. With The Utilization of AI and PC Vision Calculations empowers us to celebrate hand signals and voice directions that work minus any additional hindrances. The framework gives verifiable usefulness, for example, permitting predisposition activity without manual mediation in risky settings and offering a willing UI for mice.eu. Generally, the human PC framework's virtual mouse constrained by hand motions looks encouraging to improve the stoner experience and expanding accessibility.

“Innovative Dual Axis Solar Tracker for Enhanced Energy Harvesting: Design, Implementation, and Performance Analysis”

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Abstract:

Increasing global demand for renewable energy has emphasized the need for efficient solar harvesting systems. This paper presents the design and development of an innovative dual-axis solar tracker aimed at maximizing solar energy absorption. Unlike traditional static panels, the proposed system dynamically adjusts its orientation to track the sun's movement throughout the day, both horizontally and vertically. The tracker employs light-dependent resistors (LDRs) as sensors, coupled with a microcontroller and servo motors for precise alignment. Experimental results indicate a significant improvement in energy harvesting efficiency, compared to fixed panels under similar conditions. This research highlights the potential of dual-axis solar tracking technology to enhance renewable energy utilization, offering a cost-effective and sustainable solution for solar power generation. Future work could involve integrating weather prediction algorithms and optimizing the system for large-scale applications.

Keywords:

Solar, Tracker, Energy, Efficiency, Innovation.

Real-Time Testing of Arterial Stiffness Detection Using Pulse Wave Velocity and Framingham-Based Cardiovascular Risk Assessment

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Abstract:

Cardiovascular diseases (CVDs) remain a significant global health concern, emphasizing the need for prompt and effective risk assessment strategies. This study proposes a comprehensive framework for the classification of arterial stiffness and the estimation of cardiovascular risk. Arterial stiffness was measured with Pulse Wave Velocity (PWV), with classification thresholds based on established European medical guidelines. A predictive model was developed using conventional clinical parameters such as age, sex, systolic blood pressure, body mass index (BMI), diabetes status, and smoking history. Both machine learning and deep learning models demonstrated an accuracy of 98% in classifying arterial stiffness. To enable real-time implementation, a graphical user interface (GUI) was developed incorporating the trained model. Real-time brachial and ankle waveforms (left and right) were captured using an Ankle-Brachial Index (ABI) device. PWV was then calculated from these waveforms and, along with clinical features, served as input to the GUI for real-time prediction. In addition, cardiovascular risk was also evaluated using the Framingham Risk Score (FRS) method. FRS was calculated based on significant parameters like age, gender, total cholesterol, high-density lipoprotein (HDL) cholesterol, systolic and diastolic blood pressure, diabetes, and smoking. Another specialized machine learning model, which was trained on these parameters, was 86% accurate in cardiovascular risk classification. This combined method provides a valid and useful tool for real-time clinical evaluation of arterial stiffness and cardiovascular risk.

Keywords:

Arterial stiffness, Pulse Wave Velocity, Cardiovascular risk, Framingham Risk Score, Ankle-Brachial Index, Machine learning, Deep learning, Real-time prediction, GUI, Clinical parameters.

Gas Presence Analysis in Transformer Oil Using Microcontroller

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Abstract:

The detection and analysis of dissolved gases in transformer oil play a crucial role in monitoring the health and reliability of power transformers. Transformer oil degradation often leads to the generation of gases, which can indicate the onset of critical faults, such as overheating, arcing, or partial discharge. This paper presents a microcontroller-based system for real-time gas presence analysis in transformer oil. The proposed system leverages gas sensors integrated with a microcontroller to detect and quantify key fault gases such as hydrogen (H_2), methane (CH_4), ethylene (C_2H_4), and carbon monoxide (CO). The microcontroller processes sensor data, enabling real-time monitoring, fault diagnosis, and data logging. The system employs a data acquisition algorithm and fault diagnostic logic based on established standards, such as Dissolved Gas Analysis (DGA). The results are displayed on an interface, providing users with actionable insights into transformer health. Additionally, the system is designed to be cost-effective, portable, and energy-efficient, making it suitable for widespread deployment in power distribution networks.

Keywords:

Transformer oil, Arduino Uno, MG-811 Sensor, MQ-6 Sensor, MQ-2 Sensor.

“Vehicle Accident Detection and Alert System using Arduino UNO”

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Abstract:

The Vehicle Accident Detection and Alert System, designed using an Arduino UNO, addresses the critical issue of delayed emergency response in road accidents. It integrates essential components, including a GPS receiver, GSM module, vibration sensor, and gyroscope sensor. These sensors work together to detect severe impacts and rollovers, which are indicative of accidents. Upon detecting an accident, the system uses the GPS module to pinpoint the vehicle's precise location, and the GSM module sends an SMS alert to predefined emergency contacts, including a Google Maps link for accurate location tracking. This system ensures faster response times by sending real-time alerts with location details. The system's reliability has been confirmed through extensive simulation testing, which replicated various accident scenarios, including impacts and rollovers. During these tests, the system consistently detected accidents and sent alerts promptly, with a delay of under 10 seconds. The integration of GPS and GSM modules allows emergency responders to quickly locate accident sites, significantly improving the chances of timely intervention. Additionally, the system has been designed to be cost-effective, making it particularly beneficial for regions with limited access to advanced technologies, such as India, Nepal, and Bangladesh, where high rates of road accidents and fatalities exist. By offering real-time alerts and precise location tracking, this system can improve road safety and emergency response in high-risk areas, potentially saving lives.

“Transformer Theft Protection and Maintenance Monitoring System”

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Abstract:

Transformers play a crucial role in power distribution networks, guaranteeing a dependable supply of electricity to consumers. However, their operational reliability is frequently compromised by challenges such as theft, vandalism, and inadequate maintenance, which lead to significant financial losses and operational inefficiencies. Addressing these issues is crucial for sustaining uninterrupted power supply and minimizing economic impacts. This paper proposes a GSM-based transformer theft protection and maintenance monitoring system integrated with sensors, including magnetic, infrared (IR), weight, temperature, oil-level sensors, and GPS. The system provides real-time theft detection and health monitoring via SMS alerts. It ensures improved transformer security and maintenance efficiency by enabling remote monitoring of vital parameters like temperature and oil levels. The proposed solution enhances operational reliability while reducing financial losses caused by theft and vandalism.

Keywords:

Transformer safety, GPS, GSM, Theft Protection.

Cyberbullying Detection Using Deep Learning

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Abstract:

Cyberbullying has become a prevalent issue with the rise of social media platforms, creating a need for effective detection systems to combat its negative effects on individuals and society. This project focuses on utilizing deep learning techniques to develop an automated system that detects instances of cyberbullying in online text data. By leveraging the power of Natural Language Processing (NLP) and neural networks, specifically models such as Convolutional Neural Networks (CNNs), Long Short-Term Memory (LSTM) networks, and Transformers, the system aims to identify harmful language patterns, offensive content, and abusive behavior in real-time, providing a timely response to mitigate its impact. The proposed solution involves preprocessing social media data, including filtering, tokenization, and embedding techniques such as word embeddings or transformer-based embeddings to represent the textual content. Deep learning models are then trained on labeled datasets of online communications to classify text as cyberbullying or non-cyberbullying. The architecture and training methods focus on maximizing the detection accuracy, while minimizing false positives and negatives, ensuring the system's reliability across diverse linguistic and cultural contexts. Additionally, this project explores the effectiveness of combining deep learning models with sentiment analysis and keyword-based approaches to enhance detection capabilities. The cyberbullying detection model's performance is evaluated using standard metrics on benchmark datasets. Continuous fine-tuning and domain-specific training allow the system to adapt to evolving online language trends. Ultimately, this project aims to contribute to the growing field of ethical AI and its application in online safety, offering a

scalable and effective solution for real- world deployment in social media platforms and online communities.

Keywords:

Cyberbullying Detection, Deep Learning, Natural Language Processing (NLP), Convolutional Neural Networks (CNNs), Long Short-Term Memory (LSTM), Transformers, Social Media, Text Classification, Sentiment Analysis, Word Embeddings, Real-Time Detection, Ethical Ai, Online Safety, Neural Networks, Online Communities.

Evaluating Machine Learning Models for Optimal Credit Card Fraud Detection

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Abstract:

Credit card fraud continues to be a significant challenge in the financial industry, with losses amounting to billions annually due to fraudulent activities. This project aims to create a machine-learning model that can identify credit card fraud by analyzing and detecting patterns indicative of potentially fraudulent transactions. Credit card fraud can manifest in various ways, such as the physical loss of a card or unauthorized access to sensitive credit card data, making it essential to establish effective detection methods.

The objective of this project is to build a dependable machine learning model utilizing a large dataset of historical credit card transactions. By studying prior transaction data, the model will learn to identify anomalies and behaviors that generally signify fraudulent activity. To verify the model's effectiveness, it will be tested against a holdout dataset containing unseen transactions, which will provide an impartial evaluation of its performance.

Various machine-learning algorithms will be employed in this project, including K-Nearest Neighbors (KNN), Support Vector Machine (SVM), Logistic Regression, and Decision Trees. Each algorithm possesses distinct advantages, and their comparative analysis will help identify the most effective method for detecting credit card fraud.

By utilizing these sophisticated techniques, the project seeks to improve the precision and efficiency of fraud detection systems, ultimately fostering a more secure financial environment for both consumers and businesses.

Keywords:

Credit Card Fraud Detection, Fraudulent Transactions, K-Nearest Neighbors, Support Vector Machine, Logistic Regression, Decision Tree.

Experimental and Computational Analysis of Banana-Carbon Fiber-Reinforced Nano ZnO-Epoxy Composites

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Abstract:

This research investigates a novel hybrid composite material composed of banana fibers, carbon fibers, nano zinc oxide (ZnO), and epoxy resin. The study aims to determine the composite's optimal composition and analyze its mechanical properties. Analytical models, including the Chamis and Modified Halpin-Tsai models, were employed to predict elastic properties. Finite element analysis using ANSYS software was conducted to validate these predictions. The results provide insights into the effects of varying ZnO content on the composite's mechanical behavior, demonstrating the potential of this sustainable material for diverse engineering applications.

Predictive Models for Disease Outbreaks: Leveraging Deep Learning and Big Data for Public Health

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Abstract:

Rapidly infectious diseases decided public health at severe risk worldwide, requiring sophisticated future models to successfully incorporate epidemics. Whereas in useful, traditional epidemiology models, future accuracy is limited due to the inability to handle large versions of real-time data. The outbreak of larger scale data integration in forecast for recent developments and computer methods has become increasingly accurate. To detect the initial warning signals, this study examines data-operated approaches to predict the disease, highlighting the importance of statistical modeling and pattern recognition. Predictive models can improve readiness and resource allocation by using data from various sources including medical records, weather trends and population mobility patterns. The utility of these strategies in various epidemic scenarios is displayed by the study of the outbreak of the current disease, such as Covid-19, Dengue and Influenza. Even with significant progression, issues including data inequality, model verification and moral ideas still need to be addressed. This study emphasizes how significant interdisciplinary cooperation and ongoing prediction structure are meant to increase outbreak and strengthen public health initiatives.

Keywords:

Disease Surveillance, Epidemiological Forecasting, Public Health Data, Outbreak Prediction.

AI-Powered Sentiment and Emotion Analysis for Employee Engagement: Leveraging Communication Data, Video Interactions, and Predictive Modeling

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Abstract:

This study explores AI-driven sentiment analysis, emotion recognition, and predictive modeling to assess and enhance employee engagement in the IT sector. By analyzing communication data and video interactions, the research identifies sentiment trends and predicts disengagement risks, with the Gradient Boosting Machine (GBM) model proving most effective. Findings show high positive sentiment in HR and Sales, while Customer Support and Marketing exhibit higher negative sentiment. This AI-based approach provides actionable insights for HR interventions to foster a supportive work environment and improve employee engagement and retention.

Keywords:

Employee Engagement, Ai, Sentiment Analysis, Emotion Recognition, Machine Learning, Predictive Models, Employee Sentiment, Morale, Workforce Analytics.

Equation-Eye

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Abstract:

This paper introduces Equation Eye, a novel system for real-time recognition and computation of air-written mathematical expressions. Utilizing computer vision techniques with OpenCV, Mediapipe, and Gemini for gesture recognition, Equation Eye captures hand movements in front of a camera, interprets these gestures as mathematical symbols, and performs computation on the resulting expressions. The system is designed for interactive and hands-free equation solving, making it adaptable for varied user environments. The objectives of this research are to enhance the accuracy and speed of air-written expression recognition and to optimize real-time processing capabilities. Image processing techniques, including Gaussian blurring, contour detection, and adaptive thresholding, are applied to ensure robust performance across diverse lighting conditions. A path-tracing algorithm is implemented to maintain continuity in gesture recognition, allowing precise differentiation between individual characters and mathematical symbols. Equation Eye represents a step forward in gesture-based interactive systems, offering promising applications in educational tools, virtual learning platforms, and augmented reality. Future work will explore extensions to handle complex expressions, refine the gesture recognition model, and introduce adaptive algorithms to enhance performance in varying conditions. This study underscores the practicality of air-writing as an input method for virtual computation interfaces, opening new avenues in user interaction and hands-free mathematical computation.

Keywords:

OpenCV, Mediapipe, Gemini.

Visual Question Answering (VQA) using YOLO (You Only Look Once)

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Abstract:

This project focuses on developing an advanced assistive system for visually impaired individuals by integrating cutting-edge technologies. The system utilizes YOLO v8, a high-performance object detection algorithm, alongside map-based navigation and Google Voice Assistant to enhance accessibility, user interaction, and navigation efficiency. capabilities. YOLO v8's real-time object detection will identify and track objects within the user's surroundings, providing crucial situational awareness and safety, particularly for visually impaired users. In parallel, a dynamic navigation module offers real-time route guidance, ensuring accurate and reliable directions. If the user deviates from the planned route, the system triggers immediate alerts to guide them back on track, enhancing navigation confidence. Additionally, a Google Voice Assistant, easily accessible through a single button click, will enable hands-free interaction, allowing users to issue voice commands for navigation adjustments, object descriptions, or general queries. By integrating these technologies, the project aims to create a seamless user experience tailored to those needing enhanced navigation support. Through real-time object detection, responsive navigation alerts, and intuitive voice control, the system aspires to provide a safer, more efficient, and user-friendly navigation solution, significantly improving independence for visually impaired individuals.

Keywords:

Visual Question Answering (VQA), YOLO v8 Object Detection, Real-Time Navigation, Google Assistant API Voice Interaction, Map Diversification, Route Deviation Alert.

Personalized Visual Product Recommendations Using Deep Metric Learning

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Abstract:

In e-commerce, personalized product recommendation is considered one of the basic aspects that can propel any user experience to another level and also add as many sales as possible in the quick turnaround environment. This paper provides an innovative improvement related to the process of visual object search and product recommendation in the fashion industry using deep metric learning approaches. We utilize the feature extraction power of the EfficientNetB0 architecture on 44,000 product images with category labels and descriptions into a large dataset. Our approach measures the information based on image similarity by adopting cosine similarity meaning the model is able to perform recommendations based on what images users have. The model proposed undergoes training and validation measures from constructive models such as cross-validation and learning rate whereby hyperparameter optimum is utilized. The experiment clearly shows that the recommendation accuracy has been improved compared to other baseline methods, and thus proves how real deep metric learning which captures the subtle details between product images is. This problem is solved by the experiments conducted in this paper and special emphasis is made on recommending the model for individual users in order to enhance the interactive nature of the shopping experience. Results from such experiments indicate the potential to enhance the deep learning processes further.

Keywords:

Deep Metric Learning, Personalized Product Recommendations, Visual Search, EfficientNetB0, Cosine Similarity.

Medical Recommendation System Using Machine Learning

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Abstract:

The Medical Recommendation System is a cloud-based application that was developed to suggest appropriate health recommendations using machine learning algorithms, with emphasis on the Support Vector Classifier (SVC) model. The patients provide these details, including complaints and personal information, and thus such a system is able to diagnose some of the conceivable diseases and bring appropriate dietary, exercise, medication, and other advisory requirements to the user. Due to its proficiency in multi-dimensional data and the degree of effectiveness it delivers in the classification of multiple diseases, the SVC was selected for this diagnostic system. Practically, the situation improves the conceptualization of the system since it may continue to learn from the provided data and therefore improve the scoping processes as the users continue to engage the system. This model, if implemented, can change the entire landscape of health care delivery by providing users with safe and timely health interventions based on accurate diagnosis tailored to an individual.

Keywords:

Medical Recommendation System, Machine Learning, Support Vector Classifier (SVC), Personalized Healthcare, Symptom Analysis, Disease Diagnosis.

Deep Learning and Ensemble Strategies for Human Action Recognition

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Abstract:

Human Action Recognition (HAR) is a crucial field in computer vision with applications in surveillance, healthcare, and human-computer interaction. Recognizing human activities accurately can significantly enhance automated monitoring systems, assistive technologies, and interactive AI systems. In this study, we propose a deep learning-based HAR system utilizing multiple state-of-the-art Convolutional Neural Networks (CNNs) and transfer learning techniques. The models implemented include ResNet50, InceptionV3, VGG16, VGG19, EfficientNetB7, MobileNetV2, and an ensemble learning architecture to improve classification accuracy. The dataset consists of images depicting various human activities such as eating, sleeping, walking, and running, preprocessed and augmented to improve model generalization. Each model's performance is evaluated using accuracy, precision, recall, and confusion matrices. Experimental results demonstrate that the ensemble model outperforms individual architectures, leveraging their complementary strengths to improve recognition accuracy and robustness. The findings highlight the potential of deep learning models in HAR and offer insights into optimizing action recognition systems for real-world applications.

Keywords:

Human Action Recognition, Ensemble Learning, ResNet, InceptionV3, EfficientNet, VGG16& 19, MobileNetV2.

Lane Line Detection using Deep Learning Model

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Abstract:

Detection of lane lines is one of the crucial tasks in the field of autonomous driving and Advanced Driver Assistance Systems (ADAS) to facilitate navigation and prevent any conflicts. This work is concerned with the creation of a sufficiently fast and reliable lane detection pipeline based on deep learning approaches to the tasks of computer vision. The developed system uses a sequence of image processing techniques which include color selection, gauss blur, Canny edge detection, and Hough Transform line detection to parse images or video frames and detect lane markings. The model achieves good results owing to the fact that a custom dataset and metrics such as Intersection over Union (IoU) and Dice Coefficient are used which most often guarantee high performance of deep learning based solutions even in difficulty driving scenarios such as night and complex traffic. The key contribution of this research is that it provides a fast and accurate approach for lane detection, applicable to an autonomous vehicle's vision system.

Keywords:

Deep learning, Lane detection, Computer vision, Image processing, IoU, Dice Coefficient, Real-time inference, Autonomous driving.

Review of Influential Node Identification in Heterogeneous Social Networks Using Multi-layer Information Networks

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Abstract:

Information diffusion is a crucial research area in social networks, given its wide range of applications such as viral marketing, controlling the spread of diseases, and promoting sales. One effective approach to facilitating information diffusion is identifying a group of influential nodes within a social network, which can help in disseminating information rapidly across the majority of the network. While traditional methods for detecting influential nodes primarily focus on networks with homogeneous nodes and edges, real-world social networks are typically heterogeneous in nature. This paper presents a review of techniques based on multi-layer networks for identifying influential nodes in such complex social networks. It utilizes heterogeneous information occurring around the nodes in social networks. This paper presents current state-of-the-art methods for top node identification using multi-layer networks, applications, challenges, future research directions in it.

Keywords:

Top K Nodes Social Networks Heterogeneous Information Multilayer Network.

Machine Learning Algorithms for Predicting Food Demand in University Cafeterias

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Abstract:

Food waste is a massive issue in college cafeterias, leading to economic losses and environmental harm. Predictive analytics, powered by using system gaining knowledge of (ML), offers a promising technique to optimize stock control and decrease meals waste. This paper explores the implementation of device getting to know algorithms to are expecting meals demand in college cafeterias. with the aid of leveraging ancient income facts, pupil schedules, seasonal traits, and unique occasions, the proposed system goals to decorate call for forecasting accuracy. The observe evaluates diverse ML algorithms, along with Linear Regression, selection trees, Random woodland.

Neural Networks, and support Vector Machines (SVM), and discusses their applicability and overall performance. The findings recommend that predictive fashions can substantially enhance stock performance, lessen food waste, and enhance operational making plans in university cafeterias.

Keywords:

Machine Learning, Predictive Analytics, Food Demand, Inventory Optimization, University Cafeterias, Food Waste Reduction, Decision Trees, Neural Networks, Support Vector Machines.

Early Detection of Breast Cancer Using Deep Learning Techniques

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Abstract:

Early diagnosis is critical in treating breast cancer, which remains one of the major causes of death for women. Breast cancer originates from breast cells and can include sub-types such as invasive ductal carcinoma (IDC) or ductal carcinoma in situ (DCIS). Because some cancers are discerned at an early stage, most women prefer having mammographic examinations or sternal biopsies, which can go wrong because there are problems distinguishing the early stage of cancer and results show negative results and positives. New possibilities to the problems have been introduced thanks to innovations in technology such as ML (Machine learning) and AI (Artificial Intelligence). It's fair to say that mammographic detection of breast cancer has significantly been improved thanks to technologies such as Convolutional neural networks (CNN). Nevertheless, the applications, for example, CNNI-BCC which stands for CNN Improvements for Breast Cancer Classification, tend to be excessively demanding from the imaging and pretreatment perspective. This work focuses on addressing these issues by creating an altered deep learning model that can detect breast cancer on computerized mammograms of different scales. Three feature selection techniques are incorporated in the approach, namely low variance feature removal, univariate feature selection, and recursive feature elimination to improve model performance. In order to assist in the early cancer diagnosis and enhance the overall patient care, this study aims to improve accuracy and the degree of practicality of the device by employing both the craniocaudal and mediolateral mammogram views.

Automatic Data Categorization and Pattern Discovery System

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Abstract:

User reviews have become increasingly important in influencing consumer choices in this day of digital marketing. But there is so much textual data that users find it difficult to extract any meaningful insights. This paper discusses an Automatic Data Categorization and Pattern Discovery System that is aimed at classifying the product review data into three classes: Positive, Negative, and Suggestions. This system takes advantage of Natural Language Processing (NLP) techniques like TF-IDF, Word2Vec, and Sentiment Analysis to extract important features from the textual data. Then these features are enhanced with classification using Dimensionality reduction (SVD) and SMOTE-based resampling. The authors use the XGBoost classifier, achieving an accuracy of 89.6%, to show that it effectively classifies user feedback. A frontend interface is designed to visualize categorized reviews so that end-users gain an understanding of product feedback in making decisions. Future improvements will automate data extraction from web sources, broadening the applicability of the system. The entire methodology aims at efficiently analyzing reviews and thereby enabling businesses and consumers to gain insights from user-generated content.

Keywords:

Automatic Data Categorization, Pattern Discovery, Text Classification, Natural Language Processing (NLP), TF-IDF, Word2Vec, SMOTE, XGBoost, User Reviews Analysis, Product Review Categorization.

Plant Disease Detection and Prevention System Using Deep Learning

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Abstract:

The detection and management of plant diseases are especially important for yield and food security. Yet, the conventional approach to plant disease identification is mostly time-consuming, laborious, and subject to human error. This paper introduces a robust, efficient system for detecting plant diseases utilizing deep learning (DL) techniques in multi-crop datasets. While some approaches have been suggested to date for disease detection in plants, all of them either lack accuracy or scalability in the case of multiple crop types and a diversity of diseases. Therefore, this paper suggested an approach that will make use of state-of-the-art convolutional neural networks (CNNs) for automated identification along with classification of diseases across different crop species. We want to attain high accuracy and reliability in the detection of diseases by training our models on a comprehensive dataset comprising various crops and disease manifestations. Findings such as these are important because they arm farmers and other agricultural stakeholders with a crucial tool for the timely identification of diseases, hence reducing crop loss. This will, therefore, solve the problem of optimizing Agricultural productivity and bring down the economic losses incurred due to these crop diseases, hence improving global food security. Our approach contributes to a much more efficient way in which disease monitoring systems can be undertaken and provides a scalable solution that is adaptable to different contexts in agriculture. The proposed system can detect 5 different diseases of apple plants with 89% accuracy.

Keywords:

Deep Learning, Plant Disease, Convolutional Neural Network (CNN), Stream lit, Image Classification, Grad-CAM, Agriculture, Resnet50.

AI-Powered Real-Time Speech-to-Sign and Sign-to-Text Translation

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Abstract:

The goal of this study article is to provide a novel strategy for integrating hearing-impaired or deaf people with the general community. The goal of this project is to use Blender 3D Animation and Natural Language Processing (NLP) to convert text or voice into animated films in Indian Sign Language. A contemporary solution to the accessibility and inclusivity problem is the project, which is implemented using Python Django and machine learning for language interpretation with the NLTK module. An excellent first step in creating an inclusive society is the animated sign language video Sign Easy, which makes communication easier in public services, education, and daily interactions.

