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BRAINWARE UNIVERSITY

ICETC-2022

ICETC

2nd International Conference on the Emerging Technologies in Computing

24th - 25th February 2022 **Kolkata, West Bengal** **VIRTUAL CONFERENCE**

Organized By

Brainware University, Kolkata, West Bengal

in Association with

Institute For Engineering Research and Publication (IFERP)

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IFERP-Explore

Preface

The "2nd International Conference on the Emerging Technologies in Computing (ICETC-2022)" is being organized by Brainware University, Kolkata, West Bengal in Association with IFERP-Institute For Engineering Research and Publications on the 24th & 25th February, 2022.

Brainware University, Kolkata has a sprawling student –friendly campus with modern infrastructure and facilities which complements the sanctity and serenity of the major city of West Bengal.

The "International Conference on the Emerging Technologies in Computing" was a notable event which brings Academia, Researchers, Engineers, Industry experts and Students together.

The purpose of this conference is to discuss applications and development in area of "Emerging Technologies in Computing" which were given International values by Institute for Engineering Research and Publication (IFERP).

The International Conference attracted over 90 submissions. Through rigorous peer reviews 29 high quality papers