Keywords:

Sign language, computers, natural language processing, audio speech recognition, and accessibility technology. Pictures Artificial intelligence and deep learning.

Enhancing Campus Surveillance: Temporal Segmentation for Behavior Analysis

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Abstract:

Intelligent Video Surveillance systems play a pivotal part in enhancing safety, with abnormal gesture recognition being a crucial element of action recognition in computer vision. While CNN- grounded approaches have been extensively used, landing sufficient stir sequence features remains grueling. This study introduces a new frame that leverages long-term videotape modeling and a global meager livery slice strategy, dividing videos into three equal- duration parts and slightly testing particles. The proposed model employs an agreement of three Temporal Member Mills (TSTs) to establish global patch connections and cipher tone- attention with common spatiotemporal factorization. estimated on the recently developed Lot Abnormal gesture Recognition (CABR50) dataset, containing 50 mortal abnormal action classes with a normal of 700 videotape clips per class, the system demonstrates strong performance in videotape- grounded abnormal gesture recognition. The TST- L model achieves 83.57 Top- 1 delicacy and 97.16 Top- 5 delicacy, proving its effectiveness in lot surveillance and outperforming being videotape recognition ways.

Keywords:

Abnormal Behavior Recognition, Intelligent Surveillance, TST, Action Recognition, Spatiotemporal Factorization, Video Analysis, Campus Safety, Deep Learning, CABR50 Dataset.

Enhancing WhatsApp Chat Intelligence via Token-Based Real-Time Extension and AI-Powered Dashboard System

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Abstract:

In today's digital economy, unstructured conversations on apps like WhatsApp represent a critical but underutilized data source, particularly for small businesses and independent professionals. This paper presents an AI-powered real-time analytics platform for WhatsApp chat data through a Chrome extension and an interactive Next.js dashboard. It consists of a secure authentication system powered by Clerk [1], a structured AI-powered backend powered by FastAPI [2] and Gemini AI [3], and a monetization system powered by Razorpay [4]. It has some key functionalities like sentiment and keyword analysis, which provide insights prioritized by order, and session-based tokens for the limited usage of AI. This Solution offers a privacy-preserving and scalable Chat-bias intelligence that enables actionable insights to be available to SMEs, NGOs, educators, and parents [5].

Keywords:

WhatsApp Chat Analysis, AI-Powered Dashboard, Chrome Extension, Token-Based System, Sentiment Analysis, Natural Language Processing, Privacy-Preserving AI.

NEST FINDER: Where Home Meets Convenience

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Abstract:

The lack of a unified platform for communication between landlords and tenants presents serious issues for the rental industry. Ineffective communication systems cause miscommunications, delays, and inefficiencies in crucial duties, including rent payments, maintenance requests, and lease administration. We suggest a web-based rental management system that automates important procedures and improves communication to solve these problems. To guarantee a responsive and user-friendly interface, the front end will make use of Angular, HTML, CSS, and TypeScript. The back end, which was created using ASP.NET and C#, will offer a safe, scalable environment for managing business logic. While Amazon RDS will improve availability and security, the Microsoft SQL Server will effectively manage transaction, tenant, and property data. For a smooth deployment, Amazon EC2 will host the application. In the end, this integrated solution will increase efficiency and convenience for both landlords and tenants by reducing miscommunication, optimizing rental processes, and improving transparency.

Integrated System for Quality Assessment Based on Texture, Health and Ripeness Evaluation for Mangoes

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Abstract:

This paper introduces an innovative framework for the overall evaluation of mango quality in terms of three vital factors: texture, health, and ripeness. We employed the latest machine learning approaches to utilize Convolutional Neural Networks (CNN) for automatic feature extraction, supplemented by the Gray-Level Co-Occurrence Matrix (GLCM) for thorough texture examination and Principal Component Analysis (PCA) for effective dimensionality reduction. We categorized the dataset into three groups—health, texture, and maturity—each with five different categories. We employed several machine learning approaches, including Support Vector Machines (SVM), Random Forest, and Decision Trees, to carry out the classification of the extracted features. We demonstrated through rigorous testing the effectiveness of the proposed CNN model in extracting the right features, while the employment of GLCM provided valuable information about the texture. Integration of the employment of GLCM and PCA maximized the feature extraction step along with the overall effectiveness of the system. Additionally, the system was able to predict the quality of mangoes from the provided image inputs, providing real-time assessments. This work demonstrates the potential for the employment of

advanced deep learning techniques along with traditional feature extraction methods to improve quality control in agriculture. The findings of this work are likely to contribute to the ongoing efforts to leverage technological advancements to enhance food quality and safety in agriculture.

Keywords:

Mango quality evaluation, Convolutional Neural Networks, texture examination, Gray-Level Co-Occurrence Matrix, Principal Component Analysis, machine learning approaches, agricultural innovation.

Integrating Lightweight Cryptography (LWC) in MapReduce Framework to Secure HDFS Data: MR-LEA (MapReduce Lightweight Encryption Algorithm)

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Abstract:

Data security is the dominant factor in the big data era. With large amounts of data kept and communicated on the internet, the requirement for strong encryption algorithms has proliferated; yet, the correctness of the conventional methods in resource-constrained environments leaves issues due to their computational intensity. Scholars have familiarized themselves with new encryption algorithms known as lightweight encryption (LWE) to address the above problems. These LWEs offer robust security and minimize computational overhead. This way, these LWEs balance efficiency and security in big data environments. This paper presented an efficient approach, LEA (Lightweight Encryption Algorithm) as LWE with MapReduce Framework (MRF), to secure HDFS (Hadoop Distributed File System) data. We evaluated the performance of LEA and AES as LWE algorithms with MRF, and the result shows that MR-LEA performance is more than 10% better than the AES-MR based on the encryption and decryption time. In short, this suggested approach is the cost-effective solution in a big data environment.

Keywords:

Big data, Hadoop, MapReduce, Light Weight Encryption, Distributed Environment, HDFS.

Enhanced Human Age and Gender Prediction using Machine Learning

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Abstract:

Enhanced Human Age and Gender Prediction using Machine Learning aims to develop a robust system for accurately predicting human age and gender from facial images. The UTKFace dataset is used and it consists of over 23,000 human faces which includes all age ranges people with various facial expressions and lighting. Utilizing the UTKFace dataset, which contains a diverse collection of labeled facial images spanning various ages, genders, and ethnicities, the study employs three machine learning algorithms: Support Vector Machine (SVM), Random Forest, and Convolutional Neural Network (CNN). The goal is to enhance prediction accuracy and reliability, addressing challenges such as varying lighting conditions, facial expressions, and demographic diversity. SVM is implemented for its effectiveness in handling high-dimensional data and classification tasks, while Random Forest leverages ensemble learning to improve prediction stability by combining multiple decision trees. CNN, a deep learning model, is utilized for its ability to automatically extract and learn complex features from raw image data, making it particularly suitable for image-based tasks. The UTKFace dataset is pre-processed to normalize images and extract relevant features, ensuring optimal model performance. Experimental results reveal that CNN achieves the highest accuracy in age and gender

prediction due to its deep learning architecture, which excels at capturing intricate patterns in facial images. Notably, CNN achieved a 91.1% accuracy for age and 98.03% accuracy for gender prediction, outperforming other models individually such as SVM (90.28% accuracy) and Random Forest (90.74% accuracy).

Keywords:

Age prediction, Gender prediction, Machine learning, Convolutional Neural Networks (CNN), Support Vector Machine (SVM), Random Forest, UTKFace dataset, Feature extraction, Classification, Deep Learning.

Blockchain-Based E-Voting Systems

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Abstract:

The underlying paper proposes a blockchain-based new e-voting system for security, efficiency, and improvement in the process of electing representatives. It makes use of immutability and tamper resistance in solving some critical vulnerabilities of conventional systems: fraud in voting, ballot stuffing, and vote manipulation.

The paper also encompasses an extensive review of the literature on blockchain-based e-voting systems. This research addresses a variety of key concerns, including the benefits, challenges, and impacts coupled with technologies and implementations, while pointing out the future directions of research in this domain.

Securing 5G Networks with Blockchain: A Comprehensive Survey on Authentication Strategies and Challenges

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Abstract:

As 5G networks evolve, authentication processes require greater security measures, prevent from threats such as impersonation, replay attacks, and man-in-middle attacks. The exposure of identity and vulnerabilities associated with location tracking in existing 5G-AKA authentication mechanisms render these mechanisms ineffective. Blockchain technology inherently provides a decentralized and cryptographic approach that can be used to improve authentication security in 5G networks. This paper provides a broad overview of authentication techniques based on blockchain technology that mitigate against security threats and deals with scalability and efficiency challenges in this area. We then discuss a variety of frameworks; highlighting their strengths, weaknesses, and areas for future research. Furthermore, this study explores potential advancements in using blockchain for authentication to enhance the security and efficiency of 5G networks.

Keywords:

Blockchain, 5G, Authentication, 5G-AKA.

A Comprehensive Survey: Evaluating the Efficiency of Ai & ML Techniques on Cyber Security Solutions

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Abstract:

Given the continually rising frequency of cyberattacks, the adoption of artificial intelligence methods, particularly Machine Learning (ML), Deep Learning (DL), and Reinforcement Learning (RL), has become essential in the realm of cybersecurity. These techniques have proven to be effective in detecting and mitigating cyberattacks, which can cause significant harm to individuals, organizations, and even countries. Machine learning algorithms use statistical methods to identify patterns and anomalies in large datasets, enabling security analysts to detect previously unknown threats. Deep learning, a subfield of ML, has shown great potential in improving the accuracy and efficiency of cybersecurity systems, particularly in image and speech recognition. On the other hand, RL is again a subfield of machine learning that trains algorithms to learn through trial and error, making it particularly effective in dynamic environments. We also evaluated the usage of ChatGPT- like AI tools in cyber-related problem domains on both sides, positive and negative. This article provides an overview of how ML, DL, and RL are applied in cybersecurity, including their usage in malware detection, intrusion detection, vulnerability assessment, and other areas. The paper also specifies several research questions to provide a more comprehensive framework to investigate the efficiency of AI and ML models in the cybersecurity domain.

Keywords:

Cybersecurity; Cyber-attacks; Artificial Intelligence (AI); Machine Learning (ML); Deep Learning (DL); Reinforcement Learning (RL) ; Threat Detection.

Enhanced Smart Irrigation System Using LSTM Neural Networks for Improved Agricultural Management

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Abstract:

Effective agricultural productivity and sustainable resource management depend on proper management of irrigation system water. This research focuses on using LSTM neural network methods to predict water discharge levels in uncontrolled irrigation channels. This project aims to solve canal water distribution problems through the development of a machine learning model combining LSTM, ANN, Random Forest, and SVM techniques. Researchers tested the performance of the models by analyzing their RMSE and R^2 scores. The evaluation showed that the LSTM model achieved the highest performance with a Root Mean Square Error of 0.063 cubic meters per second and an R-squared value of 0.89. The results of this study demonstrate that LSTM models can minimize water resource loss and improve agroecosystem sustainability by optimizing the performance of irrigation systems.

Facial Recognition Based Attendance System

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Abstract:

Face recognition is one of the most efficient applications in image processing and plays an important role in the technical field. Identifying human faces is an urgent issue, especially when checking students. With the help of facial biostatistics, the visitor system is based on face recognition based on high resolution and advanced computer technology. The goal of developing this system is to digitize traditional ways of being. B. Oral call and manual recording. Both traditional livelihoods and existing biometric systems are susceptible to unauthorized active ingredients. This paper should learn these tasks. The proposed system includes the haar problem algorithm: OpenCV, DLIB, Pandas, and MySQL. After facial recognition, an attendance report is created and saved in Excel format. The system was tested under a variety of conditions, including lighting, head movement and changes in student camera processing. A rigorous test evaluates general complexity and accuracy. The proposed system is an efficient and robust solution for the class room presence management, eliminating manual work and time consumption. Furthermore, system development is inexpensive and requires a installation.

Gesture-Based Interaction Using Computer Vision and Python

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Abstract:

Computers are a huge part of our lives, and a lot of our daily work depends on them. Making them easier and more efficient to use is something we are always trying to improve. One of the most important tools for interacting with a computer is the mouse. While wireless mice, like Bluetooth ones, help us cut cords, they still need a USB connection, so they're not entirely device-free.

This system solves that by offering a way to control the computer's cursor without any physical mouse, using just a camera. It uses MediaPipe and OpenCV to detect hand gestures through machine learning, allowing users to move the cursor, click, and scroll—completely hands-free. This makes interacting with computers easier and more convenient, without the need for any extra devices.

Keywords:

Computer vision, hand gesture recognition, Media-pipe, virtual mouse.

Speech to Sign Language Translator

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Abstract:

Communication plays a crucial role in daily life and is recognized as an essential human ability. With this perspective, our project is designed to assist individuals who experience challenges with verbal expression or discomfort while speaking. The primary objective of our study is to enhance interaction for people with hearing and speech impairments. Sign-based communication relies on specific movements involving the hands, arms, and facial cues to express thoughts. Our solution identifies these visual symbols and facilitates communication with hearing devices. The proposed system is intended to bridge the communication gap for individuals who face difficulties in being understood. In particular, we utilize the Indian Sign Communication System (ISCS) with the aid of auditory and visual sensors. This system converts spoken dialogue into visual sign representations by analyzing captured frames or real-time video.

Keywords:

Indian Sign Communication, facial cues, video sequences.

Beyond the Algorithm: Deep Learning as a Service and the Future of AI in the Cloud

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Abstract:

Deep Learning as a Service (DLaaS) is an emerging paradigm that enables organizations to leverage deep learning capabilities on cloud platforms without requiring significant infrastructure investments. With the growing adoption of artificial intelligence (AI) applications across industries, DLaaS has gained prominence as a scalable, cost-effective, and accessible solution for training and deploying deep learning models. This paper provides a comprehensive analysis of DLaaS, highlighting its architecture, security challenges, performance considerations, and future research directions. The study explores the role of cloud platforms such as AWS, Google Cloud AI, IBM Watson, and Microsoft Azure in providing DLaaS solutions. Furthermore, it examines security challenges, including data privacy concerns and potential mitigation strategies such as homomorphic encryption and federated learning. The paper also discusses performance optimization techniques like distributed training and resource elasticity. The findings suggest that DLaaS plays a crucial role in democratizing AI by making deep learning accessible to a wider audience while maintaining scalability and security.

Keywords:

Deep Learning, Cloud Computing, DLaaS, AI, Security, Scalability, Performance.

Adaptive Cost Optimization in Cloud Computing Using Multi-Agent Reinforcement Learning

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Abstract:

Cloud computing has become an essential technology for delivering scalable and adaptable computing resources over the Internet. However, the dynamic and fluctuating pricing strategies used by cloud service providers present considerable challenges for cost optimization, particularly in ever-changing and diverse environments. This paper introduces a holistic approach to dynamic cost optimization for cloud resource allocation, utilizing advanced machine learning models and heuristic optimization methods. Our solution continuously adjusts to evolving workloads, resource availability, and pricing structures to reduce costs while ensuring desired performance levels. The experimental results highlight the effectiveness of our approach, demonstrating substantial cost savings compared to conventional static provisioning techniques. This research improves the growing field of cloud resource management by offering a dynamic, adaptive framework for cost-efficient cloud utilization.

Keywords:

Cloud computing, Cost optimization, Machine learning, Pricing models, Adaptive computing.

Student Grade Prediction using Machine Learning

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Abstract:

Student grade prediction is an important issue in the education journey, as it helps institutions to improve learning strategies, identify students who are at-risk, and offer needed help. This paper investigates many machine learning algorithms to predict student's grades and identify those who are at risk of not passing. The study uses both synthetically generated data via convolutional neural network and kaggle dataset. Key features consist of school, sex, age, address, famsize, Pstatus, Medu, Fedu, Mjob, Fjob, reason, guardian, traveltime, studytime, failures, schoolsup, famsup, paid, activities, nursery, higher, internet, romantic, famrel, freetime, goout, Dalc, Walc, health, absences, G1, G2, G3. Several machine learning models, including linear regression, Decision Tree, Feed Forward Neural Network(FNN), Random Forest(RF), Long Short-Term Memory(LSTM), Convolutional Neural Network(CNN) were applied and compared.

Keywords:

Decision Tree, Feed Forward Neural Network(FNN), Random Forest (RF), Long Short-Term Memory(LSTM), Convolutional Neural Network(CNN).

A Hybrid Approach Integrating Flow Matching, Gan Restoration, and Cryptographic Security to Enhance Qr Code Generation and Protection

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Abstract:

This research presents a novel Flow Matching-based QR Restoration Model that integrates GAN-based deblurring with a cryptographic security mechanism, enhancing both the accuracy and security of QR codes. Unlike conventional GAN-based restoration, which primarily reconstructs the visual structure, our approach leverages flow matching techniques to learn the sequential flow of QR patterns, resulting in superior restoration fidelity. Additionally, we introduce a cryptographic layer that keeps the QR code unreadable until the correct decryption key is entered, preventing unauthorized scanning. The proposed model achieved a QR code restoration accuracy of 92.4%, outperforming conventional GAN based restoration, which recorded an accuracy of 85.7%. Furthermore, our approach reduced restoration time by 18.5% while enhancing readability by 29% for highly degraded QR codes. The integration of flow matching and cryptographic protection bridges the gap between restoration and security, offering a robust alternative to existing methods.

Real-Time Traffic Monitoring System Using YOLO

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Abstract:

Urban traffic is becoming increasingly complex, presenting significant challenges in managing congestion and ensuring smooth traffic flow. Normal every-day traffic controlling systems often fail to adapt in real time to fluctuating traffic, leading delays. This project seeks to develop a machine learning based system that connects to traffic lights and

schedule traffic lights , enabling dynamic monitoring and management of traffic. By employing a Convolutional Neural Network (CNN) model, specifically YOLO (You Only Look Once), the system will detect and analyze vehicles in real-time, allowing for quick corresponding adjustments to traffic signals and information displays.

Unlike current solutions, this approach leverages real-time traffic to optimize the flow, particularly in environments where traffic conditions can change rapidly. The integration of YOLO enables quick and accurate object detection, essential for timely interventions in congested areas. The outcome of this study is expected to significantly reduce congestion, mitigate delays, and improve overall traffic efficiency. This project is crucial in advancing smarter, more adaptive urban traffic systems, capable of meeting the demands of modern cities and ensuring a more efficient transportation network.

Brain Tumour Classification using Deep learning Neural Network

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Abstract:

Deep learning(DL) has attracted considerable attention in the recent past and has emerged as an effective means of handling various complex problems in several fields. This particular research employed a popular deep-learning architecture in deep neural network(DNN) classifier to classify 90 brain MRI scans into 4classes: normal; glioblastoma; sarcoma; and metastatic bronchogenic carcinoma tumors. The classifier is further complemented due to the feature extraction, consisting of discrete wavelet transform(DWT) and principal component analysis(PCA) for dimensionality reduction. The results promise very high accuracies of classification upon evaluation from several performance metrics.

Keywords:

Deep learning, discrete wavelet transform, dimensionality reduction, deep neural network classifier, feature extraction, brain MRI classification, glioblastoma, sarcoma, metastatic bronchogenic carcinoma, principal component analysis, classification accuracy, performance metrics.

Intelligent Waste Reporting Towards Cleanliness of India on Sustainable Terms

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Abstract:

Managing post-festival waste in India is a tough job since much decoration material, idols, flowers, and miscellaneous rubbish fill streets, sewers, and unused plots. Though the Municipal Corporation (MCD) effectively manages household garbage, festival trash tends to be overlooked for a long duration of time, resulting in environmental contamination, clogged drainage, and health hazards. In order to mitigate this problem, we have created a web-based platform that allows citizens to report abandoned waste through uploading images, providing specific locations, identifying the type of waste, and monitoring the status of the request in real-time. As soon as a report is filed, our waste management unit gets notified in real time, and immediate action is taken to collect and dispose of the waste either by recycling or environmentally friendly processes [6.2]. The real-time monitoring ensures transparency, efficiency, and community participation in keeping the surroundings cleaner.

The program goes beyond post-festival cleaning, contributing to wider waste management betterment in India. By preventing active waste generation in public spaces, it helps prevent long-term environmental risks [6.3]. Promoting public engagement encourages shared responsibility, moving waste management from being government-centric to a more participatory process. Sustainable disposal processes ensure proper recycling of waste, reducing landfill utilization [6.1]. Moreover, through the use of technology like real-time monitoring, AI-powered waste sorting, and data analysis, the platform improves coordination with municipal authorities and streamlines waste management processes [6.4]. By this convergence of technology and public participation, our project seeks to create a cleaner, more efficient, and environmentally friendly waste management system in India.

Enhancing Continuity of Care: A Blockchain-Based Solution for Decentralized Medical Record and Billing Management

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Abstract:

The fragmented nature of healthcare systems often leads to inefficiencies in patient care coordination, particularly when individuals transition between providers. This paper proposes a blockchain-based framework to address the challenge of decentralized medical record and billing management. By assigning patients a unique blockchain public address, healthcare providers can securely access historical treatment data, prescriptions, and billing information through a tamper-proof, patient-authorized ledger. The system employs smart contracts to automate access permissions, ensuring only verified providers retrieve encrypted records after obtaining patient consent. Cryptographic techniques, such as asymmetric encryption, safeguard sensitive data while enabling interoperability across disparate healthcare networks. A hybrid architecture combines on-chain metadata (e.g., transaction hashes, timestamps) with off-chain storage of encrypted records via distributed file systems, balancing scalability and security. The solution minimizes administrative redundancies, reduces billing disputes, and mitigates risks of incomplete medical histories. Case study simulations demonstrate a 40% reduction in duplicate diagnostic tests and a 30% improvement in billing accuracy compared to traditional electronic health record (EHR) systems. By prioritizing patient-centric data ownership and regulatory compliance (e.g., HIPAA, GDPR), this framework enhances care continuity, fosters trust among stakeholders, and establishes a scalable model for secure health information exchange.

Chronic Kidney Disease Prediction using Transformers and QCNN

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Abstract:

The use of detection of chronic kidney disease (CKD) has become an important use of artificial intelligence when using medical imaging, which improves early diagnosis and better patient results. The project benefits from a CT scan dataset to evaluate the performance of condition deep learning architecture for CKD detection. In particular, we use and compare Vision Image Transformer (ViT), the data efficient image transformer (DeiT), Swin Transformer and Quantum Convolutional Neural Network (QCNN) to detect their efficiency in medical image analysis. These models are used for strong convenience and classification. The purpose of the study is to emphasize the strength and boundaries of this architecture in terms of accuracy, calculation efficiency and projection for medical imaging functions. Our findings will provide insight into the integration of advanced deep learning techniques to improve the CKD diagnosis.

Keywords:

Chronic Kidney Disease (CKD), Medical Imaging, Deep Learning, Vision Image Transformer (ViT), Data-Efficient Image Transformer (DeiT), Quantum Convolutional Neural Network (QCNN), Swin Transformer, Feature Extraction, Medical Image Analysis, AI in Healthcare.

Super Cipher Cryptographic for Communication System

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Abstract:

With the rapid advancement of digital communication, securing sensitive data against potential threats has become a critical concern. Traditional cryptographic algorithms face increasing challenges due to evolving cyber threats and advances in computational capabilities. To address these issues, we propose a novel cryptographic approach, Super Cipher Cryptographic, designed to enhance security in communication systems.

The proposed model integrates multiple encryption techniques by combining symmetric and asymmetric methods with advanced permutation-substitution mechanisms, ensuring high resilience against cryptanalysis. It incorporates dynamic key generation and multi-layered encryption to strengthen data confidentiality and integrity while maintaining computational efficiency.

The system's robustness is evaluated through entropy analysis, key sensitivity tests, and resistance to brute-force, differential, and linear cryptanalysis. Preliminary results demonstrate that the Super Cipher Cryptographic method provides enhanced security compared to conventional encryption standards, making it a promising solution for modern secure communication systems.

Keywords:

Cryptography, Super Cipher, Secure Communication, Encryption, Symmetric Encryption, Asymmetric Encryption, Data Security, Cybersecurity.

Decentralized Trust Frame Work for Transparent and Secure Electoral Processes using Block Chain

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Abstract:

The integrity of democratic processes often hinges on the reliability and transparency of voting systems. However, traditional and many modern electronic voting methods are prone to errors, manipulation, and inefficiencies. To address these limitations, this paper proposes a blockchain-based voting framework that ensures a decentralized, transparent, and secure election process. By leveraging distributed ledger technology, the system records immutable votes, mitigates fraud risks, and guarantees voter privacy. The integration of biometric verification enhances authentication, ensuring that each individual votes only once. Additionally, the system supports remote voting, offering accessibility without compromising security. This innovative approach reduces resource consumption, eliminates reliance on intermediaries, and provides end-to-end verifiability. Through comprehensive design and implementation, the proposed model aims to establish trust and resilience in electoral systems, paving the way for more robust democratic practices in the digital age.

An Ai Based Hand Gesture and Voice Controlled System for Physically Disabled Person

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Abstract:

A real-time A realtime fingertip-gesture primarily based interface is still difficult for person pc interactions, due to sensor action, converting mild stages, and the complexity of tracking a fingertip across a diffusion of topics. Using fingertip shadowing as a virtual mouse is a popular fashion on screen with screen and without mouse tool. Gesture managed virtual mouse makes human pc interaction easy by way of utilizing Hand Gestures and Voice instructions. The pc requires almost no direct touch. This project recognizes hand movements and vocal commands using state-of-the-art device learning and computer vision algorithms, which operate effortlessly without the need for extra hardware. These days, artificial intelligence and machine learning can be used to complete any work you conduct on a daily basis. One such invention that can assist us in numerous ways is a voice assistant. In addition to asking inquiries, users can ask their assistant for assistance with simple actions like launching the browser.

Keywords:

Machine learning, AI assistant with simple actions like launching the browser.

“User Adoption and Continuous Intention of Quick Commerce Apps: Evidence from India”

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Abstract:

The burgeoning quick commerce (q-commerce) sector in India is reshaping consumer behavior, making it essential to understand the factors that drive user adoption and ensure continuous intention. This study explores the determinants of q-commerce app usage by integrating the Uses and Gratifications Theory (UGT), Diffusion of Innovation (DOI) Theory, and Information Systems (IS) Theory. Primary data from a survey of over 350 Indian q-commerce users was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) to examine the relationships between key constructs such as compatibility, relative advantage, complexity, information quality, system quality, service quality, and convenience motivation on trust, satisfaction, and behavioral intention. The results indicate that compatibility, convenience motivation, service quality, and system quality are critical drivers of user satisfaction and trust in q-commerce apps. Specifically, when users perceive that an app aligns well with their lifestyle, fulfills their need for convenience, offers reliable service, and is technically sound, they are more likely to be satisfied and trust the app. These factors, in turn, significantly influence users' intentions to continue using the apps. The study also found that satisfaction and trust are very important as the effect of convenience motivation and information quality on user behavioral intentions are enhanced when trust and satisfaction are high, respectively. While customer experience and information quality did not emerge as significant direct predictors, these findings offer valuable insights for q-commerce providers to enhance user adoption and ensure continuous usage intention in the competitive Indian market by focusing on the key drivers of satisfaction and trust.

Keywords:

Quick Commerce, User Adoption, Continuous Intention, UGT, DOI, IS Theory, Trust, Satisfaction.

AI-Based Parkinson's Disease Detection and Assessment: Integrating Evaluation for Enhanced Diagnosis

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Abstract:

Parkinson's disease (PD) is a degenerative neurological disorder that affects millions of people around the world. Early detection is critical to effectively managing the disease, but traditional diagnostic methods can miss subtle early signs. This paper proposes an AI-based detection and assessment system integrating multimodal data such as gait patterns, resting hand tremors, MRI Scans of the brain, facial expressions, and cognitive evaluation of non-motor symptoms. Using machine learning algorithms, particularly XGBoost, logistic regression, and random forest, the system provides a comprehensive and reliable diagnosis of PD. The focus is on a holistic evaluation that offers medical professionals a tool for improved diagnosis and patient management.

Keywords:

Parkinson's Disease, AI-based detection, machine learning, weighted average, CANTAB, holistic evaluation, tremor analysis, weighted fusion, cognitive assessment.

Text Simplification for Education using Reinforcement Learning

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Abstract:

Text simplification has played a crucial role in education, assisting in making complex textual content comprehensible to its audience, including nonnative speakers, students with reading difficulties, and individuals with cognitive impairments. Conventional technique-based and supervised-learning approaches have, however, failed to maintain a desirable compromise between meaning preservation and readability enhancement. Hence, we present a reinforcement-learning-based framework for text simplification, which optimizes readability while maintaining the semantic integrity of the text. Our approach utilizes reward functions to measure fluency, grammatical correctness, and content preservation, thus allowing for adaptive learning with no or very little labeled data. The RL model is trained with a reward-based mechanism that promotes simplifications that are in line with human preferences, ensuring that the simple texts do not lose their informative and interesting value. Benchmarked against existing state-of-the-art methods in text simplification, the performance of the proposed algorithm is experimentally evaluated on the benchmark datasets. Obtained results exhibit that our method produces simplified texts better on readability and essential information retention than those with classic methods. This study illustrates the promise of using reinforcement learning to improve educational accessibility and personalize learning experiences.

Keywords:

Text Simplification, Reinforcement Learning, Educational Technology, Natural Language Processing (NLP), Readability Enhancement, Semantic Preservation, Machine Learning, Accessibility, Personalized Learning, Language Modeling.

Chatbot with Wikipedia using Large Language Models

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Abstract:

In this paper, a proposed chatbot system powered with LLMs can query and answer fact questions appropriately with Wikipedia alone being the Reference Source. Few shot learning is leveraged in the proposed chatbot for high conversation accuracy, low hallucinations, and low response latency. The system promotes increased trust and contextual awareness in conversation with users through the incorporation of LLM-generated output with Wikipedia-based fact-checking. For efficiency and scalability, a model distillation of a high capacity model such as GPT-4 is conducted for a lighter LLaMA model with no loss in response quality and then an optimized chatbot is proposed for real-life use case. In current work, a mixed evaluation mechanism with both AI and human evaluations is adopted for chatbot testing. It holds a high fact accuracy level and outperforms retrieval-based and conventional AI-generated model types. Comparison shows that the proposed model outperforms real-time queries, past events, and current events with a pleasurable and useful user experience. Current work proposes that AI architectures can make use of a mix of AI and conventional architectures for chatbot development and introduces a concept of a cost-effective, efficient, and smart knowledge base chatbot for a range of applications.

Keywords:

(Large Language Models (LLMs), Wikipedia, GPT-4, LLaMA Model).

Time Series Data Compression for Industrial Data

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Abstract:

Industrial processes generate vast amounts of time-series data, necessitating efficient compression methods to reduce storage and transmission costs while preserving data accuracy. This project introduces a time-series compression algorithm tailored to industrial data, leveraging pattern recognition to identify and compress repetitive sequences. The proposed method not only enhances compression efficiency but also ensures the retention of critical information required for analysis and forecasting. Experimental results demonstrate that our approach achieves a 5 to 6.5 times higher compression ratio compared to traditional compression algorithms, with minimal loss of data fidelity. This makes it a scalable and effective solution for real-time industrial data management.

Keywords:

Compression, Pattern-Recognition, Time-Series Data, CNN Autoencoder, Deflate Algorithm.

Detection of Counterfeit Products using Private Blockchain

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Abstract:

In many different industries, counterfeit goods present serious problems since they erode consumer confidence and brand integrity. Due of their vulnerability to replication, conventional authentication techniques like holograms and RFID tags have not been sufficient [1]. A blockchain-based product authentication system that incorporates QR codes for verification is proposed in this study. Product data is stored across several nodes and hashed using SHA-256 by utilizing a private blockchain architecture [2]. Every product has a unique QR code that allows users to use a web-based application

to confirm authenticity. An automated email alert is sent out in the event that disparities are found [3]. This method avoids the significant expenses related to public blockchains while guaranteeing improved security, immutability, and decentralization. Furthermore, it offers a clear, effective, and user-friendly way for producers and customers to monitor and confirm the legitimacy of products [4].

Keywords:

Blockchain, Product Authentication, QR Codes, Private Blockchain, Counterfeit Detection.

Email Spam Detection Using ML Algorithms

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Abstract:

In a time when more than 3.4 billion phishing emails are sent every day, email security is a pressing issue for organizations and individuals. This paper introduces a novel method for detecting email spam by combining advanced natural language processing strategies with machine learning strategies. Our model demonstrates outstanding precision in differentiating between good and bad emails without compromising on meeting the changing needs of contemporary email threats.

Keywords:

Naive Bayes, SVM, Random Forest, KNN, TF-IDF, Decision Tree, and Machine Learning.

Heartbeat Monitoring System

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Abstract:

IoT technology in health transforms traditional monitoring systems into real-time health data analysis. This paper proposes an innovative heart monitoring system by employing IoT and utilizing an ESP8266 NodeMCU board, a heartbeat sensor module, and an OLED display. Heart rate measurements are a major time-sensitive means for medical interventions. To complement further enhancements of patient care, implement machine learning predictive analytics algorithms. From records of previous heart rates, the system will be able to identify potential health issues such as arrhythmia and tachycardia, thus providing proactive management of cardiac health. Furthermore, the system utilizes cost-effective components such as breadboard jumper wires and LEDs in cases of abnormal readings, thus making it feasible to scale up. This paper integrates multiple advancements in IoT and machine learning. That is practically an all-rounded solution in heart-rate monitoring also predicts potential health trouble. This represents a large step forward in the creation of health technologies: predicting possible health issues based on real-time monitoring paired with predictive analytics can heighten better decision-making power among providers for themselves and their patients. The outcome of this work proves that such approaches, based on combining machine learning with IoT-based heart monitoring, are well-suited for future research and development of health solutions.

Keywords:

Internet of Things (IOT), heart rate monitoring, ESP8266, machine learning, predictive analytics, healthcare technology.

Detection of Counterfeit Products by Blockchain

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Abstract:

There are a lot of inefficiencies in supply chain management, including duplicate services, bad departmental planning, and a lack of standardization. This is mostly because there is not enough transparency. Product counterfeiting, which is becoming more popular, is one of the biggest problems businesses face today. It is hard to tell difference in the fake or real product by seeing them, It hurts the customers trust and create problems for businesses. Even counterfeiting affect lots of people not many known how it affect brands. To stop this different different methods is used based on artificial intelligence(AI). But these methods have some problems. For example, QR codes can be copied and put on fake goods. Also, AI models that use Convolutional Neural Networks (CNNs) need a lot of computing. The idea of this project is to detect the products which is fake by supply chain tracking. To implement this we use blockchain technology in our project.

which makes them hard to scale. This project suggests using a blockchain-based system to make it easier to spot fake goods by making it possible to see the full history of a product's supply chain. At every stairs of the supply chain, blockchain innovation makes sure that only real goods can be identified and tracked. Because it is decentralized, many people can view and check records at the same time, which encourages collaboration and gets rid of the need for middlemen. One great thing about blockchain is that its record can't be changed, so data can't be changed without everyone agreeing. This guards against vulnerabilities and makes sure that the data is correct. The suggested system uses blockchain's cryptographic security to make a record of transactions that can't be changed and can be checked. This makes counterfeiting much less likely. This essay describes how the blockchain-based system was created and how it works, showing that it can be solve problems in the supply chain and make it easier to find fake goods. This method is a scalable and reliable way to protect supply chains and restore customer trust in product authenticity by making it easier to track and more secure.

Automatic Helmet Recognition and Number Plate Identification Using CNN

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Abstract:

Traffic accidents have become increasingly common, making manual regulation difficult, especially in highly populated regions like India. A significant concern is the widespread practice of riding motorcycles without helmets. The manual monitoring of these situations have become a huge burden for the traffic department and there is a necessity for the introduction of automation to streamline the process of monitoring the motorcycles. Several highly populated cities in India, have a prevailing video surveillance framework that can be utilized for the automated monitoring of motorcyclists. This paper provides the pioneering approach aimed at identifying the motorcycles in which the rider is not wearing any helmet and extracting the number plate details from such occurrences. The execution of such method involves the application of CNN models for the recognition of distant objects like motorcycles, motorcycle helmets, and license plates. The CNN model is trained on a dedicated dataset which contains different images of various classes relevant to the task. The results demonstrate a highly satisfactory and precise detection of helmets and license plates. Extracted number plate

images undergo further processing using image enhancement techniques and the digits in the number plate are recognized using the OCR techniques for further work. By integrating deep learning, image processing and OCR techniques this approach stands as a promising solution for enhancing the safety of motorcyclists.

Keywords:

Helmet Detection, Number plate Detection, Image enhancement Techniques, Deep learning, Convolutional Neural Networks, Automatic monitoring, Optical Character Recognition.

Next Gen IoT Enhanced Attendance System

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Abstract:

The primary aim of the Real-Time Attendance Marking System is to mark attendance immediately and effectively. As students or subjects move through cameras strategically positioned around the campus, the system is programmed to scan for presence, identify the subject, and mark attendance in real-time. This aspect is crucial, as it reduces any significant time gap in updating attendance records, thus making the entire process overall more effective. To accomplish such performance, the system utilizes an optimized architecture which integrates Convolutional Neural Networks (CNN) with Long Short-Term Memory (LSTM) networks. This innovative combination enables the system to process visual information rapidly and accurately, thus allowing attendance records to be updated virtually in an instant. By optimizing the CNN-LSTM architecture, we can decrease the detection and recognition processing time significantly. The advantages of such a system are more than convenience; they also reduce administrative burden for traditional attendance mechanisms. With real-time automated reporting, institutions can better ensure compliance with attendance policy. Not only does this simplify administrative work, but it also ensures accurate and dependable records of attendance, allowing the provision of the same for academic and administrative use. In short, the Real-Time Attendance Marking System is set to increase operational efficiency, facilitate institutional compliance, and provide a hassle-free experience for administrators as well as students. Utilizing cutting-edge technology, this system is a quantum leap above attendance management.

Lightweight Privacy- Preservation Authentication Protocol: VANET

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Abstract:

The rapid growth of information and communication technology (ICT) has paved the way for developing smart cities, which governments have introduced worldwide to enhance urban living standards. Vehicular Ad-hoc Networks (VANETs) offer promising solutions to improve road conditions, traffic congestion, driving safety, and passenger comfort. However, ensuring security in VANETs remains a critical concern due to the highly dynamic nature of vehicles. In this paper, we propose a lightweight authentication scheme for vehicle authentication with Roadside Units (RSUs) in VANETs, along with secure protocols for the online registration of vehicles and RSUs with the Transport Authority (TA). Additionally, we introduce a strategy to preserve vehicle and traveler privacy during communications with the TA and RSU by using blind signature. The proposed protocol effectively resists some attacks such as replay, impersonation, man-in-the-middle attacks, etc. We employ lightweight cryptographic components such as XOR, hash functions, and concatenation in resource-constrained environments such as VANET. Furthermore, AVISPA tool is used to validate that the proposed protocol is secure against known attacks. Performance analysis demonstrates that our scheme outperforms existing approaches regarding communication and computation costs.

Contactless Wash Basin Gadget Using IOT

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Abstract:

The principle purpose of automated wash basin device is to improve hygiene and water saving in public and private restrooms. By using ultrasonic sensors to identify user presence, this technology minimizes interaction with surfaces and eliminates the need for manual taps by automatically starting the flow of water. The system, which is run by solar panels, guarantees energy efficiency and sustainability, making it a efficient sanitation. Significant drops in water usage are also facilitated by the incorporation of water-saving technologies such as automated shut-off features and scheduled flow control. By utilizing renewable energy sources, this project supports global sustainability goals in addition to cleanliness and convenience. An innovative way to improve user experience, hygiene, and energy efficiency is provided by automatic wash basins that include LED lighting, a self-cleaning nozzle system, and water temperature control. With the use of energy-efficient LED lights to improve visibility, this creative design attempts to develop a smarter wash basin that automatically modifies the water temperature for maximum comfort. The water supply system is kept hygienic by the self-cleaning nozzle feature, which lowers the possibility of contamination and eliminates the need for manual cleaning. This a solution offers consumers a seamless. This automatic wash basin technology raises the bar for contemporary washroom facilities by resolving issues with traditional wash basins.

Keywords:

Ultrasonic sensors, Solar panels, Self-cleaning nozzle, Water temperature Control, LED lightning.

Climate-Driven Epidemic Forecasting System (CliDEF)

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Abstract:

Predicting contagious disease outbreaks can play a vital role in supporting early public health responses and preventing widespread impact. This project focuses on building a machine learning model that uses weather-related features—such as temperature, humidity, and rainfall—to forecast the likelihood of disease outbreaks. The dataset includes over 60 years of historical weather and disease data, sourced from NOAA and Kaggle.

A key part of this work is feature engineering, where raw data is carefully transformed into meaningful variables that help improve model accuracy. Multiple machine learning algorithms were explored, including Logistic Regression (LR), Random Forest Classifier (RFC), AdaBoost Classifier (ADC), and Decision Tree Classifier (DTC), to compare their ability to recognize patterns and make reliable predictions.

The results demonstrate how combining historical data with thoughtful feature design and diverse classification methods can provide powerful tools for anticipating outbreaks—ultimately supporting more informed and timely public health decisions.

Keywords:

Disease outbreak prediction, machine learning, weather data analysis, feature engineering, logistic regression, random forest classifier, AdaBoost, decision tree classifier, epidemiological forecasting, public health surveillance, CliDEF.

Finding Dark Pattern

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Abstract:

Dark patterns are deceptive user interfaces employed by e-commerce websites to manipulate users' behavior in a way that benefits the website, often unethically. This study investigates the detection of such dark patterns. These are some existing solutions to find dark patterns: UIGuard, a knowledge-driven system using computer vision techniques and natural language pattern matching to analyze UI elements and identify dark patterns by integrating taxonomies and distilling knowledge from real-world examples. Other approaches categorize dark patterns based on detectability into automated, manual, or undetectable, utilize explainable machine learning models trained on e-commerce dark pattern datasets, and explore generative AI technologies driven by regulatory interest. We propose a solution that combines web scraping techniques (BeautifulSoup4 and Selenium WebDriver) with contextual understanding through fine-tuned BERT language models and generative capabilities for identifying outlier dark patterns. Our approach involves scraping textual content from e-commerce websites, feeding it line-by-line into the fine-tuned BERT model for dark pattern detection, and leveraging BERT's bidirectional sentence analysis and generative abilities. The study builds upon such research on automatically detecting and explaining dark patterns in user interfaces, ultimately aiming to raise awareness and protect consumers from these deceptive practices.

Keywords:

Dark Patterns, Generative AI, Behavioural Audits, Algorithmic Fidelity.

Blockchain-Integrated Deep Learning Framework for Secure and Decentralized Pneumonia Diagnosis Using Chest Radiographs

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Abstract:

Pneumonia is one of the most common causes of death worldwide. It is a condition of the inflammation of the lungs, specifically in the alveoli, which are millions of tiny air sacs that help us take in oxygen. It can develop from a range of different infections, which are caused by different pathogens, including viruses, bacteria, and fungi. Chest radiographs are globally used standard method used for pneumonia diagnosis but the traditional manual interpretation is a time-consuming process and the diagnosis is contingent to variability. Deep CNN has proved to exhibit exceptional performance and accuracy in pneumonia diagnosis. This research presents a hybrid framework of AI and blockchain to build a secure, trustworthy and accurate pneumonia diagnostic system. The project compares the efficiency of VGG-16, ResNet-50 and AlexNet for pneumonia detection. Based on the result a custom CNN model is created to provide effective results quickly. The model is trained with a dataset of ~25,000 images using a 256*256 photograph decision with 32 batch length. The trained version produces an accuracy of 95%. The custom model when integrated with a private blockchain ensures data integrity, secure storage, and controlled access to medical records. Statistical results obtained demonstrate that Deep learning based pneumonia detection model hosted on a private blockchain network give reliable system medical diagnosis framework.

Accessible E-Learning Platform for Inclusive Education: Enhancing Student-Centric Learning through Universal Design

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Abstract:

In accordance with the fourth goal for the Sustainable Development Goals (Quality Education), this study describes the creation and assessment of an accessible e-learning platform intended to serve students with a range of requirements, especially those with disabilities (PWD). The research integrates the principles of Universal Designs for Learning (UDL), WCAG 2.1, and technological compatibility to address the rising demand for inclusive and student-focused digital learning environments that go beyond traditional models. Features including large text alters, navigation, commands via voice, high contrast and dyslexia-friendly formats, and ARIA-enabled screen reading support were added to the system using a design-based research approach. High rates of adherence to accessibility standards were found during an accessibility audit that used the WAVE tool. Teachers' and students' user comments showed increased learning retention, better usability, and positive engagement. By presenting an open-source, scalable approach that supports educational equity, this article adds to the tracks on educational technology, methodology and assessment, and educational technology ecosystems. Additionally, it outlines methods for incorporating inclusive principles into curriculum design in order to foster a culture of learning that is internationally aware and proficient in digital technology. Policy makers, instructors, and developers looking to close the accessibility gaps in online education will find value in the work.

Recipe Recommendation Engine

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Abstract:

With the increasing demand for personalized health and nutrition solutions, individuals seek AI-driven tools to assist in meal planning and dietary recommendations. This research introduces an AI-Powered Health and Recipe Assistant designed to provide customized health insights and intelligent recipe recommendations based on available ingredients. Users input their available ingredients, and the system utilizes the Spoonacular API to generate suitable recipe suggestions. The system also features a chatbot and BMI calculator that provide personalized health advice. By integrating Google Generative AI for tailored guidance, recipe preparation steps, estimated cooking time, and other meal details, along with NLP-based chatbot interactions, the system ensures efficiency and relevance. NLP is leveraged to understand user queries, detect intent, and generate context-aware responses, enhancing the chatbot's ability to provide meaningful health recommendations. Evaluation results demonstrate the system's effectiveness in delivering accurate ingredient-based meal recommendations and AI-powered health insights, addressing the growing need for smart, user-centered dietary planning solutions.

Keywords:

Ingredient-Based Recipe Recommendation, NLP-Based Chatbot, AI-Generated Diet Recommendations, BMI Analysis, Google Generative AI.

Identification of Degraded Printed Scripts in Hindi & English – A Review

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Abstract:

Scripts are an important factor in maintaining the linguistic and cultural heritage of civilizations, with Hindi and Sanskrit at the core of most ancient manuscripts and historical records. Unfortunately, most of these documents have degraded to a considerable extent over the years because of problems such as smudging of ink, fading, blurring, and broken or overlapping characters—resulting in precise Optical Character Recognition (OCR) as a serious challenge. This paper offers a thorough survey of recent progress in the field of degraded script identification, relying on well-established criteria to select proper and up-to-date studies. It discusses several types of degradation and their respective impact on OCR accuracy, contrasting with conventional machine learning approaches with new deep learning-based approaches. Preprocessing operations like binarization, deblurring, and noise removal are highlighted for their contribution to recognition performance improvement. The paper also briefly addresses the growing complexity in the identification of multiple scripts in bilingual and multilingual documents. As there is not much of a standard dataset for degraded Sanskrit and Hindi, this review highlights the need for more standardized benchmarking procedures. Aside from technical issues, the paper also discusses actual applications in digital preservation and archiving of historical documents. The review ends by describing future research directions, highlighting hybrid methods and the potential of generative models to be used in improving the restoration of highly degraded scripts.

WhatsApp Chat Analyzer Using AI

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Abstract:

One of the most widely used apps for interacting these days, whether among colleagues or with friends and family, is WhatsApp. WhatsApp conversations can include curious trends and helpful information that aren't immediately apparent. This initiative analyzes those conversations in a clever, data-driven style to help you more effectively understand them. This project nicely arranges WhatsApp chat data using popular tools like pandas, seaborn, matplotlib, and emoji. After that, it transforms the data into clear charts and images to assist in understanding the discussions. This project offers us to identify the primary subjects, recurring themes, and trends in the messages, whether they are sent in a group chat or one-on-one.

Keywords:

WhatsApp, Messaging apps, Chat data, Trends, Information, Data-driven, Pandas, Group chat.

The Role of Generative AI and Deep Learning in Next-Generation IoT Systems

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Abstract:

The integration of Generative Artificial Intelligence (Generative AI) and Deep Learning into the Internet of Things (IoT) presents transformative opportunities for creating smarter, more efficient, and adaptive systems. This paper explores the synergistic role of these technologies in addressing critical challenges in IoT, including data scalability, real-time decision-making, security, and interoperability. Generative AI techniques, such as Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs), enable synthetic data generation, anomaly detection, and predictive modelling, while Deep Learning enhances pattern recognition, real-time analytics, and system adaptability. The proposed conceptual framework highlights the layered integration of these technologies in IoT architectures, emphasizing their potential in applications such as smart cities, healthcare, industrial automation, and precision agriculture. The study also identifies key limitations, such as resource constraints and ethical concerns, and outlines future research directions for advancing lightweight frameworks and standardized solutions. This work provides valuable insights for practitioners and researchers, offering a roadmap for leveraging Generative AI and Deep Learning to enhance the intelligence, efficiency, and security of next-generation IoT systems.

Keywords:

Generative AI, Deep Learning, Internet of Things (IoT), Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs).

A Comparative Analysis of ANN and P&O MPPT Techniques in PMSG-Based WECS

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Abstract:

This study investigates the design and optimization of a Maximum Power Point Tracking (MPPT) system integrated with a Permanent Magnet Synchronous Generator (PMSG)-based Wind Energy Conversion System (WECS) to enhance power extraction under variable wind conditions. The WECS converts wind energy into mechanical power via a turbine, which is then transformed into electrical energy by the PMSG. Due to wind speed variations, an MPPT algorithm dynamically adjusts the operating point to maximize efficiency. The PMSG's AC output is rectified to DC and regulated through a DC-DC boost converter, where the MPPT determines the optimal duty cycle. This work compares Perturb and Observe (P&O) and Artificial Neural Network (ANN)-based MPPT methods. P&O perturbs system parameters and observes power variations, offering simplicity and low computational demand but exhibiting oscillations and slow response to rapid wind changes. ANN-based MPPT, utilizing pre-trained models, predicts optimal operating points in real time, ensuring faster convergence, improved stability, and higher efficiency. Although ANN requires substantial pre-training and computational resources, it effectively tracks key parameters such as load voltage, current, rotor speed, and electromagnetic torque, enhancing power output and system smoothness. Additionally, ANN is applicable in fault detection and control optimization within WECS. The choice between P&O and ANN depends on

system complexity and performance requirements. This study demonstrates that ANN-based MPPT significantly improves power efficiency, making it a robust solution for modern wind energy systems. The findings highlight the importance of selecting suitable MPPT techniques for optimizing renewable energy utilization.

Keywords:

Artificial Neural Network, Boost Converter, Maximum Power Point Tracking, Permanent Magnet Synchronous Generator Wind Turbine.

Medical Domain Specific Information Retrieval Using RAG

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Abstract:

As medical information has grown dramatically in recent years, having the ability to effectively retrieve accurate and relevant knowledge becomes absolutely essential for health care professionals and researchers alike. The research introduces a question-answering system powered by AI aimed at maximizing the availability of medical information. The system processes an immense repository of medical documents by transforming text data into high-dimensional representations, retaining their semantic content. When a user searches for a query, a similarity search algorithm finds and fetches the most relevant passages or documents in the database. A language model then makes context-sensitive and accurate responses based on the information fetched, providing high reliability and accuracy. By combining natural language processing (NLP) and sophisticated retrieval methods, this system facilitates access to reliable medical knowledge at high speed and with great efficiency, which assists informed decision-making in the medical field.

Keywords:

Retrieval Augmented Generation (RAG), Medical Information Retrieval, Natural Language Processing (NLP), Machine Learning in Healthcare, Semantic Search, Question- Answering System, Knowledge Embeddings, Healthcare AI, Similarity Search Algorithm, Clinical Decision Support.

A Research Paper on Identifying Credit Card Fraud

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Abstract:

The problem of credit card theft is common in today's digital landscape, especially with the rise in online payment options. As more businesses transition to online transactions, the threat of fraud has increased, with fraudsters employing various techniques to illegally obtain funds from unsuspecting users. This research aims to implement several machine learning techniques to differentiate from fraudulent and authentic transactions. Transactions will be categorized into distinct groups, allowing for the application of different classifiers tailored to each group. The classifiers will be trained independently, and the one demonstrating the highest accuracy will be utilized for fraud detection. Our analysis employs a dataset comprising online transactions made by anonymous credit card users, characterized by a significant imbalance—featuring a vast majority of legitimate transactions and a limited number of fraud cases.

Keywords:

Accuracy, Error Rate, Sensitivity, Specificity.

Wanderlust

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Abstract:

This paper offers a complete view of a Tour and Travel Management System, which aims to simplify travel and tourism processes through automation. The system allows users to easily create, book, and confirm travel itineraries. Given the significant role tourism plays in modern life, a centralized platform for these activities is crucial. This research introduces a framework for understanding and improving travel and tourism experiences using a dynamic website. The system provides travelers with detailed information on destinations, packages, and booking choices, while also streamlining operations for travel businesses. Furthermore, this paper examines current trends, challenges, and research goals within travel management systems.

Keywords:

Automation, Booking, Confirmation, Dynamic, Tourism Management.

XRD and Sem Analysis of Ground Granulated Blast Furnace SLAG –GGBFS and Coal Bottom Ash as a Green Alternative in Mortar

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Abstract:

The successful research and development of sustainable material for building construction have led to significant advancement in cost effective and sustainable alternatives. The utilization of such material in mortar will not only provide economic benefits but also reduce the disposal burdens. In this study Ground Granulated Blast Furnace Slag (GGBFS) and Coal Bottom Ash (CBA) are used as alternative of Pozzolana Portland Cement and Natural sand respectively. e X-ray Diffraction (XRD) and Scanning Electron Microscopy (SEM) was carried out for Pozzolana Portland Cement, Natural Sand, Ground Granulated Blast Furnace Slag (GGBFS) and Coal Bottom Ash (CBA) The results shows that the chemical composition of GGBFS aligns closely with typical pozzolanic materials. SEM analysis reveals that GGBFS particles are angular with complex shapes and surface textures, which may influence its workability and reactivity also CBA particles are largely spherical and rounded, which may enhance particle packing and workability in blends. Thus , finding of this study will contribute to the development of sustainable and eco-friendly mortar mix by investigating the feasibility of Ground Granulated Blast Furnace Slag (GGBFS) and Coal Bottom Ash (CBA) as alternative materials.

Analyzing Public Sentiment and Thematic Trends in Metaverse Token Reviews Using ML and Micro Interlocutor Analysis

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Abstract:

In the evolving digital finance landscape, metaverse tokens have become pivotal within decentralized ecosystems, spanning gaming, DeFi, NFTs, and smart contracts. This study examines four key tokens—Floki, Render, Sandbox, and Stacks—using a hybrid approach that combines machine learning (ML)-based sentiment analysis and topic modeling with qualitative Micro Interlocutor Analysis (MIA). Reddit served as the primary data source, capturing community-driven discourse and sentiment.

After preprocessing Reddit comments, Latent Dirichlet Allocation (LDA) identified six dominant themes: Gaming, DeFi & Virtual Finance, Market Trends, Blockchain, NFTs, and Financial Risk. Blockchain and Market Trends were most frequent, highlighting the community's focus on technology and speculation. VADER sentiment analysis revealed an overall optimistic tone, with NFTs (78.2% positive), Gaming (76.6%), and DeFi (66.7%) viewed most favorably. Financial Risk drew the highest negativity (38.7%), reflecting concerns over scams and volatility.

Token-specific sentiment showed Sandbox and Stacks receiving the most positive feedback, while Floki garnered mostly neutral sentiment. Render sparked mixed reactions, particularly around Gaming and Risk. For predictive modeling, text was vectorized using BoW, TF-IDF, and Hashing, and classified using six ML models. Logistic Regression, XGBoost, and Decision Tree achieved the highest F1-scores (above 0.85).

Complementing the quantitative analysis, MIA via expert interviews revealed that trust, platform reputation, and community engagement significantly influence sentiment and adoption. This integrated approach offers nuanced insights into how online communities perceive metaverse tokens, bridging data-driven predictions with human behavioral drivers to inform strategic decision-making in Web3.

Keywords:

Metaverse Tokens, Decentralized Finance (Defi), Blockchain Technology, Virtual Economy, Nft Transactions, Digital Ownership.

Economic Impact Analysis Through Youtube Trends

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Abstract:

YouTube is essentially an online platform that is most utilized for video streaming. YouTube has become a major catalyst in the interference and influence of public opinion and consumer behavior of the current online platforms. In this paper, we examine the potential of YouTube trends as economic outcome predictors for the stock market in the India. In our experiment, we analyze digital engagement metrics, such as views, likes and comments, correlated to economic indicators across datasets from YouTube trends, Indian stock markets statistics. It is found that there can be a strong correlation between YouTube trends and stock market performance in the technology, gaming, and entertainment industries, and the stock prices. The limited dataset could not confirm the hypothesis that YouTube trends can predict economic performance, but other macroeconomic factors and detailed analysis with larger dataset need to be taken into account for precise forecasting. By looking at the use of digital engagement metrics to forecast the economy, the paper provides insights for leveraging digital to forecast the economy and points out areas of future research.

Keywords:

YouTube trends, economic indicators, hypothesis testing, digital engagement, predictive analysis, Pearson correlation, PySpark.

“Exploring Discrepancies in Online Hotel Bookings: Impact on Customer Satisfaction and Revisit Intentions in Tier 2 and Tier 3 Cities of India”

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Abstract:

Introduction & Background

The rapid expansion of online hotel booking platforms such as Goibibo, Booking.com, Makemytrip, OYO, Agoda, and Yatra.com has significantly transformed the hospitality industry. These platforms offer convenience, competitive pricing, and a wide range of choices to travellers. However, discrepancies between the information presented on these platforms and the actual services provided by hotels have become a major concern. Common issues include misleading images, hidden charges, denied bookings, and forced relocations, which directly impact customer satisfaction and trust. This research explores the influence of perceived value, technology dependence, and expectation confirmation on customer satisfaction and revisit intentions, particularly in Tier 2 and Tier 3 cities in India, where regulatory oversight is often weaker.

Theoretical Framework

This study is grounded in the Expectation Confirmation Theory (ECT), which explains how customer satisfaction is shaped by the gap between expectations and actual experiences. The research also incorporates concepts from service quality models, particularly SERVQUAL, to analyze discrepancies in hotel services. The framework hypothesizes that perceived value and technology dependence significantly shape customer expectations, which, when unmet, lead to dissatisfaction and lower revisit intentions.

Methodology

A quantitative research approach was employed, utilizing survey data from hotel customers who booked through online platforms, as well as data extracted from online reviews using web-scraping techniques. The study applies Partial Least Squares Structural Equation Modeling (PLS-SEM) to test hypotheses and analyse relationships between key variables. Sentiment analysis through Google Colab further examines customer perceptions of discrepancies in hotel services. The sample consists of approximately 300 survey respondents and 1,250 online reviews gathered from booking platforms.

Key Findings (Expected Outcomes)

The study anticipates several key findings:

- Higher perceived value positively influences customer satisfaction and loyalty.
- Increased dependence on technology raises customer expectations, making discrepancies more noticeable.
- Mismatches between promised and actual hotel services result in significant dissatisfaction.
- Dissatisfied customers are less likely to revisit the platform or recommend it to others.

Improved transparency and grievance redressal mechanisms can mitigate negative experiences and enhance customer trust.

Implications & Contributions

This research contributes to the hospitality industry and academic literature by addressing gaps in service quality related to online hotel bookings. It provides insights for booking platforms to implement stricter quality control measures and improve customer experience. Policymakers can use the findings to develop guidelines that ensure greater transparency and fairness in digital hospitality services. Additionally, the study offers practical recommendations for hotels to align their online representations with actual service delivery, fostering long-term customer loyalty.

Conclusion

The findings of this study highlight the urgent need for greater transparency, accountability, and regulatory oversight in the online hotel booking sector. Addressing discrepancies will not only enhance customer satisfaction but also strengthen the credibility of booking platforms and hotel businesses. Future research could explore AI-driven solutions for automated quality verification and fraud detection in hotel listings, ensuring a more reliable experience for travellers.

Classification and Detailed Uses of Indian Medicinal Leaves Using Deep Learning

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Abstract:

Classifying medicinal plants is super important in areas like botany, pharmacology, and even traditional medicine. And you know what? With the recent leaps in deep learning, we're now able to create automated systems that can identify and sort through medicinal leaves much more easily than before. So, this study dives into building a strong deep learning model specifically designed to classify Indian medicinal leaves, pulling from a dataset that includes 77 different species. We're tapping into using transfer learning with the Xception architecture and convolutional neural networks, and, which has already been trained on ImageNet. This helps us pull out the key features from the leaf images. Before we get into the nitty-gritty, we make sure to pre-process our dataset by the resizing the images to the 299x299 pixels and normalizing those pixel values so everything runs smoothly. To keep things fair and unbiased, the dataset is splits into train data, validation data, and the testing parts—80%, 10%, and 10%, respectively. While training, we also throw in some data augmentation and regularization techniques like dropout to help prevent overfitting and improve how well the model generalizes.

Keywords:

Medicinal Leaves, Deep Learning, Xception, Image Classification, Indian Medicinal Plants, Transfer Learning, Data Augmentation.

Twitter Bot Detection using XGBoost Ensemble Method

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Abstract:

The spread of automated Twitter accounts, or bots, has become a major challenge in platform integrity and preventing misinformation. Currently used machine learning-based techniques, such as Support Vector Machines (SVM), Random Forest (RF), Naïve Bayes (NB), Decision Trees (DT), and K-Nearest Neighbors (KNN), have been extensively employed to detect bots but tend to fall short in feature complexity and classification accuracy. In this research work, we present an optimized model for bot detection using Extreme Gradient Boosting (XGBoost), a solid ensemble learning model with high efficiency and better prediction capabilities. By employing a collection of labeled Twitter accounts, we derive rich sets of features incorporating user activities, tweet behaviors, and network dynamics. Experimental results show that XGBoost performs better than traditional classifiers in accuracy, precision, recall, and F1-score. The introduced method obtains a dramatic improvement in detection accuracy to 93%, efficiently separating human and bot accounts with fewer false positives. Further, the feature importance handling capacity of XGBoost and the data misbalancing make the model stronger. These results demonstrate the efficiency of gradient-boosting methods in social media bot detection and provide an efficient solution for real-time use.

Keywords:

Twitter bot detection, machine learning, XGBoost, ensemble learning, social media security.

Attendance Management Device with Face Recognition

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Abstract:

This paper presents an automated attendance management system utilizing face recognition technology, implemented using an ESP32-CAM module. The system captures real-time images of students, processes them using Python-based face recognition libraries, and matches the detected faces against a pre-registered student database. Attendance records are automatically logged in a CSV file and can be easily managed through a graphical user interface. The GUI, developed using Python, provides an intuitive platform for administrators to monitor and manage attendance records in real time. It displays student details, attendance logs, and timestamps, allowing for quick verification and manual adjustments if necessary. To enhance usability, the system is integrated into a standalone device built around the ESP32-CAM. This device features an embedded camera for image acquisition, Wi-Fi connectivity for seamless data transfer, and a compact enclosure for portability. A simple power source, such as a rechargeable battery or USB adapter, ensures continuous operation. The device communicates with a central server via HTTP requests, transmitting attendance data securely and efficiently.

Keywords:

Face Recognition, Esp32-Cam, Attendance Management, Csv, Opencv, Automation, Gui, Python.

Characteristic Study and Mechanical Properties of Reactive Powder Concrete by Using EMMA Software

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Abstract:

Reactive powder concrete (RPC) is a relatively new type of portland cement based material with compressive Strength between 200 and 800 MPa, elastic modulus between 50 and 75 GPa, and ductility with an ultimate elongation that could equal $7000 \times 10^{-6} \text{m/m}$. Development of an ultra-high strength ductile concrete designated RPC (Reactive Powder Concrete), was made possible by the application of a certain number of basic principles relating to the composition, mixing and post-set heat curing of the concrete. RPC 200, which can be used under job site conditions similar to those for conventional high performance concretes, can be used in the construction of prestressed structures incorporating no passive reinforcement.. Its use in concrete proportioning has helped in creating denser and stronger mixes. Numerous packing theories and models have evolved over the course of time to optimize the concrete. Out of which the Modified Andreassen curve has found its practical application in optimizing high-performance concrete. The main objective of the study was to study different particle packing theories and their effects on the mortar mixes and to design the most optimized material which gives the maximum strength. In this paper, the use of quartz sand and Modified Andreassen packing theory has been adopted for the concrete proportioning. This paper also deals with the changes in density and compressive strength in concrete after the application of the Modified Andreassen curve. The EMMA software whose algorithm is based on the Modified Andreassen curve is used for proportioning the concrete. The mix design focuses on achieving ultra-high performance. Mechanical Properties Testing: Compressive, flexural, and tensile strength tests are conducted to evaluate the mechanical performance of RPC, typically showing superior strength compared to conventional concrete. Microstructural Analysis: X-ray Diffraction (XRD) are used to study the material's microstructure, helping understand the hydration process and bond formation. Application & Performance Evaluation: RPC is applied in high-strength structural elements, bridges, and marine structures, with performance evaluation ensuring its suitability for load-bearing applications.

Automated Plant Care For Smart Gardens Using IoT

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Abstract:

The integration of IoT in agriculture and home gardening has revolutionized plant care by enabling real-time monitoring, automated watering, environmental sensing, and predictive nutrient management. Traditional methods often lead to inefficiencies such as overwatering, under-fertilization, and lack of real-time insights. This study presents an IoT-based Smart Garden System utilizing soil moisture sensors for precise watering, rain and wind sensors for adaptive irrigation, smoke detectors for fire prevention, and Wi-Fi-enabled microcontrollers for real-time data transmission. AI-driven nutrient management, weather prediction algorithms, and smart home integration further enhance automation and plant care. A mixed-method research approach, including field experiments and user surveys, was used to evaluate the system across various environments (indoor, outdoor, greenhouse). Outcome are a 40% decrease in work effort, 35% decrease in wastage of water usage, and 30% increase in the health of plants. This research is adding to smart farming and urban farming as it presents the ability of IoT to increase efficiency, lower wastage of resources, and enhance sustainability, with subsequent research aimed at developing capabilities of AI, enhancing home automation interoperability, and determining long-term impacts on plant health.

Keywords:

IoT, Smart Gardening, Automated Plant Care, Real-time Monitoring, Smart Home Integration, Sustainable Agriculture.

Diabetic Retinopathy Classification and Detection Using Coloured Images with Deep Learning Inspired Framework

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Abstract:

Diabetic Retinopathy (DR) is a condition caused by prolonged high blood sugar, leading to retinal damage and potential vision loss. This research develops an AI-driven system for automatic DR stage classification using Gaussian-filtered fundus images from the APTOS 2019 Blindness Detection dataset, resized to 224x224 pixels and categorized into five severity levels. Deep learning models, including VGG19, MobileNetV2, EfficientNetB0, and EfficientNetB4 with transfer learning, were employed. Feature extraction techniques like Singular Value Decomposition (SVD) and Principal Component Analysis (PCA) further improved model efficiency. The system achieved an average accuracy of 95%, with evaluations based on accuracy, sensitivity, specificity, and AUC-ROC. This study demonstrates the potential of deep learning to automate DR detection, enabling early diagnosis and improved outcomes for diabetic patients. The dataset and pretrained models were obtained from the APTOS 2019 Blindness Detection competition.

Keywords:

Diabetic Retinopathy, Deep Learning, CNN, VGG19, MobileNetV2, EfficientNetB0, EfficientNetB4, Gaussian-Filtered Images, SVD, PCA.

Fresh Fusion

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Abstract:

The demand for convenience in grocery shopping has surged in today's fast-paced world, yet consumers often struggle to access fresh, locally sourced produce while balancing their busy schedules. This study addresses the critical gap between local vendors and consumers, as existing grocery delivery services predominantly cater to large retailers, sidelining smaller suppliers.

This research proposes the development of Fresh Fusion, a grocery app designed to connect consumers directly with local vendors. The platform ensures the delivery of fresh, high-quality produce, empowering small businesses and enhancing local economies. By integrating technology with agriculture and commerce, Fresh Fusion aims to create a seamless ecosystem for sustainable, community-based shopping.

Key outcomes include fostering healthier eating habits, reducing the carbon footprint associated with long supply chains, and supporting small-scale vendors to compete in a digital economy. The app's potential to revolutionize food supply systems lies in its ability to bridge the gap between producers and consumers, paving the way for a resilient and sustainable future.

Health Harbinger : An Offline AI for First-Aid and Disease Symptoms Analysis

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Abstract:

Health Harbinger is an offline AI-based system enabling offline immediate medical care without the need for the internet. It developed using the Hugging Face's First-Aid-Instructions Dataset and Disease-Symptoms-Precautions Full dataset, fine-tuned Large Language Model (LLM), which offers first aid guidance and symptom analysis with the time. Designed for deployment on low-power edge devices such as Raspberry Pi, the system runs quantized AI models and operates at high efficiency to work in dense or emergency deployments with limited resources. Supports multilingual interaction, which can also be enriched with voice and camera modules to accurately identify heart attacks in real-time. It is therefore great to have in emergency situations, rural areas, or personal first aid kits. It arises high in reviews verifying the validity and reliability of it, demonstrating that it's able to provide connected, instant support. Health Harbinger illustrates the possibility of solutions to healthcare gaps by offline AI, allowing people to offer immediate and informed care until professional help can be found.

NeuroSecure ID: An EEG Based Biometric System

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Abstract:

Traditional biometric systems like fingerprint, facial recognition, iris, retina, and voice recognition have long been utilized for identification and authentication due to their unique, personal characteristics. These technologies provide several security benefits, ranging from controlling entry to device unlocking. However, they are not without some disadvantages, especially concerning misuse and ethical concerns. The possibility that these biometrics can be compelled to be used for identification without the subject's permission is one of the most urgent problems. In fact, traditional biometrics like fingerprints, irises, and retinas remain usable even after death, which raises serious concerns about privacy and security, as these identifiers can be exploited. This is where our proposed system comes in: an EEG based biometric system which evaluates the brain's electrical activity to determine identity. EEG uses electrodes applied to the scalp to record electrical impulses produced by brain neurons. And it cannot be forcefully used as the signals vary on different state and conditions, it cannot be forcefully verified.

Keywords:

EEG(Electroencephalography), Authentication, Machine learning.

Breath Easy: A Low-Cost Ventilator System with Oxygen Monitoring

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Abstract:

Conventional mechanical ventilators are not only costly, but they also tend to be out of reach for communities in rural and underprivileged areas. This lack of accessibility significantly restricts their ability to obtain crucial respiratory support, ultimately jeopardizing the lives of those in critical need of assistance. This paper explores the implementation of the "BREATH EASY" project, which addresses the urgent need for an affordable, efficient, and portable ventilator system with real-time oxygen monitoring, especially in low-resource healthcare settings. The proposed system aims to deliver cost-effective ventilation while ensuring optimal oxygen levels for critically ill patients through an integrated oxygen monitoring mechanism. This ventilator system is developed using open-source hardware and affordable components, balancing cost and performance without compromising quality. The system offers real-time monitoring of SpO₂ (oxygen saturation), pressure regulation, and an alarm system to notify healthcare providers about critical changes in patient conditions. It is lightweight, portable, and easy to use, making it an ideal choice for emergencies, field hospitals, and rural clinics. Extensive prototype testing and simulations have demonstrated the system's effectiveness in providing reliable respiratory support, maintaining stable oxygenation levels, and enhancing patient safety. By offering a budget-friendly and scalable solution, the BREATH EASY ventilator has the potential to greatly enhance access to critical care, alleviate ventilator shortages during pandemics and emergencies, and save lives in resource-limited settings.

Exploring the Potential of Wind-Powered Roof Ventilators for Sustainable Energy Solutions

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Abstract:

Innovative systems that effectively use renewable resources are becoming more and more necessary as the need for sustainable energy solutions rises. An Integrated Wind-Driven Ventilation and Energy Generation System is shown in this study, which uses roof ventilators to capture wind energy and produce power while preserving natural ventilation. A DC generator, which transforms mechanical energy into electrical energy, and a gear mechanism make up the system. Through the use of an inverter, the produced power may be used for AC loads after being stored in a battery via a charging circuit. This multifunctional strategy improves indoor air quality and energy efficiency, making it a practical option for commercial, residential, and industrial facilities. The research highlights the system's role in integrating renewable energy sources and providing eco-friendly building solutions while examining system performance, possible optimizations, and future improvements.

Keywords:

Renewable energy, wind-driven ventilation, power generation, DC generator, charging circuit, eco-friendly building solutions.

Detecting Parkinson's Disease with Voice Analysis and Machine Learning

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Abstract:

Parkinson's disease (PD) is a long-term neurological disorder state that will most likely go undetected in its initial stages because its symptoms are not very obvious. Initial identification is important for efficient management and treatment. This paper proposes a Parkinson's disease detection system using machine learning and voice analysis. The system evaluates 22 vocal features, like shimmer, jitter, and harmonic-to-noise ratio, of a 5-second voice sample. A Gradient Boosting Classifier achieved the maximum accuracy of 94.87% and AUC score of 0.9777. The system is developed with an easy-to-use web interface with Streamlit, real-time voice analysis, elaborate visualizations, and historical logging. This low-cost, non-invasive technique has the capability to transform early Parkinson's detection, especially among remote or underprivileged communities.

Keywords:

Parkinson's disease, voice analysis, machine learning, Gradient Boosting, early detection, telemedicine.

Computational Insights Into Process Optimization for Green Hydrogen Production Via Electrolysis: A MATLAB-Based Mini Review

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Abstract:

The production of green hydrogen from electrolysis is a clean energy source, however, the effort to optimize the relevant process performance and costs is still an area of great concern. The focus of this review is evaluating a range of MATLAB-assisted computing methods in the testing and optimization of electrolysis parameters such as electrolyte concentration, current density, voltage, and temperature. By taking advantage of the computing and simulation features offered by the `MATLAB` programming process, research labs can visualize and model electrochemical reactions associated with hydrogen production as to determining a potentially efficient operating environment. The most popular method used for optimization of multiple variables and objective conditions is genetic algorithms (GAs). Utilizing GAs a global optimum for operating variables can be identified, energy costs can be minimized, and hydrogen production can be maximized. Gradually, predictive models using neural networks (NNs) are becoming more common in forecasting hydrogen production performance under varying conditions. The use of MATLAB's Neural Network Toolbox allows for the design and training of NNs to forecast hydrogen production rates, furthering optimization capabilities for operational decision-making. Multi-objective optimization as another tabled optimization approach in MATLAB is focused on maximizing hydrogen yield with minimizing energy and environmental concerns. The electrolysis process is made more effective, economical, and flexible to renewable energy sources through the use of MATLAB's multi-objective optimization, neural network, and genetic algorithm techniques.

Keywords:

Green Hydrogen Production, Electrolysis, Optimization, MATLAB.

AI Conversational Experience for Automobile Buyers to Choose Right Choice of Car that Suits their Needs

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Abstract:

In the rapidly evolving digital era, the process of purchasing a car has significantly shifted from traditional dealership visits to online platforms. While this transformation offers consumers vast access to information, it also introduces challenges such as information overload, lack of personalization, and difficulty in comparing options effectively. To address these challenges, this project proposes an intelligent car recommendation chatbot that provides real-time, personalized suggestions and expert insights tailored to each user's unique preferences. Built using Langflow, a visual interface for constructing and managing workflows with Large Language Models (LLMs), the chatbot functions as a virtual car sales assistant capable of understanding user inputs and delivering contextually relevant responses. The system caters to a wide range of user-defined filters including budget, car type, brand preferences, seating capacity, fuel efficiency, regional availability, and specific driving needs. Key functionalities include personalized car recommendations, comparative analysis of car models, evaluation between new and used cars, region-specific insights, and real-time alerts on promotions and upcoming launches. Furthermore, the chatbot extends support to post-purchase services by offering basic diagnostics and suggesting nearby service centers or mechanics based on user location. The development process followed a structured methodology encompassing five primary phases: requirement analysis, system design, implementation, integration, and testing. The use of Langflow allowed for rapid prototyping by visually connecting nodes such as memory management, prompt templates, and external tool integrations, all without the burden of writing extensive boilerplate code. Each node in the Langflow pipeline is designed to perform specific tasks, ensuring modularity and scalability of the system. Testing was carried out using multiple user scenarios to assess the chatbot's performance, response accuracy, adaptability, and ability to manage multi-turn conversations. Integration with external APIs and curated datasets further enhanced the chatbot's real-time decision-making capabilities. By leveraging the reasoning power of LLMs and combining it with structured data and prompt engineering, the project demonstrates a practical application of generative AI in the automobile domain. This intelligent assistant not only simplifies the car-buying journey for users but also improves decision-making with expert-level recommendations. In conclusion, the chatbot redefines digital car sales interaction by offering an innovative, scalable, and highly personalized solution for navigating the complexities of automobile purchase.

DeepShrimp: Early and Precise Disease Detection in Shrimp Farming

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Abstract:

Aquaculture, especially shrimp farming, is a critical contributor to global food security but remains vulnerable to disease outbreaks that cause high mortality and severe economic losses. Traditional diagnostic methods are often slow, labor-intensive, and inaccurate. To address this, we propose *DeepShrimp*, an AI-driven system that combines deep learning and computer vision to enable early detection and classification of shrimp diseases. Utilizing the lightweight YOLO-N object detection algorithm, DeepShrimp accurately identifies four major conditions—White Spot Syndrome Virus (WSSV), Black Gill Disease, Black Spots, and Healthy Shrimp. The system integrates advanced image preprocessing, severity analysis, and cost impact evaluation to enhance prediction reliability and provide actionable insights. A real-time chatbot offers support for disease-related queries and aquaculture best practices. DeepShrimp automates the analysis pipeline and report generation, offering shrimp farmers a comprehensive, efficient, and scalable solution for proactive disease management and sustainable aquaculture.

Keywords:

Shrimp Disease Detection, YOLO-N, Deep Learning, Computer Vision, Object Detection.

Smart Meals An AI-Enabled iOS Application to Reduce Food Waste

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Abstract:

Food waste remains one of the most pressing challenges in India, with nearly 74 million tonnes of food discarded annually—accounting for around 22% of the country's foodgrain output. This research presents Smart Meals, a user-friendly iOS application designed to bridge the gap between food donors and recipients through an AI-powered chatbot and Firebase-backed infrastructure. The app offers real-time food donation listings, secure user authentication, and intelligent matching based on location and availability. Most importantly, the integrated AI chatbot ensures users—especially first time donors—receive instant assistance, guiding them through each step of the donation process. We explore how this solution not only enhances efficiency but also fosters a culture of giving and sustainability. A pilot test in urban areas reveals positive user engagement, ease of use, and early indicators of real impact on food redistribution. This paper outlines the system architecture, development methodology, and potential scalability of this AI-integrated donation platform. Powered by Firebase for real-time backend support and secure user authentication, and enhanced by an integrated AI chatbot, Smart Meals provides an intuitive and guided experience for all users—especially first-time donors. The chatbot handles frequently asked questions, explains the donation process, and reduces the friction commonly associated with altruistic participation. Through geolocation-based matching, the system ensures efficient delivery of surplus food within optimal time windows.

Keywords:

Food waste management, food donation, iOS app, Firebase Realtime Database, geolocation, SwiftUI, sustainability, hunger relief, community engagement, mobile application, AI chatbot, food waste.

Unmasking Fake Accounts in Social Networks with Machine Learning & NLP Approaches

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Abstract:

Social networking platforms have woven themselves into the daily lives of millions, providing spaces where individuals can create profiles and connect with others irrespective of geographical boundaries or time zones. While these platforms offer considerable benefits, they simultaneously present challenges related to user security and data privacy. One prominent concern is the proliferation of fraudulent profiles, which can serve as conduits for malicious activities, scams, and misinformation. To combat these threats, it is critical to classify user accounts into genuine and fake categories. Effective classification enables social networks to reduce risks and safeguard sensitive information. Historically, a variety of techniques have been employed to identify counterfeit profiles on these platforms. However, as fraudulent accounts become increasingly sophisticated, more precise detection methods are necessary. In this paper, we present an innovative approach that integrates (ML) and (NLP) techniques to refine traditional algorithms, specifically Support Vector Machine (SVM) and Naive Bayes. Our method examines user profile data, extracting both behavioural patterns and linguistic cues indicative of inauthentic accounts. By combining the strengths of ML and NLP, our proposed approach aims to substantially enhance the accuracy of fake profile detection, leading to more robust classification. The results of this research are expected to offer valuable insights for improving the security and reliability of social networking sites. This paper comprehensively details the methodology, experimental setup, and evaluation of the proposed techniques. Our extensive experiments validate our approach's remarkable effectiveness in real-world social network environments with high precision and efficiency. The system will be able to detect fraudulent profiles with a recall of 93.5% and a precision of 91.2%.

Keywords:

NLP, ML, Support vector Machine (SVM), Datasets, Social Network, Detecting fake accounts.

End-to-End Security in Full-Stack Freelancing Platforms: From JWT Auth to Payment Gateway

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Abstract:

This paper explores a robust security model tailored for contemporary full-stack freelancing platforms. Given the growing reliance on these platforms for managing confidential user information and financial operations, ensuring end-to-end security has become critical. The study introduces a comprehensive security framework encompassing JSON Web Token (JWT) authentication, encryption of sensitive data, secure API interactions, and the safe integration of payment gateways. Through systematic analysis and architectural design, the paper illustrates how these elements collectively strengthen the platform's defense mechanisms. The proposed approach serves as a practical guide for developers and system architects aiming to build secure and reliable freelancing ecosystems in an increasingly hostile cyber environment.

Keywords:

End-to-end security, JWT-based authentication, secure payment integration, API security, data protection, freelancing systems.

Student Performance Analysis with Machine Learning

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Abstract:

In today's educational landscape, data science and machine learning play a pivotal role in enhancing the quality of education. This project aims to leverage these technologies to analyze and predict student performance based on various factors. The primary objective is to provide educators, administrators, and policymakers with insights that can help improve the overall educational experience and outcomes. The project utilizes a diverse dataset containing information such as student demographics, socio-economic status, attendance records, study habits, and past academic performance. By employing machine learning algorithms, we aim to extract patterns and correlations within the data to develop predictive models for student performance. Key components of this project include data preprocessing, feature engineering, and model selection. We explore a range of machine learning algorithms, such as linear regression, decision trees, random forests, and gradient boosting, to determine which model best fits the data and provides accurate predictions. The outcomes of this project are multifaceted. Firstly, it allows educators to identify at-risk students early, enabling timely intervention and support to improve their academic performance. Secondly, it provides insights into the factors that most strongly influence student success, which can be used to inform educational policies and practices. Finally, the project promotes a data-driven approach to education, fostering the use of technology to enhance learning and teaching. Through this project, we demonstrate the power of data science and machine learning in the education sector and emphasize the importance of data-driven decision-making to enhance student performance and the overall quality of education.

Sign Language Recognition Using Deep Learning

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Abstract:

A speech impediment is a disability that impairs a person's ability to communicate verbally. One of the most structured languages is employed as a signal language to overcome this difficulty. In order to facilitate communication even in the event that someone is not proficient in sign language, it is practically necessary to have a method or program that can recognize motions in the language. This article goal is to bridge the gap between persons with disabilities, such as the deaf and dumb, and other people. The artwork provided on paper is an attempt (extension) to look at the problems in the Indian Sign Language (ISL) character class For this assessment, the person need to be capable of take pics of hand motions the use of a webcam, and the computer must expect and display the call of the picture that become taken. The obtained image goes via a numerous process, consisting of dilatation, mask operation, and conversion to grayscale, among other pc- imaginative and predictive techniques. The proposed version is trained the uses a Convolutional Neural Network (CNN) to discover the image. At completion, our model's accuracy is more than 95%.

Keywords:

ISL (Indian Sign Language), Deaf persons, hand gestures, machine learning, image processing, convolutional neural networks (CNNs).

Facial Recognition and Machine Learningbased Student Monitoring System in a Campus

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Abstract:

The Facial Recognition and Machine Learning-based Student Monitoring System is an innovative solution designed to automate the process of student attendance tracking and behavior monitoring in educational institutions. Traditional methods of recording attendance, such as manual roll calls or swipe card systems, are time-consuming, prone to errors, and can be manipulated.[1]

Our system addresses these issues by leveraging the power of facial recognition technology and machine learning algorithms to create a seamless, accurate, and efficient method of tracking student attendance and monitoring their behavior within a campus environment. Using state-of-the-art technologies such as Dlib for facial landmark detection, OpenCV for image processing, for combining facial recognition and real-time interaction, the system identifies students as they enter classrooms or other designated areas. The system captures their facial data, compares it against a pre-registered database, and automatically logs their attendance. This data is then stored securely in MongoDB, a cloud-based real-time database, allowing for instant access and retrieval by administrators, teachers, and even parents. The system also generates comprehensive attendance reports and visual representations of student presence, making it easier for administrators to track attendance patterns and spot irregularities. In addition to attendance, the system employs machine learning algorithms to analyze student behavior, identifying trends such as consistent late arrivals or absences. These insights can be used by teachers and administrators to address potential academic or personal issues. Notifications are automatically sent to students and their parents via email, promoting accountability and encouraging timely corrective action.

The Facial Recognition and Machine Learning-based Student Monitoring System not only minimizes the effort required for attendance tracking but also enhances the overall safety and security of the campus by ensuring that only authorized individuals are present[5].

By fostering a culture of accountability and providing valuable behavioral data, this system helps improve student engagement, reduces absenteeism, and contributes to the academic success of the institution. This technology-driven solution is a step forward in creating smarter, more efficient, and secure educational environments.[4].

Keywords:

Facial Recognition, Machine Learning, Student Monitoring, Attendance Tracking, Behavior Analysis, Dlib, OpenCV, MongoDB.

Classification of Skin Diseases Using CNN

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Abstract:

Skin diseases pose high challenges in the diagnostic process since they have multiple visual features and overlapping clinical presentation. In this paper, an efficient deep learning framework is presented for skin disease detection and classification using the DermNet dataset. Our approach optimizes the model's performance utilizing MobileNetV3 Small for its accuracy, computational complexity, and resource adaptability. Extensive pre-processing, data enhancement, and knowledge transfer strategies are employed in our proposed framework for improved performance of the model. Empirical observations show that not only does our system reduce the complexity of models but also provides competitive accuracy over more complex models. This research highlights the likely applicability of light-weighted neural networks within the context of medical imaging and proposes a practical solution for effective and fast skin disease detection within clinical environments.

Keywords:

Skin Disease Detection, DermNet Dataset, MobileNetV3 Small, Lightweight Deep Learning, Medical Imaging, Transfer Learning.

Mental Health Application

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Abstract:

The rising incidence of mental health issues, combined with the widespread accessibility of technology, has driven the creation of digital tools to promote mental wellbeing. This paper outlines the development of a mental health application designed to offer accessible, tailored, and scientifically validated support to users experiencing stress, anxiety, and related concerns.

Key features include mood monitoring, personalized advice, guided mindfulness practices, and real-time stress tracking via wearable devices.

A central focus of the app is data security and privacy, adhering to standards like GDPR and HIPAA through encryption and secure authentication processes. The design process prioritizes user-centered principles, incorporating insights from mental health experts and target users to inform feature development. The paper discusses the app's architecture, workflow, threat model, and security measures to protect sensitive information.

The app's features were assessed based on user feedback, evidence-based efficacy, technical feasibility, and regulatory compliance. Findings reveal its potential to provide impactful mental health support, enhance user engagement, and safeguard user data. This research underscores the critical role of integrating digital health tools with mental health interventions, offering valuable perspectives on the future of mental health applications.

Keywords:

Digital health, mental health app, mood monitoring, stress tracking, wearable technology, personalized interventions, mindfulness exercises, data privacy, GDPR compliance, HIPAA compliance, user-centered design, telehealth, mobile health, cognitive behavioral therapy (CBT), mobile app development, security frameworks.

A Comprehensive Analysis of Malware Family: A Survey

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Abstract:

This paper shines how malware detection and analysis expand and reveal how an attack are becoming more difficult and the security tools like IDS and Firewall are less effective. Today attackers inject special crafted malware that are capable of bypassing the security mechanisms. This study reviles different approaches that could be helpful in detecting the malicious activities. Like signature-based detection and other advanced techniques like static and dynamic analysis. It also discourse techniques like API calls, analyzing memory dumps, and examining behavior patterns. The literature review discloses enhancement in malware analysis concentrating on advanced and automated detection methods to encounter advanced threats. At the end this paper reviles major malware attacks and focusing the upgradation in detection methods such that to avoid new risk.

Keywords:

Malware, Review, signature detection, Attacks.

Node Deployment In Under Water Sensor Networks Using Machine Learning and Deep Learning

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Abstract:

Underwater Sensor Networks (UWSNs) are crucial for applications such as oceanographic data acquisition, environmental monitoring, disaster mitigation, and military surveillance. The efficiency and reliability of UWSN are primarily contingent upon optimal node placement techniques, which significantly affect network coverage, connectivity, and energy consumption. Unlike terrestrial sensor networks, UWSNs face various challenges such as limited bandwidth, high propagation delay, dynamic topology due to water currents, and energy constraints. This study offers an exhaustive examination of diverse node deployment strategies in Underwater Wireless Sensor Networks (UWSNs) and assesses their efficacy through machine learning models, such as Convolutional Neural Networks (CNN), Fully Connected Neural Networks (FCNN), Long Short-Term Memory (LSTM), and Extreme Gradient Boosting (XGBoost). The performance of these models is assessed based on mean absolute error (MAE) and R^2 score, offering insights into their applicability for optimizing node placement in underwater environments.

Early Stage Disease Detection Through Finger Nail Image Using Deep Learning

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Abstract:

Diseases often lead to visible changes in fingernails, including color changes, texture, or even shape, and can help in the early diagnosis of diseases like kidney disease, melanoma, and anemia. This paper works on machine learning (ML) and deep learning (DL) approaches to detect disease using images of fingernails. A dataset is prepared and divided into 80% training and 20% testing, and two models, CNN and ResNet-50, are evaluated. The CNN model had 89% accuracy, outperforming in the case of healthy nails and kidney disease but was poor with melanoma, whereas ResNet-50 had an accuracy of 54%, with very poor performance on rare cases like melanoma. These results indicate that although CNN is very good at extracting relevant features, there are still some issues that need to be addressed regarding class imbalances and underrepresented categories in both models. Future work should focus on data augmentation, class-weighted loss functions, and fine-tuning to enhance accuracy and reliability. This research underscores the potential of ML and DL for non-invasive, early disease detection, offering valuable insights for improving healthcare diagnostics.

Keywords:

CNN, Resnet-50, disease detection, finger nail.

Enhancing Lunar Surface Imagery from Chandrayaan Missions using Super-Resolution Techniques

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Abstract:

High-resolution imagery is crucial for detailed scientific analysis and planning future exploration missions on the lunar surface. ISRO's Chandrayaan missions provide valuable data through instruments like the Terrain Mapping Camera (TMC) and the Orbiter High-Resolution Camera (OHRC). While TMC offers wide coverage (approx. 90% of the surface) at a moderate resolution (5m/pixel), OHRC provides exceptionally high-resolution images (25cm/pixel) but covers a much smaller area (approx. 5%). This work addresses the challenge of obtaining high-resolution detail over broader lunar regions by enhancing TMC images using deep learning-based superresolution. We leverage overlapping OHRC data as ground truth to train and evaluate selected architectures, including a Super-Resolution Generative Adversarial Network (SRGAN), an

Enhanced Deep Super-Resolution network (EDSR), and a Vision Transformer adapted for Super-Resolution (ViT-SR), comparing them against traditional BiCubic interpolation. Our experiments demonstrate the utility of these deep learning techniques in improving TMC image resolution. SRGAN yielded the highest quantitative performance in our tests, achieving an average SSIM of 0.610 and PSNR of 13.40 dB on the test dataset, representing a clear improvement over the baseline and other tested models. This study highlights the potential of applying diverse deep learning super-resolution models to Chandrayaan data for generating enhanced lunar datasets, supporting detailed geological studies and future mission planning.

Keywords:

Super-Resolution, Lunar Surface, Chandrayaan, TMC, OHRC, SRGAN, EDSR, Vision Transformer, ViT-SR, Deep Learning, Image Enhancement, Remote Sensing, SSIM, PSNR, Generative Adversarial Networks, Convolutional Neural Networks.

Model-Driven Software Engineering: Automated model-based development

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Abstract:

Model-Driven Software Engineering (MDSE) has emerged as a transformative paradigm in software development, focusing on creating high-level abstract models that are systematically transformed into executable systems. This approach addresses challenges associated with traditional code-centric methods, including scalability, error reduction, and development efficiency. MDSE emphasizes automation through model transformation and runtime adaptability, significantly reducing development costs and bridging the gap between problem domains and implementation. This research explores the integration of MDSE methodologies with Agile practices to enhance stakeholder collaboration and ensure iterative progress.

Keywords:

Model-Driven Software Engineering, Automated Model-Based Development, Model Transformation, Agile Practices, Runtime Modeling, Software Automation, Domain-Specific Languages.

XAI Heart Disease Prediction

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Abstract:

This project presents a lightweight and interactive web application designed to predict the likelihood of heart disease using clinical parameters. Built using Streamlit, the application leverages a machine learning classification model trained on the widely used Cleveland Heart Disease dataset. To enhance model transparency and trustworthiness, SHAP (SHapley Additive exPlanations) has been integrated, providing users with clear and intuitive visual insights into how each input feature contributes to the prediction. The aim is to create a tool that is not only accurate but also interpretable, helping both developers and potential users understand the logic behind each outcome. The project emphasizes accessibility, explainability, and the practical application of machine learning in the healthcare domain.

Keywords:

"Heart disease prediction", "SHAP", "Streamlit", "Machine learning", "Explainable AI".

Quokka-Inspired Optimization Algorithm for Efficient VM Migration in Edge Computing

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Abstract:

Edge computing works on the data near the source and uses less bandwidth while taking less time to process. However, efficient migration of Virtual Machine (VM) faces various obstacles owing to resource constraints, dynamic load, and mobility on the edge. Since the VM migration enables the running workloads shifted from one physical server to another, resource management is enhanced, response time is lowered and performance enhanced. In this paper, we propose the Quokka-Inspired Optimization Algorithm (QOA), a bio-inspired technique to solve the VM migration problem in edge computing. The quokka is selected as the model for QOA because of this kind of highly adaptive and resource-efficient existence in rather severe conditions. Like quokkas who have to adapt different behaviours to ensure proper functioning with few resources, QOA optimizes workload, energy utilization, migration cost, and provides for high resource provision. The algorithm controls adaptation of the migration process based on system characteristics dependent on load, resource profile, and energy usage. Furthermore, it employs exploration and exploitation approaches different from those suggested by a neighbouring solution to escape local optima and identify proper migration schemes. Results based on standard tests indicate that QOA achieves convergence that is better than prior

techniques and shows scalability, which translates into higher system effectiveness. This characteristic enables it to be suitable for real-time applications along the edge of the computing environment. The performance of the VM migration strategy based on Quokka-Inspired Optimization is evaluated in terms of energy consumption, resource availability, migration cost, and load. The proposed Quokka method achieves the minimal migration cost of 0.0599, the minimal energy consumption of 0.4832, maximal resource availability of 0.8107 and the minimal load of 0.0041. Cost, load, and energy have been presented as being managed efficiently by QOA, thus enabling resource-demanding edge settings to be served effectively.

Keywords:

Resource availability, Virtual machine migration, Cloud systems, Edge computing, Quokka optimization algorithm.

Wireframing the Requirements Elicited for Optimal Requirements Clarity

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Abstract:

As per industry standards, the software defect removal cost in System Qualification Testing is 15 times more than that in Requirements phase. Controlling the escaped defects in requirement phase plays crucial role in reducing the Cost of Quality. Average defects detected escaped from requirement phase is 35%. There is a need to limit the escaped defects to less than 10%. This paper explores how wireframing contributes to reducing defects in software requirements. It identifies the challenges of requirement defects, demonstrates the role of wireframing in mitigating these issues and highlights the benefits of this approach in improving communication, clarity, and overall project outcomes. Requirements are converted into wireframes for optimal requirements clarity and to reduce the escaped defects to the subsequent phases of software development life cycle.

Keywords:

Wireframe, Requirement Defects, Process Improvement, Requirement Elicitation, Prototyping.

Optimization of Friction Stir Processing Parameters for Aluminium Alloy 6061 with Chromium Particles

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Abstract:

This study investigates the enhancement of Aluminium Alloy 6061 (AA6061) through chromium-reinforced Friction Stir Processing (FSP) to address its limitations in wear resistance while maintaining its excellent strength-to-weight ratio and corrosion resistance. The research systematically examines how chromium particle integration via FSP affects the alloy's microstructure, mechanical properties, and tribological performance. Using optimized FSP parameters, chromium particles were successfully incorporated into the AA6061 matrix, resulting in significant microstructural refinement through dynamic recrystallization. Comprehensive material characterization revealed a uniform distribution of chromium particles and the formation of beneficial intermetallic phases. Mechanical testing demonstrated substantial improvements, with hardness increasing by 30-40% and tensile strength enhancing by 20-25% compared to untreated AA6061, while maintaining acceptable ductility levels. Tribological evaluation under varying load conditions showed remarkable wear resistance improvement, with wear rates reduced by 50-60% in high-load scenarios. This enhancement is attributed to chromium's inherent hardness, its role in forming a protective oxide layer, and the refined grain structure achieved through FSP. The study further explores the relationship between processing parameters, chromium concentration, and resulting properties, establishing optimal conditions for maximum performance enhancement. These findings have significant implications for industries requiring durable aluminium components, particularly in aerospace for structural parts, automotive for engine components, and marine applications for corrosion- and wear-resistant elements. The research demonstrates that chromium-reinforced FSP offers a practical and effective method to upgrade AA6061's performance in demanding environments, providing a foundation for future work on hybrid reinforcement systems and industrial-scale implementation of this surface modification technique.

“Emerging Trends in Plant Disease Detection: A Survey on Machine Learning and Deep Learning Applications”

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Abstract:

Plants play a crucial role in global food production, but environmental stressors often lead to diseases that threaten agricultural yields. Conventional manual identification of plant diseases is time-consuming, error-prone, and inconsistent, limiting effective prevention. To address this, Machine Learning (ML) and Deep Learning (DL) technologies have emerged as transformative tools for early and accurate disease detection.

This research synthesizes advancements in ML/DL applications for plant disease identification from studies published between 2015 and 2024. Findings highlight improved detection accuracy and operational efficiency through these methods. For instance, experiments cited in the file demonstrate how DL models like convolutional neural networks (CNNs) can analyze plant images to diagnose diseases with high precision.

However, challenges persist, including limited availability of diverse datasets (e.g., region-specific plant images), variability in image quality due to lighting or resolution, and difficulties in distinguishing subtle differences between healthy and diseased plants. The study also proposes solutions, such as crowdsourcing datasets and enhancing image preprocessing techniques, to overcome these barriers.

By addressing these limitations, the research aims to guide agricultural scientists, practitioners, and technology developers in refining ML/DL tools for scalable, real-world implementation. This underscores the need for ongoing innovation to balance the benefits of automated detection with practical constraints.

Diabetes Prediction using Machine Learning

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Abstract:

Diabetes is a chronic disease with the potential to cause a worldwide health care crisis. According to International Diabetes Federation 382 million people are living with diabetes across the whole world. By 2035, this will be doubled as 592 million. Diabetes is a disease caused due to the increase level of blood glucose. This high blood glucose produces the symptoms of frequent urination, increased thirst, and increased hunger. Diabetes is a one of the leading cause of blindness, kidney failure, amputations, heart failure and stroke. When we eat, our body turns food into sugars, or glucose. At that point, our pancreas is supposed to release insulin. Insulin serves as a key to open our cells, to allow the glucose to enter and allow us to use the glucose for energy. But with diabetes, this system does not work. Type 1 and type 2 diabetes are the most common forms of the disease, but there are also other kinds, such as gestational diabetes, which occurs during pregnancy, as well as other forms. Machine learning is an emerging scientific field in data science dealing with the ways in which machines learn from experience. The aim of this project is to develop a system which can perform early prediction of diabetes for a patient with a higher accuracy by combining the results of different machine learning techniques. The algorithms like K nearest neighbour, Logistic Regression, Random forest, Support vector machine and Decision tree are used. The accuracy of the model using each of the algorithms is calculated. Then the one with a good accuracy is taken as the model for predicting the diabetes.

Keywords:

Machine Learning, Diabetes, Decision tree, K nearest neighbour, Logistic Regression, Support vector Machine, Accuracy, support vector classifire.

Object Detection in Autonomous Vehicles: Leveraging YOLO and Faster R-CNN for Real-time Applications”

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Abstract:

Object detection is one of the backbone technologies in autonomous vehicle that helps them to perceive objects around/closely by detecting pedestrians, vehicles & traffic signals etc. Aim of this study is to calculate the efficiency and probability on both state of the art deep learning models i.e YOLO (You Only Look Once) and Faster R-CNN for real-time applications. Faster R-CNN is well known for the high detection accuracy but uses a lot of computation time, not the best to be real-time. In contrast to that, YOLOv3 and YOLOv5 are fast in terms of speed which means that they cap real-time detection with slight decrease in xaxis accuracy. The evaluation of the model performance under different driving conditions is conducted using KITTI dataset in the research. However real-time applications (e.g. YOLO) are preferable while accuracy becoming critical (Faster R-CNN) for a number of tasks. This contrasting study demonstrates the promise of semi-integrated models combining both speed and accuracy, as they can be used in perception of autonomous vehicle.

Keywords:

Autonomous vehicles, Object detection, YOLO, Faster R-CNN, Deep learning, Real-time applications, KITTI dataset, Computer vision, AI-driven mobility.

Application of Regenerative Braking System in Power Generation at Low Level

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Abstract:

This paper presents application of regenerative braking system in power generation at low level, in recent years, there is the lack of reliable alternative energy sources, increasing efficiency and reducing exhaust gas emissions has become the focus of the modern automotive research. Commercial vehicles such as refuse trucks and delivery vehicles lose a tremendous amount of kinetic energy during frequent braking and constant drive at low speeds on designated city routes, which results in higher fuel consumption and Green House Emission Gas (GHG) emission than other on-road vehicles. Numerous attempts have been made to improve type of vehicles. The technological combination of Exhaust Gas Recirculation (EGR) and Diesel Particulate Filter (DPF) after treatment is one of the effective ways to solve the vehicle emission, especially for NO_x and soot. However, this method is not able to reduce the GHG emission since the low temperature combustion of this technology results in increasing the fuel penalty. Sacrificing engine efficiency in exchange for reduced pollutants cannot fundamentally solve the energy crisis. In order to achieve overall GHG reduction targets, a strong reduction is needed particularly for commercial vehicles.

Keywords:

Braking System, Regeneration, Power System, Dc Motor.

Multi-Model CNN Ensemble for Classifying Knee Osteoarthritis Severity Levels Using X-ray Imaging

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Abstract:

Knee Osteoarthritis (KOA) is a common leg joint symptom that causes joint pain and limits movement, particularly in older adults, affecting their quality of life. Early recognition is important to prevent further progression, yet current methods face accuracy challenges and rely on time taking process inorder to extract the features manually, which can lead to errors. The aim is to automate the system based on ensemble of deep learning models such as EfficientNetB3, HRNet32, and ConvNeXt to automatically identify useful high-level features from X-rays and to differentiate KOA severity levels into 0, 1, 2, 3 and 4. EfficientNetB3 is used for capturing the fine-grained details, HRNet32 maintains spatial information vital in structural analysis, and ConvNeXt improves feature extraction with these state-of-the-art convolutional architectures. The ensemble approach improves classification accuracy, achieving 94.00% test accuracy with outperforming individual models. The model performance can be impacted based on the dataset quality for affecting the reliability of feature extraction and classification. However, by exploiting multiple architectures, the ensemble model enhances robustness against image inconsistencies and the system can ensure a quicker productivity, more precise, and uniform detection. This approach can help in improving the diagnostic process, facilitate early KOA detection, prompt interventions and better patient outcomes and also enable enhanced treatment planning and monitoring of disease progression.

Keywords:

Knee Osteoarthritis (KOA), Deep Learning, Convolutional Neural Networks (CNN), Ensemble Model, X-ray Imaging, EfficientNetB3, HRNet32, ConvNeXt, Severity Classification.

Design and Development of Enzymatic Fuel Cell

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Abstract:

Enzymatic Fuel Cells (EFCs) use biocatalysts to transform chemical energy into electrical energy, providing a sustainable energy generation solution. Selecting the right enzymes, such as laccase, alcohol dehydrogenase, and glucose oxidase, is essential for maximizing stability, substrate specificity, and catalytic efficiency. Improvements in electron transfer efficiency through nanostructuring, enzyme immobilization, and electrode design are necessary to boost EFC performance. Temperature control, enzyme concentration, redox mediator optimization, and pH regulation are important factors that affect efficiency. As a viable substitute for traditional fuel cell technologies for sustainable power generation, EFCs will continue to improve with additional research in enzyme discovery and electrode engineering.

Keywords:

Enzymatic Fuel Cell, Bio-catalysts, Protein Binding, Glucose Oxidase.

AI-Driven Personal Entrepreneurship Coach for Students

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Abstract:

The AI-Driven Personal Entrepreneurship Coach for Students is an innovative platform designed to empower students with the skills, knowledge, and mindset necessary to succeed as entrepreneurs. This project leverages artificial intelligence to provide personalized, interactive learning experiences that guide students through the various stages of building and growing a business. The platform offers dynamic business simulations, personalized curriculum, real-time feedback, and virtual startup incubators, enabling students to gain practical experience without the risks associated with real-world failure.

Students can engage in hands-on learning through business challenges, decision-making scenarios, and AI-powered market insights, all tailored to their individual progress. The platform also features investor simulation tools, helping students practice pitching ideas and receive feedback on their business models. With AI-driven matchmaking, students can connect with mentors and potential collaborators to enhance their entrepreneurial journey. Additionally, gamified entrepreneurship challenges and competitions motivate students to actively participate and improve their business acumen. By combining entrepreneurship education with real-world simulations, the AI-Driven Personal Entrepreneurship Coach provides an interactive, scalable, and accessible approach to entrepreneurial development, helping students transform their ideas into viable business solutions.

Progressive Encryption Framework for Low-Latency Healthcare Sensor Data Protection

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Abstract:

This paper introduces a novel approach to protecting sensitive healthcare sensor data that prioritizes robust security while simultaneously addressing the critical challenges of latency and network efficiency. Our proposed Progressive Encryption Framework (PEF) establishes multiple security layers through a sophisticated strategy including: (1) risk-calibrated tiered encryption with hospital-grade protection for critical data, (2) security-focused edge processing that minimizes data exposure, (3) secure homomorphic computation capabilities that protect data even during analysis, and (4) integrity-preserving healthcare-specific compression techniques. Security analysis and theoretical validation suggest that PEF can achieve transmission latency reduction and network bandwidth savings. This security-first framework establishes a foundation for next-generation healthcare IoT protection systems with multiple security enhancement pathways designed to adapt to evolving threat landscapes while optimizing performance parameters.

Marine Pollution and Control Techniques

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Abstract:

Aquatic life, human health, and marine ecosystems are all at risk due to marine pollution, which has become a major environmental issue. This paper presents a summary of state-of-the-art techniques for detecting and mitigating marine pollution. Using remote sensing, satellite imaging, underwater sensors, and AI-based data analysis, the study explores real-time pollution monitoring. The use of machine learning algorithms makes it possible to identify pollution types, sources, and spread patterns with extreme accuracy. The study highlights innovative control techniques like intelligent filtration systems, bioremediation, and self-governing marine drones for cleaning and surveillance. By combining environmental science and modern technology, the proposed approaches offer a comprehensive framework for managing and preventing marine pollution in a sustainable way. Human health, biodiversity, and marine ecosystems are all seriously threatened by marine pollution, which is brought on by plastics, chemicals, oil spills, and nutrient runoffs. International cooperation is therefore desperately needed to lessen and control its effects using innovative management strategies and sustainable policies.

With a focus on sustainable solutions to safeguard marine ecosystems and human health, the paper highlights cutting-edge technologies like artificial intelligence (AI) and remote sensing for detecting and mitigating marine pollution.

Physical and Structural Characterization of Zinc Alkali Strontium Borate Glasses

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Abstract:

Zinc activated strontium borate glasses with composition $x\text{ZnO} - 10\text{SrO} - 20\text{Na}_2\text{O} - (70-x)\text{B}_2\text{O}_3$ ($x = 0, 3, 6, 9$ mol%) have been synthesized for examination of their physical and structural characteristics. Employing analytical grade chemicals, the glass samples were prepared using the conventional melt-quenching method at 1250°C in an alumina crucible and subsequently annealed at 400°C. Density, considered as one of the most influential parameters for gauging the change in the structure of the glass, was calculated using Archimedes principle using Benzene as immersion liquid. A comprehensive analysis of additional important physical parameters namely, average molecular weight, molar volume, and average boron-boron separation, have also been conducted. An increase in the values of the density and decrease in molar volume values was observed as the content of ZnO in the glass matrix was increased. The lack of the sharp peaks, and the broad humps in the X-Ray Diffraction (XRD) spectra confirmed the amorphous nature of the synthesized glasses. The results derived from these methodologies were consistent and are compatible with the established literature.

Next-Generation Firewalls: Evolution, Comparative Insights, and AI-Driven Adaptive Cyber Defence Systems

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Abstract:

Firewalls have been the front line of defense in network security for decades, constantly evolving to stay ahead of emerging threats. This report examines how firewalls have progressed from simple filters to more intelligent ones such as Next-Generation Firewalls (NGFW) and Unified Threat Management (UTM), which integrate several security functions into a single entity. We compare their pros and cons to determine what works best in the current cyber environment. However, as cyberattacks become increasingly sophisticated, old-fashioned methods aren't always sufficient. Then AI-driven security (AIACDS) enters the picture. Unlike antiquated systems, AI-ACDS can recognize threats in real time, respond to new dangers, and even automate countermeasures, allowing it to move faster and more effectively against contemporary hackers. This study illustrates why AI-driven security is increasingly necessary, providing greater protection than conventional firewalls while keeping pace with the speed and sophistication of today's cyber threats.

Keywords:

Firewall, NGFWs, UTM, AI-ACDS.

Medi-Scan: AI-Powered Diagnosis for Pneumonia, Kidney Stones, Bone Fractures, and Brain Tumors

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Abstract:

This project is about how we built an app using artificial intelligence for diagnosing medical conditions examined by images like scans and x-rays. In the app, we use a special kind of artificial intelligence called deep learning, where it is trained to recognize patterns in images using many samples. In this project we have gathered thousands of images regarding medical conditions such as bone fractures, pneumonia, kidney stones, and brain tumors. Then we cleaned up the images by noise data, organizing their size properly and enhancing their variations. This helps the AI model to focus on important details. Later we train our deep learning model on the prepared images. the model to detect the patterns of the medical conditions for the particular images given. later tested the model, providing new images to verify the accuracy and reliability. The outcome of the AI model was able to detect the conditions accurately, which can help the people to make decisions quickly. The app is designed to be user-friendly and secure. The app allows users to choose their medical condition and allows them to upload images and give clear and accurate reports, which helps them to reduce delays in treatment, prevent misdiagnosis, and reduce healthcare costs. Overall, it offers fast and accurate care, is an alternative to traditional methods, and supports patients by providing better health care.

Keywords:

Medical diagnosis, open-cv, Tensor flow, Deep learning, Artificial Intelligence.

Identification of Encryption Algorithms Using Deep Learning Techniques

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Abstract:

The paper proposes a deep learning framework for encryption algorithm identification from ciphertext. The framework employs a hybrid model consisting of Convolutional Neural Networks (CNNs) and Bidirectional Long Short-Term Memory (BiLSTM) networks, supplemented with an attention mechanism to identify both local and sequential dependencies. The model is trained on a diverse dataset with ciphertext samples encrypted using AES, RC4, RSA, Blowfish, and Twofish algorithms. To handle class imbalance, the system uses SMOTE (Synthetic Minority Over-sampling Technique) for better detection accuracy for less prevalent ciphers. The architecture is equipped with character-level tokenization, global max pooling, and layer normalization to improve feature extraction and generalization. Besides, class-weight training focuses more on learning hard ciphers like Blowfish and Twofish, which tend to be difficult to detect. The iterative and multi-layered analysis greatly improves the ability of the model to identify various encryption schemes, with the advantage of a significant cryptanalysis and cybersecurity tool.

Analyzing Factors Affecting the Viewer Favoritism Towards Indian Premier League Team

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Abstract:

One of the most well-known T20 cricket events in the country, the Indian Premier League (IPL) continues to rise in popularity. The league was established in 2007 by the Board of Control for Cricket in India (BCCI), and it continues to evolve to be a major economic and sporting event. Despite large expenditures on player contracts and marketing, there is an absence of comprehensive research on the main factors that influence fan loyalty and preferences. To determine the causes of fan favouritism along with its effects, further research is necessary. To identify those variables that affect fan preference, we apply social network analysis, or SNA. The 15 significant elements that our analysis first identified were ultimately narrowed down to 8 components, each of which had a distinctive impact. We categorize these elements into three categories based on the SNA: very, moderately, and least influential. Celebrity influence, rivalry matches, legacy influence, social media influence, and regional bias are examples of elements that have a moderate amount of influence. The least significant factors are past performance, the IPL Auction effect, and loyalty shifting. Researchers may better understand the factors affecting Indian Premier League viewer preference with the use of our findings.

Keywords:

Indian Premier League, T20 Cricket, Fan Preference, Cricket, IPL.

Smart Home Integration Web Application

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Abstract:

The Development of a Home Interior Website Leveraging Modern Web Technologies to Create an engaging, user-friendly platform for showcasing interior design portfolios and connecting clients with designers. The website is developed using the Vite framework with React for the frontend, ensuring fast rendering and a responsive user experience. The backend is powered by Express.js and Node.js, providing robust server-side functionality and efficient handling of API requests. MongoDB is utilized as the database to store dynamic content, offering flexibility and scalability. Additionally, Tailwind CSS is employed for styling, enabling rapid development of aesthetically pleasing and consistent user interfaces. This combination of technologies ensures a seamless, high-performance web application that meets the needs of both interior designers and clients, offering features such as project galleries, user authentication, and an admin dashboard.

Keywords:

Home interior, website development, React, Vite, Express.js, Node.js, MongoDB.

Optimized Grid-Based Topology Control in Supernode-Driven Wireless Sensor Networks

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Abstract:

Topological control of wireless sensor networks should be efficient enough to achieve optimal data transmission capacity and proper usage of network resources. Many algorithms, such as the k-ATC scheme, MDP schemes, fuzzy clustering techniques, and sensor active-sleep cycle schemes, have been proposed in the literature. This work proposes a novel two-level architecture for sensor networks and a circumscribed grid approach for node deployment. The suggested algorithm integrates supernodes and wireless sensor nodes in a grid-based topology, using k-disjoint paths to provide k-connectivity within the network. The method guarantees that every sensor node is connected, covered with neighboring nodes and smart supernodes thereby enhancing fault tolerance. The algorithm also enable users to personalize and optimize the network topology for better network performance and less resource usage.

Keywords:

S upernodes, topology control, k-disjoint paths, fault tolerance, inscribed, circumscribed, grid deployment.

Studies on viability of Tea waste as a sustainable resource for caffeine extraction

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Abstract:

This research paper explores the potential utilization of tea waste, a byproduct of the tea industry, for the extraction of caffeine and other valuable compounds. With the increasing global consumption of tea, significant amounts of waste are generated, which are often disposed of improperly, leading to environmental and health concerns. The study investigates the chemical composition of tea waste, which primarily consists of lignocellulosic biomass, proteins, and alkaloids, including caffeine. Various extraction methods, particularly liquid-liquid extraction using solvents such as dichloromethane, acetone, and ethanol, were employed to isolate caffeine from waste tea. The results indicate that the dichloromethane/sodium carbonate combination is the most effective in extracting caffeine, outperforming other solvent and base combinations. Additionally, the research highlights that coffee waste contains higher caffeine levels compared to waste from black and green tea. The findings suggest that tea waste can be a valuable resource for extracting caffeine, contributing to waste reduction and promoting sustainable practices in the agricultural sector.

Water Quality and Disease Prediction System for Aquaculture

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Abstract:

This paper presents an IoT-driven real-time water quality monitoring and disease prediction system for aquaculture, integrating MATLAB-based machine learning models to ensure optimal aquatic health. The system employs NodeMCU (ESP8266) as the central controller, interfacing with pH, turbidity, DHT11 (humidity and temperature), and DS18B20 (temperature) sensors to continuously collect water quality data. This data is transmitted to the ThingSpeak cloud for remote access and real-time monitoring. Additionally, a Local Database (Local DB) is implemented to store machine learning models and MATLAB scripts for on-device execution, enhancing system autonomy.

The disease prediction framework utilizes Naïve Bayes and K-Nearest Neighbors (KNN) algorithms to classify water quality conditions and detect early signs of aquatic diseases. Data preprocessing techniques such as normalization, outlier removal, and feature extraction improve prediction accuracy, while weather data integration accounts for environmental influences on water parameters. A custom-designed water sampling tank prevents sensor degradation due to algae accumulation, ensuring long-term measurement reliability. MATLAB processes the acquired sensor data, executes the prediction models, and transmits real-time alerts to the ThingSpeak dashboard, enabling proactive intervention.

By combining IoT, machine learning, and cloud- based analytics, this system provides a cost-effective, scalable, and energy-efficient solution for automated water quality management and disease prevention. The integration of real-time alerts, adaptive learning models, and IoT-driven monitoring offers a transformative approach to sustainable aquaculture, reducing manual intervention while improving fish health and farm productivity.

Keywords:

Water Quality Monitoring, Disease Prediction, Machine Learning, Aquaculture, MATLAB, ThingSpeak, Naïve Bayes, KNN, NodeMCU.

Multiple Disease Prediction Based on User Symptoms Using MI & DI

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Abstract:

The project titled work "Multiple Disease Prediction Based on User Symptoms Using Machine Learning and Deep Learning" is undertaken with vision of creating an easily accessible system capable of forecasting the probability of having specific diseases according to data inputs provided by the users or uploaded medical images. The four priority health alignments included in the proposed system are lung cancer, heart disease, diabetes and liver disease. For diabetes, Liver disease, and heart disease we utilized random forest algorithm which done a fine job for analyzing structured data such as test results or symptoms to provide great and good predictions. In the case of lung cancer, we employed Alex net which is deep learning model specifically trained to study X ray images and detect the presence of the disease. User experience- Oriented, the system has separate modules for every condition. Users can simply input their symptoms or upload data, Like X ray images, and get timely and reliable predictions. we can make the most of the latest machine learning and deep learning technologies to get better results, this project showcases how technology can greatly improve healthcare diagnosis and complement timely medical invention.

Keywords:

Machine Learning, Deep Learning, Python Flask, Symptom-based Diagnosis, Medical Image Analysis, X-ray Classification, Healthcare AI, Disease Detection System, Predictive Healthcare, Real-time Disease Prediction, Health Informatics, Medical Data Processing.

Multi-Lingual Text Summarizer Using Generative AI

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Abstract:

As digital information continues to expand, the need for efficient multilingual text summarization has become increasingly important, particularly in a diverse linguistic landscape like India. This research explores the development of generative AI-based summarization models for widely spoken Indian languages, including Hindi, Bengali, Tamil, Telugu, and Marathi. Traditional extractive methods often struggle to preserve semantic depth and contextual accuracy, making them less effective for complex linguistic structures. To overcome these challenges, we implement transformer-based generative models fine-tuned for Indian language processing. Our approach incorporates pre-trained language models, cross-lingual embeddings, and transfer learning, utilizing the Hugging Face API to generate summaries that are both coherent and contextually relevant. We are using BLEU, ROUGE, and human metrics assessments and comparing the results with the existing summarization techniques for evaluating the performance resulting in notable highlights in improvements in fluency, accuracy, and readability demonstrating the potential of generative AI in enhancing multilingual content accessibility.

Keywords:

Generative AI, hugging face API, multilingual, summarization.

Effect of Alkali Treatment on the Properties of PALF/Coir Epoxy Hybrid Composites

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Abstract:

Natural fiber reinforced composites are in huge demand as they offer the best alternatives for the existing plastic due to their lightweight, ease of availability, high strength, and biodegradability. Natural fibers utilized in this study are readily available and reasonably priced. This study considers epoxy resin as a matrix material, whereas coir and pineapple leaf fibers (PALF) are regarded as reinforced materials. The mechanical characteristics of hybrid epoxy composites reinforced with 10% alkali-treated PALF/Coir fiber are examined in this work. Fiber-matrix adhesion is increased by the alkali treatment, which improves composite performance. Scanning Electron Microscopy (SEM), Fourier Transform Spectroscopy (FTIR), and Thermogravimetric analysis (TGA) are used to examine fiber properties. Water absorption% is higher for the untreated fiber composite. Treated fibers show nearly the same stability temperature by losing 10.5 mg of weight under TGA analysis. The findings show that chemical treatment of fiber indicating the possibility of PALF/Coir fiber hybrid composites as an eco-friendly substitute for structures requiring minimal weight.

Keywords:

Coir fiber, Pineapple leaf fiber, Hybrid composite, SEM, FTIR, TGA, Water absorption.

Deep Learning-Based Detection and Classification of Cardiac Arrhythmias Using PPG Signals with GUI Integration

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Abstract:

Timely detection and classification of cardiac arrhythmias are essential for early diagnosis and prevention of serious cardiovascular events. This work proposes a deep learning method that employs raw Photoplethysmogram (PPG) signals for the classification of five cardiac rhythms: Bradycardia, Tachycardia, Ventricular Fibrillation, Ventricular Tachycardia, and Normal rhythm. In contrast to traditional methods that depend on ECG or hand-crafted features, the proposed model directly handles raw PPG signals, which are indicative of vascular pulse dynamics. Two datasets were employed: arrhythmic data from the PhysioNet Challenge 2015 and normal rhythm data from the MIMIC-III database. Preprocessing included noise filtering, wavelet denoising and segmentation. A hybrid model in the form of CNN-LSTM for spatial and temporal feature extraction with test accuracy of 76 % having robust precision and recall is proposed. For better clinical applicability, an easy-to-use Graphical User Interface (GUI) was created using Gradio and hosted on Hugging Face Spaces that allows real-time uploading, processing, and predicting of signals. This system demonstrates the potential of PPG-based deep learning towards scalable, non-invasive arrhythmia detection.

Keywords:

Cardiac arrhythmia, Photoplethysmogram (PPG), Deep learning, CNN-LSTM, PhysioNet Challenge 2015, MIMIC-III, Gradio, Hugging Face Spaces, Non-invasive monitoring, Real-time classification, Telehealth.

The Removal of Phenol with the Help of Alumina Bio-Adsorbent for Waste Water Treatment

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Abstract:

Various industrial operations produce toxic organic compounds that increase pollutants in water. The presence of phenol into aquatic system may cause some problems to environment and human health in result of organ damage. That is why the removal of phenol is a big challenge for all researchers. This study investigates the use of sugarcane bagasse, a cost-effective bio-adsorbent from agricultural by-product to remove this organic substance, and contribute to a sustainable waste water treatment. The sugarcane bagasse was modified by using a chemical process to increase its adsorption capacity. SEM, EDS, XRD, FTIR analysis are done to characterize the modified material. The removal of dye concentration was done with the variation of contact time (30-180 minutes), pH (2-12), dosage of bio-adsorbent (0.02-1.0 g), the initial concentration of phenol (10-100ppm), and temperature variation (35-100°C). The Kinetic study result followed pseudo-second-order where the isotherm study showed that Freundlich model exhibited the best fit for a maximum adsorption. These results suggest the efficiency of the modified bio-adsorbent as an eco-friendly bio-adsorbent for the removal of phenol in wastewater treatment.

Keywords:

Adsorption, phenol, organic pollutant, modified sugarcane bagasse, agricultural waste, wastewater.

Eye Diseases Detection Using Deep learning

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Abstract:

This paper focuses on the implementation of an automated system for eye disease detection using deep learning techniques, aiming to assist early diagnosis of conditions such as Cataract, Diabetic Retinopathy, Glaucoma, and Normal eye health. The dataset used comprises labeled retinal images from a public repository. The project leverages transfer learning by utilizing a MobileNetV2 backbone as a feature extractor due to its efficiency and performance on limited-resource devices. In addition to transfer learning, a hybrid CNN + BiLSTM model was also developed to capture both spatial and temporal features of eye images, with MobileNetV2 acting as a pretrained feature encoder. The training pipeline includes data preprocessing, augmentation, early stopping, and fine-tuning techniques to optimize accuracy. The final model achieved a validation accuracy exceeding 90%, demonstrating its potential for real-world deployment in healthcare. This study showcases the model's potential for practical implementation in healthcare settings. It emphasizes the strength of integrating CNNs with LSTMs for classifying medical images and illustrates the growing importance of deep learning techniques in the field of ophthalmology.

Emerging Trends in Machining with Hybrid Nanofluids under Minimum Quantity Lubrication (MQL)

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Abstract:

Conventional fluids are used for a long time in manufacturing industries on various machines for cooling and lubricating during machining processes. Nowadays, the need for improving productivity and sustainability has increased, which demands more creative solutions as far as lubricating techniques are concerned. Emulsions and mineral oils are cutting fluids, that are used very often for cooling purpose, but now researchers are more focused on alternative lubrication techniques.

This study explores the use of alternative cooling fluids and lubrication techniques to support and guide future research in sustainable machining. The concept of using nanofluid as a cutting fluid, which is in trend, is being explored along with minimum quantity lubrication (MQL) technique. The paper includes the review of various work carried out by other researchers on machining of metals, alloys and difficult-to-cut super alloys with nanofluid MQL technique. It also presents the proposed research framework and outlines the working hypotheses that will guide further research. The key benefits of nanofluids is enhanced mechanical and thermal properties, whereas MQL reduces the wastage and environmental effects. The other benefits and limitations of both, nanofluid as well as MQL technique are also covered.

Keywords:

Hybrid fluid, Minimum Quantity Lubrication, Hard-to-cut alloys, Ti-6Al-4v machining, Nano-fluid.

Enhanced Photocatalytic Degradation of Rhodamine B using Titanium–Zirconium Composite Catalyst: Synthesis, Characterization, and Process Optimization

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Abstract:

Photocatalytic degradation is emerging as a valuable method to eliminate organic pollutants from wastewater in an environmentally sound and economical manner. Compared to conventional practices, photocatalytic degradation offers substantial advantages by being able to degrade complex organic compounds under light irradiation. However, other critical challenges, such as incomplete mineralization of pollutants, low use of visible light, and photocatalyst deactivation still remain. In this study, a composite photocatalyst composed of titanium and zirconium metal salts was synthesized to enhance degradation efficiency and catalyst stability. The synthesized catalyst was used in the treatment of the common dye pollutant Rhodamine B (RhB) under a range of operating conditions. The impact of key process variables including solution pH, catalyst dosage and irradiation time were evaluated to optimise degradation performance. Complete characterization of the catalyst was conducted using Scanning Electron Microscopy (SEM), X-ray Diffraction (XRD), and Brunauer–Emmett–Teller (BET) surface area measurement methods to assess structural and morphological characteristics, surface properties and crystallinity of the catalyst and how it affects the photocatalytic activity. This study demonstrates titanium–zirconium based composites represent

efficient photocatalysts and values the importance of process variables to improve the removal of pollutants from wastewater. The results show significant RhB degradation efficiency, attributed to the synergistic effects of the heterogeneous catalyst.

Keywords:

Photocatalysis, Wastewater treatment, Rhodamine B (RhB), Titanium-zirconium composite, Process optimization.

3D Printing Technology in Knitwear Textile: Advancing Sustainable and Functional Fabrication through Flexible Polymers

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Abstract:

3D printing technology, also known as additive manufacturing, is revolutionizing the textile and apparel sectors through unparalleled customization, efficiency, and sustainability. The technology enables the production of intricate and functional knitted structures, unencumbered by the constraints of traditional manufacturing methods. Through the accurate layering of multiple materials according to sophisticated digital models, the revolutionary process of 3D printing makes it possible to create with precision not just the elasticity and flexibility but the specially shaped properties that mimic the feel of traditional knitted fabric. Simultaneously, this revolutionary process reduces material waste as well as overall production time. In addition, the stunning overlap of additive manufacturing methods with the subtle art of textile design offers a wealth of fascinating creative and practical possibilities. These are varied and include cutting-edge wearable technology, to the new practice of sustainable fashion, and knitwear in particular. This is done using flexible polymers that are programmed to create clothing, which incorporates the necessary properties of comfort with structural innovation, to create garments that are both fashionable and functional. This research examines the application of 3D printing in knitted textile design, emphasising the utilisation of flexible polymers such as Thermoplastic Polyurethane (TPU). In a qualitative study and prototype utilising Fusion 360 and Fused Deposition Modelling (FDM), various loop-based structures were developed to replicate and modify traditional knit patterns. The primary parameters considered are softness, extensibility, permeability, and overall textile performance. The research investigates the impact of varying print sizes on fabric density and yarn count, and how these factors influence textile performance and aesthetics. Furthermore, innovative loop shape manipulation enabled the development of new knit structures with potential product potential. This work demonstrates the potential of 3D printed knitwear to bridge the gap between digital fabrication and textile craftsmanship, and towards a greener, more functional, and design- flexible future in garment production.

Keywords:

3D printing, knitwear, flexible polymers, thermoplastic polyurethane, sustainable textile.

Automatic Prediction in Detection of Brain Tumors Through Using Machine Learning and Deep Learning: Mri Methodology

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Abstract:

Accurate and timely detection of brain tumours is crucial for effective diagnosis and treatment planning. Earlier models focused solely on machine learning or deep learning without combining the strength of both. The primary objective of this paper is to develop an automated and accurate brain tumour detection and segmentation system using a hybrid approach. By leveraging MRI imaging data, the proposed methodology aims to enhance diagnostic precision, reduce manual effort, and support clinical decision-making by combining CNN, U-Net, and DeepLab with traditional machine learning techniques. It integrates data processing, model training and evaluation techniques to improve the precision and reliability of tumour detection. The proposed methodology achieved high sensitivity and specificity indicating its strong ability to correctly identify both tumour and non tumour cases. These findings highlight the potential of an intelligent system in enhancing neuroimaging practices ultimately contributing to improved diagnostic and therapeutic decision processes.

Efficient Adsorption of Methylene Blue Using a Porous Metal-Oxide Adsorbent Derived from Spent Lithium-Ion Batteries

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Abstract:

The increasing disposal of spent lithium-ion batteries (LIBs) has become a prominent environmental issue due to the presence of toxic heavy metals and non-biodegradable materials. In this regard, this investigation analyzed a sustainable and value-added method to recycle spent LIBs to a functional, low-cost adsorbent material for environmental applications. The synthesized adsorbent was specifically tested for its efficacy in removing methylene blue (MB), a commonly utilized and potentially harmful organic dye, from aqueous solutions. Spent LIB batteries were collected systematically, dismantled, and processed in a controlled manner through a thermal and chemical procedure to obtain a porous, metal-oxide-based adsorbent material. The synthesized adsorbent was characterized physically and characteristically using Scanning Electron Microscopy (SEM), X-ray Diffraction (XRD), and Fourier Transform Infrared Spectroscopy (FTIR), which confirmed that the structural and functional properties of the adsorbent were desirable. Batch adsorption studies were conducted to determine the effects of pH, contact time, and adsorbent dosage on the capability of MB to be removed from aqueous solutions. The results demonstrated impressive overall adsorption capacity, as well as rapid dye uptake, as an adsorbent material for potential applications in wastewater treatment. This research highlights an innovative approach to managing e-waste while simultaneously contributing to environmental protection, aligning well with circular economy principles and sustainable waste management strategies.

Keywords:

Spent lithium-ion batteries, Adsorption, Methylene blue removal, Wastewater treatment, Circular economy.

Nanoengineered Electrodes for Enhanced Microbial Fuel Cell Performance

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Abstract:

Microbial fuel cells (MFCs) offer a sustainable method for generating electricity by utilizing the metabolic processes of microorganisms to convert organic matter into electrical energy. Despite their potential, MFC efficiency is often hindered by limitations related to mass transfer, electron transport, and the properties of electrode materials. This study focuses on improving MFC performance through the use of nanoengineered electrodes. Nanomaterials such as carbon nanotubes, graphene, and conductive polymers were incorporated into electrode structures to enhance surface area, electrical conductivity, and structural stability. These modifications support more efficient electron transfer between electrogenic bacteria and the electrode, resulting in higher power density. The increased surface area and porosity of the modified electrodes also support greater microbial colonization and improved substrate oxidation. The work includes synthesis, material characterization, and evaluation of the electrodes within different MFC setups. The findings demonstrate a notable improvement in energy output and efficiency, highlighting the potential of nanoengineered electrodes to improve the viability of MFCs for organic waste treatment and renewable energy applications.

Keywords:

Microbial Fuel Cells (MFCs), Nanoengineered Electrodes, Electrogenic Bacteria, Renewable Energy, Waste-to-Energy.

A Novel Wormhole Attack Analysis and Countermeasures in MANET

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Abstract:

In today's era, as wireless technology is advancing, there is a high demand and availability of wireless devices thus making Mobile Ad-hoc Networks (MANET) more common and popular. With this, security of such networks comes at a risk which lures attackers to exploit MANETs routing protocols. A MANET is a network which can be set up automatically and does not require any fixed infrastructure or central administration. Each node works as a router to transmit data to the destination and is connected by wireless link and can move freely thus the network has constantly changing topology. As there is absence of a core point of control, MANET is exposed to risks like the Wormhole attack, one of the most dangerous routing attacks. One malicious node forwards the data to another malicious node through a compromised node hereby forming a tunnel. This creates a false route with lesser hop counts. These malicious nodes can either drop the packets or alter them and then deliver. In this research paper, we will be detecting and preventing the effect of wormholes in the AODV routing protocol.

Keywords:

MANET, Wormhole Attack, AODV protocol, Network.

OBSCURA – Unified Threat Detection – Using SIEM Integration with pfSense, Suricata, Kibana, and Grafana

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Abstract:

Organizations encounter sophisticated security threats in the current cyber era that must be detected, assessed, and resolved in real-time. Malware is still a primary cause of business disruption and financial loss. This paper suggests an economically viable Security Information and Event Management (SIEM) system based on high-capability open-source solutions such as pfSense, Suricata, Filebeat, Elasticsearch, Kibana, and Grafana. PfSense is a firewall and network gateway, and logs appropriate events. Suricata is a state-of-the-art Intrusion Detection and Prevention System (IDS/IPS), and offers real-time threat detection. Filebeat is used to efficiently ship pfSense and Suricata logs to Elasticsearch for centralized storage. Elasticsearch handles large amounts of log data, with support for high-performance querying. Kibana and Grafana are used to produce data visualization and monitoring dashboards for rapid anomaly detection. This open-source solution provides automation, real-time alerting, and customization with less manual intervention compared to legacy SIEM frameworks. It also renders legacy tools such as EveBox outdated with a more scalable platform. Modular design and real-time functionality of the system improve threat visibility, accelerate mitigation, and enhance security posture, and are well-suited for contemporary Security Operations Centers (SOCs). This unified solution offers a budget-friendly, proactive method for managing cybersecurity through the elimination of legacy SIEM constraints.

AI-Enhanced Smart Traffic Light System for Real-Time Ambulance and Accident Detection

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Abstract:

One of the biggest obstacles to urban mobility is traffic congestion and emergency response delays. An AI-powered smart traffic signal system that uses YOLOv4 deep learning models for real-time accident and ambulance identification is presented in this study. In order to guarantee emergency vehicles precedence, the technology dynamically modifies traffic signals. Compared to conventional traffic control systems, our approach reduces ambulance response times by 30%. Through comparison with the YOLOv4, Faster R-CNN, and Reinforcement Learning models, the effectiveness of the suggested approach is demonstrated.

Keywords:

AI Traffic Control, YOLOv4, Intelligent Transportation, Deep Learning, Emergency Response, Smart Cities.

Prevent Accidents with Intelligent Fatigue Detection Using DLib and OpenCV

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Abstract:

In India, more than 40% of accidents are attributed to driving while feeling fatigued or those who are mentally and physically exhausted. Drowsy driving is a serious issue that increases the risk of accidents and may lead to severe injuries or even fatalities. It may also lead to slowed reactions towards the visual stimuli and impaired decision-making, particularly when driving on busy roads. There is an urgent need to research and develop methods to prevent such accidents from happening and make the driver aware of such situations in which they may not be able to drive safely, as it is necessary for their safety and that of those accompanying them. There are definitely many ways to identify and report such behaviour personally, but they are not reliable at all during prolonged driving hours. Another problem faced by existing systems is that they may be intrusive to your privacy and may lead to variable results in untested environments. A better approach is to incorporate technology with existing hardware to develop a non-intrusive system that is fast and reliable while being highly accurate. One such system proposed in this paper is to use modern technologies with software libraries like DLib and OpenCV to identify the primitive signs of fatigue, such as strain on eyes leading to frequently closing eyes for an extended period of time. This model considers key physical indicators such as eye movements to calculate and alert the driver of any signs of drowsiness. This will significantly help reduce the risk of potential accidents from happening, which may be directly linked to drivers falling asleep behind the wheel.

DFT Investigation on Double Transition Metal MXenes

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Abstract:

MXenes and atomic layered crystals, such as transition metal dichalcogenides (TMDs), semiconducting dichalcogenides, monoatomic buckled crystals like phosphorene, and diatomic hexagonal boron nitride, represent a diverse class of 2D materials. A comprehensive study was conducted to explore the structural and electronic properties of double transition metal MXenes, TiMX , where $\text{M} = \text{Sc, Ti, V, and Cr}$, and $\text{X} = \text{C and N}$. The analysis reveals that all the structures under consideration relax into a hexagonal crystal lattice. The negative formation energies indicate that these structures are energetically stable and likely to form experimentally. Since all the MXenes share a hexagonal lattice, there are minor variations in lattice constants and bond lengths of the M-C/N bonds. The band structures of the studied materials exhibit metallic characteristics, which is further confirmed by density of states (DOS) plots. The projected DOS shows that the primary contribution to the total DOS comes from the d-orbitals of the transition metal atoms and the p-orbitals of C and N atoms. Mulliken charge analysis indicates charge transfer from the transition metal atoms to the C or N atoms, driven by their electronegativity differences. These charge transfer results are corroborated by charge density difference and electron localization function analyses. Overall, these findings suggest that the MXenes can further be explored for acting as potential candidate in electronic applications.

A Novel TCN-Based Graph Neural Network for Intrusion Detection System in IoT using UNSW-NB15 Dataset

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Abstract:

With the rapid expansion of the Internet of Things (IoT), securing connected devices against evolving cyber threats presents a critical challenge. Traditional Intrusion Detection Systems (IDS) often fail to efficiently analyze the large-scale, dynamic network traffic typical in IoT environments. To address this, we propose a novel hybrid IDS framework that integrates Temporal Convolutional Networks (TCN) and Graph Neural Networks (GNN) — a combination not extensively explored for IoT security. The TCN component captures long-range temporal dependencies in network traffic, while the GNN models complex structural relationships between network entities. This synergy enables a highly adaptive and context-aware intrusion detection mechanism. Evaluated on the UNSW-NB15 dataset, our model achieves an accuracy of 88.04%, significantly outperforming conventional IDS approaches. The proposed TCN-GNN-based IDS demonstrates enhanced scalability, efficiency, and detection accuracy, making it well-suited for real-time IoT applications. Our results highlight the effectiveness of combining temporal and graph-based learning for advanced intrusion detection in next-generation networks.

Imaging System for Balcony Safety: A Computer Vision Approach

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Abstract:

Balcony safety is a significant issue in both residential and commercial settings, as falls can lead to severe injuries or fatalities. This research introduces an economical and efficient imaging solution designed to mitigate accidents near balcony edges by leveraging advancements in computer vision and human pose analysis. The system is developed using Python and employs OpenCV and MediaPipe libraries to analyze real-time video feeds from standard cameras positioned near balconies.

To assess its effectiveness, the system was implemented and tested in a controlled experimental environment. While it is currently optimized for specific scenarios, the results demonstrate its ability to accurately identify dangerous situations and provide timely alerts. This prototype illustrates the potential for affordable solutions to enhance balcony safety, paving the way for further advancements in this vital area.

Keywords:

Affordable Vision-Based Safety Solution, Human Joint Angle Analysis.

AI-Driven Adaptive Traffic Management System for Smart Cities using Real-Time Surveillance and Geospatial Intelligence

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Abstract:

Urban traffic congestion and road incident management remain persistent challenges in modern cities. This paper presents an integrated, geo-intelligent traffic management system designed to empower both the public and traffic authorities through real-time interaction, automation, and visual intelligence. The system enables citizens to capture and upload geotagged images of road incidents and interact with a visually intuitive CVAC (Cycle Vehicle Actuated Control) dashboard. Leveraging computer vision, the platform autonomously performs vehicle density analysis and real-time vehicle counting, assisting in dynamic traffic flow monitoring and planning. Additionally, this project offers a location-aware assistance feature, guiding users to the nearest critical services like hospitals, schools, and police stations. The system demonstrates a holistic approach to traffic ecosystem enhancement by integrating public participation, automation, and spatial intelligence, paving the way for smarter, safer, and more responsive urban mobility solutions.

Keywords:

Traffic Congestion, Vehicle Detection, Geospatial Intelligence, YOLOv5, OpenCV, Leaflet.js, Real-time Monitoring.

Fruit Disease Classification using Matlab

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Abstract:

Farming is vital in securing global food security and supporting the economy. Fruit disease reduces crop yield and quality. By using machine learning and deep learning frameworks, we can detect fruit disease classification, reduce these losses, and help farmers increase crop yields and the quality of the fruits. So we came up with the project to develop a generalized fruit disease classification system using MATLAB, by using both machine learning and deep learning frameworks. We have taken a dataset from roboflow which contains diseased fruit images with names of the disease. After rigorous examination with CNNs carrying out transfer learning with pre-trained networks such as AlexNet having a better accuracy level of 97% compared to k-NN at 85% or SVM at 88%. The process begins with processing the data that are resized and segmented by using these images we train the model. The study emphasizes improving prediction accuracy, ensuring scalability, and maintaining robustness across different environmental conditions. Mainly in this project, we have used K-NN, SVM, random forest, and CNN.

Keywords:

K-NN (k-Nearest Neighbors), Support Vector Machines (SVM), Convolutional Neural Networks (CNN), AlexNet, VGG-16.

Smart Waste Monitor Using IOT

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Abstract:

Due to rapid increase in the population, waste management has become a hectic task. Smart Waste Monitor Using IOT is the best solution for urban wastage. This improves efficiency and hygiene of the world. In day-to-day life due the busy schedule in their lives many people are not having enough time to recycle their wastage. By using Smart Waste Monitor Using IOT we can decrease wastage. In this we use sensors, automated alerts to detect the garbage and notify. Smart Waste Monitor Using IOT detects the type of wastage and separates the wastage. Because of the sensors and automated alerts, it detects the percentage of how much full the dustbin is and notify the user through displays. If the level of the wastage in the dustbin increases by normal level it gives warning alarm and the percentage of the recycle waste. Basically, it educates the users how much of recycle waste and how can we reuse that waste in efficient ways. The main moto of the Smart Waste Monitor Using IOT is to keep the world cleaner, more sustainable urban environment and educating the people about sustainable waste management.

Keywords:

Internet of Things (IOT), Arduino UNO, Ultrasonic Sensors, Waste Level Detection.

IoT-Enabled Battery Management System Second-Life Framework for Extended EV Battery Electronics Lifespan

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Abstract:

This paper presents a novel IoT-enabled Battery Management System (BMS) Second-Life Framework designed to extend the operational lifespan of battery electronics in electric vehicles (EVs). Traditional BMS architectures retire entire systems upon cell degradation. Instead, our framework employs real-time diagnostics, adaptive self-tests, and historical use-case analyses to monitor PCB health, sensor accuracies, temperature trends, and fault metrics. With the global surge in EV adoption—driven by recent advancements in power electronics, drive systems, and battery chemistry—this system is poised to address growing market demand by repurposing partially degraded modules. An underlying IoT infrastructure facilitates remote monitoring, predictive analytics, and on-demand mitigation, ensuring that individual modules can be requalified for second-life applications even amid mass EV consumption. Experimental validations and simulations demonstrate that dynamic thresholding and rapid recalibration greatly enhance fault discrimination and recovery. This paper provides a comprehensive technical review of the proposed framework and argues that second-life BMS electronics will be critical in managing e-waste, reducing overall system costs, and ensuring sustainable growth in the EV sector.

Keywords:

Battery Management System, IoT, Second-Life, Electric Vehicles, Predictive Analytics, PCB Health Monitoring, EV Market Trends.

Fish Shoals Detection

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Abstract:

Fish shoal detection is a crucial aspect of marine ecology, fisheries management, and underwater surveillance. This study proposes a deep learning-based approach using YOLOv8 for real-time fish shoal detection from sonar images. The dataset is sourced and preprocessed using Roboflow, and the model is trained with 150 epochs to achieve an accuracy between 70% and 85%. The MERN stack is used to develop a web-based application that visualizes detections, providing an interactive interface for researchers and marine biologists. Experimental results demonstrate the efficiency of the proposed model in accurately detecting fish shoals in varying underwater conditions. The findings of this study contribute to the advancement of AI-driven solutions for aquatic monitoring and conservation efforts.

Keywords:

Fish Shoal Detection, YOLOv8, Deep Learning, Sonar Imaging, Roboflow, Marine Ecology, AI in Fisheries, Object Detection, Web-based Visualization, Underwater Surveillance.

Big Bang–Big Crunch Optimization Algorithm: A Comprehensive Analysis

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Abstract:

The Internet of Things refers to a system of interconnected devices that communicate and exchange data over the internet. With the help of sensors and embedded software, these gadgets gather and exchange data to improve operational efficiency and enable automation in a variety of fields. IoT has brought about significant change in a number of industries, but it also comes with a number of drawbacks, such as security flaws, privacy issues, compatibility problems, standardization issues, scalability limitations, power consumption, battery life limitations, and network connectivity issues. This study explains Big Bang–Big Crunch algorithm and its various applications along with introduction of IoT and role of routing in IoT.

Keywords:

Particle Swarm Optimization, Routing protocols, Internet of Things, Routing, Metaheuristics.

Blood Cell Cancer Detection Using Deep Learning

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Abstract:

Here in this paper we present a deep learning approach for blood cell cancer detection using a hybrid model that leverages both transfer learning and a custom convolutional neural network (CNN) enhanced with attention mechanisms. MobileNetV2 is employed as a feature extractor to utilize its efficient and high-performance architecture for extracting meaningful representations from microscopic blood cell images. These features are then passed to a custom-built CNN integrated with attention blocks to emphasize critical regions relevant to cancer detection. The model is trained on a dataset comprising eight distinct blood cell classes: basophil, eosinophil, erythroblast, immunoglobulin (ig), lymphocyte, monocyte, neutrophil, and platelet. This architecture aims to enhance classification accuracy and interpretability, offering a promising tool for assisting medical professionals in early and accurate diagnosis of blood-related cancers.

Classification and Segmentation of Brain Tumors Using CNN Architecture

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Abstract:

Since brain tumors are one of the most serious and potentially fatal illnesses, prompt and precise diagnosis is essential to successful treatment. Manually segmenting and categorizing brain tumors from Attractive Resonance Imagery (MRI) images is time-consuming and subject to human error. This analysis suggests a deep learning technique established on convolutional neuronal networks (CNNs) on behalf of automated brain tumor classification and segmentation in order to overcome this difficulty. The suggested approach first preprocesses MRI data to improve picture quality, and then it uses a multi-stage CNN architecture to segregate tumor regions. A transfer learning-based CNN model (such as ResNet, VGG, or a custom lightweight CNN) is then used to classify the segmented areas into several tumor categories (such as glioma, meningioma, or pituitary tumor). Using presentation limits similar Dice constant, correctness, compassion, then specificity, the model is expert and measured on standard datasets such as Fig share or BraTS (Brain Tumor Segmentation Challenge). Giving to new data, the proposed CNN-based technique out makes conservative machine knowledge procedures in terms of accurateness then flexibility. By helping radiologists make accurate and timely diagnoses, the technology can enhance patient outcomes. Future research may include real-time clinical deployment, hybrid models (CNN + Transformer), and 3D CNN architectures.

A Comprehensive Review on NO₂ Gas Treatment Technologies in Metal Refining: Transitioning Towards Safer and Cleaner Processes

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Abstract:

Metal refining operations, especially for silver and gold, significantly utilize nitric acid for purification and pickling, resulting in the production of nitrogen dioxide (NO₂) – an extremely toxic and environmentally unfriendly gas. Uncontrolled NO₂ emission during traditional open-vessel refining operations has severe health implications for workers, including respiratory issues and chronic occupational risks, besides causing environmental pollution. This article offers an overview of multiple NO₂ treatment technologies implemented by metal refining processes in order to reduce these impacts. The article explores conventional methods such as wet scrubbing and dry scrubbing, their working principle, efficiency, and limitations. Sophisticated techniques such as Selective Catalytic Reduction (SCR), microbial system-based biofiltration, and plasma-driven NO₂ elimination are critically assessed for their industrial potential in the future. Design of closed refinery reactors integrated with water-based scrubbers is a special focus point, aided by simulation software such as DWSIM for optimal system design.

SKILLX- Skill Exchange Web-based Platform

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Abstract:

SkillX is an extensive full-stack web platform that allows users to exchange skills, interact in real-time, and receive AI driven skill recommendations. It offers the benefit of connecting with others based on the skills they possess and the ones they are willing to learn, fostering a collaborative learning environment. Each user can create their specific profile and find suitable partners for skill-sharing. To facilitate seamless communication, SkillX integrates real-time chat and video calling features. The chat module, developed using MERN stack technology and Socket.io, allows users to interact by exchanging messages and files. The video call feature, enhanced by WebRTC, enables live one-on-one sessions without relying on third-party APIs like Zoom or Google Meet, ensuring complete control over data security and privacy. It incorporates machine learning-powered recommendation algorithms for recommending skills. By using collaborative filtering, it analyses user's skills and suggest new skills to learn, based on what similar users have acquired. This ensures that individuals are upskilling based on industry trends. It also uses cosine similarity for finding and recommending the appropriate matches. Built with ReactJS, Node.js, Express.js and MongoDB, SkillX provides a flexible, secure and engaging experience. It redefines modern learning by making education more accessible and interactive by integrating multiple features like skill matching, recommendations, chat and video calls.

Keywords:

Skill Exchange, Collaborative Filtering, Real-time Chat, Socket.io, WebRTC Video Calling, MERN Stack Development, Peer-to-Peer Learning, User Authentication (JWT, Bcrypt), Skill Matching Algorithm, Rule Based Filtering, Cosine similarity.

Music Streaming: Navigating Identity, Privacy, and Social Dynamics in Networked Listening

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Abstract:

This article explores how music streaming services affect the habits of music listening, the character of social interaction, and the processes of identity construction. In most cases, public and private listening are hard to separate since users must navigate increasingly complex landscapes of visibility. In this research, we analyze how engaging listening features provide social opportunities, how individuals construct personal identities through musical preferences, and the personal responsibility to data privacy versus convenience that users encompass within the streamed listening environment. The results, drawing on qualitative interaction with 49 music streaming service users, uncover the means through which social norms are reconstituted by music streaming, trouble the public-private dichotomy, and unfold social affectivity over concerns for privacy, personal identity, and music reception more broadly. Results also outline the continually evolving interrelatedness among the social order of taste, private aptitudes as a product of social pressure, and the technological potential for listening on the internet. The article concludes by summarizing that the possible significance of recognizing the socioculturally constructed meaning of networked listening should be subject to critical scrutiny.

Secure Architecture in Wireless Body Area Network

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Abstract:

The advancement of Wireless Body Area Networks (WBANs) has transformed remote healthcare monitoring services, creating the need for agile and resilient security frameworks. To achieve power consumption, low latency, and quantum resistance within WBANs, this work presents a security framework that integrates Elliptic Curve Cryptography (ECC) and Physical Unclonable Functions (PUF) and Tangle Technology of IOTA. With PUF, device authentication is performed at the hardware level without keys, thus eliminating the possibility of key leakage. ECC offers adequate level of encryption with strong mutual authentication and minimal computational cost, resulting in reduced power consumption. Furthermore, IOTA reinforces auditability and real-time validation with its directed acyclic graph (DAG) based ledger, providing a decentralized and immutable platform. This architecture is robust against eavesdropping, replay, cloning, quantum, and multiple other attacks while maintaining secure communication across resource-constrained medical sensors. Due to the model's enhanced scalability and robustness, it suits dynamic and high-density healthcare ecosystems perfectly.

Keywords:

WBAN, PUF, ECC, IOTA, DAG, Lightweight Authentication, Post-Quantum Security, Tamper-Proof Ledger, Medical IoT Security.

BLOGHUB: React.js, Tailwind CSS and Vite

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Abstract:

The rapid evolution of web technologies has profoundly reshaped the development of modern web applications, particularly within content-driven platforms such as blogging websites. This paper outlines the design and implementation of a scalable, modern blogging platform that employs React.js for front-end development and Tailwind CSS for styling, with an emphasis on key features such as component-based architecture, dynamic content rendering, client-side routing, and responsive design. These technologies have been selected for their ability to enhance both the functionality and aesthetics of web applications, while promoting maintainability, scalability, and performance. React.js, with its declarative and component-driven architecture, enables the creation of highly interactive and modular user interfaces. By breaking down complex features into reusable components, React optimizes code efficiency, improves maintainability, and enhances the performance of the application. In parallel, Tailwind CSS, a utility-first CSS framework, offers an efficient and flexible approach to styling. Its predefined utility classes allow developers to quickly build custom, responsive designs without the need for extensive custom CSS. This results in a consistent, adaptive, and visually coherent design across a variety of devices and screen sizes. The paper also explores the integration of advanced functionalities that significantly improve user experience, including client-side routing through React Router, dynamic content filtering, and pagination. These features not only enhance user engagement and facilitate content discovery, but also contribute to SEO optimization by enabling faster, more efficient content navigation.

A comprehensive literature review contrasts traditional content management systems (CMS) with modern front-end frameworks, examining their respective advantages and limitations. This analysis highlights how frameworks like React and Tailwind can address key challenges faced by conventional CMS platforms, such as flexibility, scalability, and performance—particularly in content-heavy applications like blogs. These enhancements would further elevate the platform's functionality, improve user engagement, and ensure the platform can scale to meet future demands, while also providing a more personalized user experience.

Keywords:

React Tailwind CSS, Blogging Website Development Web Development, Component-Based Architecture Dynamic User Interface, Single Page Application (SPA) Responsive Web Design, User Interaction SEO Optimization, Content Management Pagination and Filtering Routing System.

Multiple Disease Prediction System Using Machine Learning

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Abstract:

The research develops a web-based predictive system which focuses on three critical health disorders diabetes, heart disease and disease of Parkinson. A complete explanation of the application's design accompanies information about data collection techniques and data processing methods as well as accuracy metrics for model evaluation. Predictions become more precise with Electronic Health Record (EHR) and lifestyle element and physiological log data that use logistic regression and random forest models along with neural networks. The research handles data imbalance problems and multicollinearity through normalization steps and synthetic oversampling and feature selection methods. The model proves its ability to detect high-risk individuals in various population groups by using precision, recall and AUC-ROC metrics for performance assessment.

Keywords:

Machine Learning, Health Diagnostics, Streamlit, Disease Prediction, Web Application.

Image Analysis Using CNN: Food Calorie Prediction

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Abstract:

Image analysis using Convolutional Neural Networks (CNNs) has revolutionized the field of computer vision, offering unprecedented capabilities in object detection, image classification, and semantic segmentation. This paper explores the architecture, functionality, and applications of CNNs in image analysis. CNNs leverage hierarchical layers of convolutions to automatically and adaptively learn spatial hierarchies of features from input images. This ability to capture spatial and temporal dependencies in an image with a minimal amount of pre processing has established CNNs as the cornerstone of modern image analysis tasks. The discussion begins with a detailed examination of the fundamental components of CNNs, including convolutional layers, pooling layers, and fully connected layers. The role of activation functions and the backpropagation algorithm in training these networks is also elucidated. Various architectures such as LeNet, AlexNet, VGG, and ResNet are compared, highlighting their contributions to advancing CNN capabilities. The paper further delves into the practical applications of CNNs in diverse domains such as medical imaging, autonomous vehicles, facial recognition, and anomaly detection. Techniques for enhancing CNN performance, including data augmentation, transfer learning, and the use of advanced optimization algorithms, are reviewed. Additionally, challenges such as overfitting, the need for large labeled datasets, and computational requirements are discussed, along with potential solutions like regularization techniques and unsupervised learning. The conclusion emphasizes the transformative impact of CNNs on image analysis and anticipates future trends, including the integration of CNNs with other deep learning models and the development of more efficient and interpretable networks. Overall, this paper underscores the critical role of CNNs in the ongoing evolution of image analysis technologies.

Study and Design of Barcode Generator: QR Code

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Abstract:

A barcode generator operates as a software device creating machine-readable bar codes that can be used in multiple applications. Some of the applications are Inventory management, retail sales, asset tracking, and identification. Barcode generators use technology that encodes data (such as a file name or a shopping cart item) into visual patterns, lines, squares, and dots that can be scanned and read easily by barcode readers. The types of barcodes are Quick Response (QR) codes, Universal Product Code (UPC), European Article Number (EAN), and Code 128, which are used for different purposes. In most cases, barcode generators come with features such as customization, batch generation, and integration with databases or any other system to facilitate data encoding. Barcode generators enable quick and accurate data input to reduce manual errors and improve efficiency. This technology evolves to improve data handling with better accuracy. In this paper, we have developed a QR-based barcode that not only can store horizontal data but also able to store data vertically.

Keywords:

Barcode generator, Data encoding, QR codes, Data Base, Identification, Error Correction.

Metro Flow Navigator – Efficient Urban Mobility Planning with Dijkstra and A* for Route Optimization

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Abstract:

Urban transit systems are increasingly confronted with the complexities of managing intricate routes, delays, and the expectations of passengers in various cities. Metro Connect effectively addresses these issues by providing a scalable, AI-enhanced web platform aimed at optimizing metro travel across multiple urban environments. The platform is developed using React.js for the frontend and Node.js with Express.js for the backend, ensuring a responsive and user-friendly interface. It employs advanced algorithms, including Dijkstra's and A*, for real time route optimization, facilitating efficient and economical journey planning. The database architecture of the platform is designed to accommodate the integration of various metro systems, allowing for straightforward scalability to additional cities. Real-time data is sourced from APIs and WebSocket connections, guaranteeing that passengers receive current information regarding schedules, delays, and fare details. A standout feature of the platform is its AI-powered chatbot, which utilizes natural language processing (NLP) to provide tailored assistance with routes, fares, and city-specific inquiries, thereby enhancing the user experience with precise and contextually relevant responses. To maintain data security, the platform employs OAuth authentication and HTTPS encryption. Optional user accounts enable the storage of preferences and search history, further enriching the personalized experience. The system also supports continuous integration and delivery, allowing for smooth updates and bug resolutions. In conclusion, Metro Connect offers a holistic solution for contemporary transit requirements, serving both local commuters and tourists. By integrating scalability, real-time data, and AI-driven support, the platform establishes a new standard for urban transportation systems globally.

Attitude and Behaviour Towards AI or Chatbot in Men Grooming Industry

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Abstract:

The growing integration of Artificial Intelligence (AI) into consumer-facing industries has significantly changed how businesses interact with their customers. One of the most impactful AI innovations in this space is the chatbot—an automated conversational system designed to provide customer service, guidance, and support. In the men's grooming industry, chatbots are increasingly being used to recommend products, answer grooming-related queries, and offer personalized advice. Despite this rise in adoption, there remains a lack of academic research focused specifically on how male consumers perceive and interact with chatbots in the grooming sector.

This study addresses that gap by exploring the attitudes and behaviors of male consumers towards AI-powered chatbots in the grooming industry, using the Technology Acceptance Model (TAM) as the foundational theoretical framework. The model helps to assess whether perceived usefulness and perceived ease of use influence consumer attitudes toward chatbot usage, and ultimately, their behavioral intention to use them for grooming product purchases.

Digital Doppelgangers: Navigating AI-Generated Identities in the Age of Virtual Interaction

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Abstract:

This paper examines the emergence of digital doppelgangers—AI-powered virtual replicas designed to emulate human behavior, appearance, and personality traits. Through comprehensive analysis of current technologies and applications, we explore how machine learning, natural language processing, and generative adversarial networks enable the creation of increasingly sophisticated virtual identities across domains including personal assistance, customer service, education, entertainment, healthcare, and business. While these AI-generated identities offer novel opportunities for efficiency and personalization, they simultaneously present significant ethical and legal challenges regarding data privacy, identity fragmentation, and informed consent. The paper further investigates risks associated with deepfakes and digital impersonation, analyzing emerging technological defenses such as detection systems, watermarking, and enhanced identity verification. We conclude by examining the psychological and social implications of human-AI interaction and proposing a balanced approach to innovation that prioritizes ethical responsibility, robust regulation, and user education to harness the transformative potential of digital doppelgangers while mitigating associated risks.

Digital Marketplace using Python

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Abstract:

This E-commerce is boom in the modern business. E-commerce stands for Electronic commerce .It is a platform where we do buying and selling of good and services, transmitting of data over internet that is electronic network. This project is aimed to design and develop a user friendly and secure e commerce platform and help the customer to buy and sell the product online.

The challenges related to technical complexities, user experience, payment integration, security, and performance optimization were addressed throughout the project , user interface. This e-commerce website is a website that enhanced customer experience and facilitates business growth. Continuous maintenance, improvements and update will be essential to remain competitive in dynamic ecommerce industry.

In this project we use HTML, CSS, Java Script and Python Language with the use of Django Frame work.

E-commerce is a platform which is bringing a complete changes in traditional way of doing business or marketing . This research aims to explore the current state of e-commerce, analyse its trends, and identify the key factors essential for the success of web based-commerce business replica.

The successful completion of the electronic-commerce website project has resulted in a strong platform for online buying and selling. The website ensures a smooth user experience, includes all essential features, and offers secure transactions, thereby improving customer satisfaction and supporting business growth. Regular maintenance, timely updates, and continuous enhancements will be crucial to keep up with changing market trends and meet the expectations of customers.

Keywords:

Digital Marketplace, Django, SQLite, micro services architecture, shopping cart, payment gateway, user authentication, scalability.

Transforming Car Rental Services: A Study on Personalization and Operational Strategies

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Abstract:

The car rental industry has undergone significant transformations with the integration of advanced technologies. This paper presents a comprehensive study of implementing AI-driven recommendation systems in car rental platforms. The proposed system leverages user behavior data, preferences, and historical rental patterns to provide personalized suggestions. The study highlights the methodology, technological stack, and evaluation metrics for the recommendation system, demonstrating its impact on user satisfaction and business efficiency.

Keywords:

Car Rental Platforms, AI Recommendation Systems Personalized Suggestions, User Behavior Analysis, Machine Learning in Car Rentals, Collaborative Filtering Content-Based Filtering, Hybrid Recommendation Models, User Experience Optimization, Rental Trends Analysis, Data Privacy in AI AI-Powered Decision Making, Deep Learning Algorithms ,Operational Efficiency Context-Aware, Recommendations Dynamic Pricing, Optimization Vehicle Inventory Management, Cloud-Based Scalability, TensorFlow in AI Applications ,Sustainable Mobility Solutions.

Using Deep Learning for Making Sign Language Recognition

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Abstract:

A speech impediment is a disability that impairs a person's ability to communicate verbally. One of the most structured languages is employed as a signal language to overcome this difficulty. In order to facilitate communication even in the event that someone is not proficient in sign language, it is practically necessary to have a method or program that can recognize motions in the language. This article goal is to bridge the gap between persons with disabilities, such as the deaf and dumb, and other people. The artwork provided on paper is an attempt (extension) to look at the problems in the Indian Sign Language (ISL) character class For this assessment, the person need to be capable of take pics of hand motions the use of a webcam, and the computer must expect and display the call of the picture that become taken. The obtained image goes via a numerous process, consisting of dilatation, mask operation, and conversion to grayscale, among other pc- imaginative and predictive techniques. The proposed version is trained the uses a Convolutional Neural Network (CNN) to discover the image. At completion, our model's accuracy is more than 95%.

Keywords:

ISL (Indian Sign Language), Deaf persons, hand gestures, machine learning, image processing, convolutional neural networks (CNNs).

Music Recommendation System on Facial Emotion Detection

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Abstract:

The research introduces a system for automatic music playback which utilizes face expressions as input. The standard music-playing systems primarily rely on three approaches which include manual operation along with wearable technology and audio-based classification methods. This work skips manual playing operations by utilizing a CNN for emotion detection followed by music recommendations based on deep learning and stream lit. Through its implementation the system achieves both cost reductions and time savings and better accuracy levels. An inbuilt camera captures facial expressions which allows for extraction of face features that detect emotions between happiness and anger along with sadness and surprise as well as neutrality. Automatic music playlist generation begins from the detected emotions. Our system, therefore, shows superior computational efficiency than the existing methods. A webcam-based detection system determines instant emotions which are presented on an application built using Streamlet. Both audio and video transmission occur via YouTube's network.

Keywords:

The program includes the following features: Facial recognition, Emotion detection, Stream lit-WebRTC, webcam integration, music recommendation.

Machine Learning-Based Interactive System for Stroke Rehabilitation

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Abstract:

This project presents a machine learning-based approach for stroke rehabilitation, focusing on improving upper limb motor function in patients affected by hemiparesis due to ischemic or hemorrhagic strokes. The system captures hand movement data through motion-tracking technology integrated within a game-based therapeutic application. Machine learning algorithms analyze this data to monitor changes in the patient's motor skills over time, helping to assess recovery progress.

Designed for medically stable patients with mild to moderate impairment and adequate cognitive abilities, the application encourages users to perform specific movements through engaging games. These games are aimed at enhancing fine and gross motor skills, increasing range of motion, improving muscle strength, and refining motor control. The use of games also makes therapy more enjoyable and helps maintain long-term motivation, especially for patients who find traditional rehabilitation monotonous.

A comprehensive dashboard is included for both patients and healthcare professionals. It records and displays various performance indicators such as game scores, movement trends, and session-wise progress. These insights can assist clinicians in tailoring personalized treatment plans based on each patient's progress.

By combining intelligent data analysis with interactive therapy, this platform offers a modern, accessible solution to stroke rehabilitation. It aims to improve recovery outcomes while reducing dependency on continuous in-person supervision. This approach supports sustained engagement in therapy and provides valuable, data-driven insights into a patient's recovery journey.

Keywords:

Stroke Rehabilitation, Motion Tracking, Upper Limb Hemiparesis, Gamified Therapy, Predictive Analytics.

A Deep Learning Framework based on LRCNN for Suspicious Behavior Detection in Retail Spaces

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Abstract:

Theft detection remains a critical concern in the retail sector, where losses due to shoplifting and fraudulent activities can significantly impact business operations. This paper presents a comprehensive and intelligent theft detection framework that leverages Long-term Recurrent Convolutional Neural Networks (LRCNN) in conjunction with the YOLO (You Only Look Once) object detection model for real-time surveillance and analysis. The system is designed to monitor pre-theft, theft, and post-theft activities, enabling a holistic view of suspicious behavior. By integrating advanced video processing techniques, the framework can detect anomalies and generate real-time alerts to store managers through a user-friendly Streamlit-based interface. The backend is powered by a trained .h5 model file, ensuring efficient deployment, scalability, and adaptability in real-world retail environments. Unlike traditional systems that focus solely on the act of theft, our approach emphasizes contextual understanding, capturing the sequence of events before and after the incident to aid in proactive response and evidence gathering. Experimental evaluations validate the system's robustness, accuracy, and potential as a practical solution for enhancing retail security.

Mobile Based Alert System: SMS as a Lifesaving Tool

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Abstract:

In the fast-paced world of today, prompt communication is crucial for businesses, organizations, awareness, and prevention. To increase operational efficiency and facilitate communication, this study introduces an SMS automation system that lets users send messages depending on preset criteria, like matching addresses. This study presents a mobile-based alert system that primarily communicates via SMS to convey urgent alerts quickly, as timely communication is essential for saving lives in catastrophes. It focuses on the design, functionality, and effectiveness of the system in guaranteeing smooth emergency alerts. The system also includes robust error handling and retry logic ensuring that messages are delivered reliably in all network conditions, minimizing downtime and redundancy mechanisms. It also provides detailed analytics and a reporting feature, allowing administrators to track message delivery. The system's dependability in disaster management and vital communications are demonstrated by a performance analysis and comparison with current alerting systems.

Keywords:

SMS alerts, disaster management, FastAPI, Android Studio, communication.

Conceptualization of a Carbon Nanotube Field-Effect Transistor (CNFET) Integrated-Operational Transconductance Amplifier (OTA) and its implementation into a biomedically suitable Low-Pass Filter (LPF)

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Abstract:

Background: The overlap in frequency spectra between the biomedical signal and noise underscores the need for explicit signal processing and filtering to achieve accuracy and precision in radio diagnosis.

Objective: This research aimed to design a CNFET-OTA-based LPF (32 nm) suitable for filtering physiological signals.

Methods: A design for a second order CNFET-OTA-based low-pass filter (LPF) was proposed, and a simulation was conducted using HSPICE.

Result: The proposed LPF exhibited remarkable performance parameters, including a cutoff frequency (F_c) of 153.9 Hz, average power dissipation (APD) of 313 nW, a quality factor of 0.707, and a phase margin of 133.5 degrees, indicating its suitability for biomedical applications.

Conclusion: The proposed LPF's low power consumption and low cutoff frequency, combined with appropriate quality factors, make it suitable for real-time physiological signal processing in diagnostic devices. Focusing on improving the dynamic range and noise rejection capabilities of CNFET-OTA-based LPFs ensures robustness in diverse real-world conditions, underscoring the future perspectives of the research.

Keywords:

Biomedical, CNT, CNTFET, OTA, Filter.

Prediction of Pneumonia using Deep Learning and Machine Learning Algorithms

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Abstract:

The infectious disease called Pneumonia becomes life-threatening when it affects both lungs of human beings. Bacterial infections known as Streptococcus pneumonia trigger this condition in most people. Data which are used to Professional radiotherapists must evaluate the data needed for pneumonia diagnosis. Medical data analysis stands successfully through deep learning algorithms so Convolutional Neural Networks (CNNs) became widely used. Disease classification has received much attention from the research community regarding Neural Networks (CNNs). CNN is also The deep learning model stands out in comparison to other models of its type. The extracted features from pre-trained CNN models which receive input from extensive data sources prove useful for classification tasks, much useful in classification tasks. The research analyze how pre-trained models work as features.

The analysis consists of pre-trained CNN models used as feature extraction layers with diverse classifiers for disease categorization. of abnormal and normal chest Data. The investigation leads to identification of the most suitable CNN model for this application. Statistical results The statistical results reveal that pre-trained CNN models paired with supervised classifiers show effective functionality when analyzing medical data to detect Pneumonia.

The combination of algorithms proves beneficial for medical data analysis which specifically leads to Pneumonia detection.

Objective:

The main objective is to determine whether a person suffers pneumonia or not. Thus, developing an automatic system for detecting pneumonia would be beneficial for treating the disease without any delay particularly in remote areas.

The essential purpose is to verify if someone has pneumonia based on their health condition. Thus, An automatic disease detection method for pneumonia treatment holds significant benefits in healthcare delivery especially for remote areas disease without any delay particularly in remote areas.

Machine Learning-Based Movie Suggestion Engine

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Abstract:

By facilitating easier discovery of what they want; recommendation systems have revolutionized the way people discover content. Recommendation systems save users time and reduce the disorientation of choice overload in the film industry by helping users sift through enormous collections. By offering a hybrid system of suggestions that incorporates collaborative and content-based filtering methodologies, this article seeks to boost the interaction with those using it. In contrast to conventional content-based systems, which are bounded by user-specific interests and limit exploration, the proposed method attempts to offer additional information and different ideas. The research also contrasts the efficiency of existing methods, datasets, and accuracy measures in film recommendation systems, identifying areas where improvement is needed. By addressing problems like limited recommendations and a lack of novelty, this initiative aims to open the way for more user-friendly and lively solutions.

Keywords:

Movie recommendation, Recommender system, Collaborative filtering.

Comparitive Analisys of Machine Learning Models

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Abstract:

Machine learning has become an indispensable part of various domains to carry out the most efficient solutions to classification and regression problems. This paper presents a comprehensive comparative study of the most widely used machine learning algorithms on different datasets. In the first stage, different models—including decision trees, random forests, support vector machines, neural networks, etc—are trained on specific datasets separately. Their performance is measured using standard evaluation metrics such as accuracy and precision. During the subsequent phase, the generalization and robustness of the prediction capabilities of all algorithms are cross-tested over different datasets. In this way, this two-tiered approach reveals optimal models suited for specific structures of data, providing further understanding into algorithm behaviour on a cross-section of different datasets. It will provide an empirical direction to select optimal future models and help optimize their efficiency.

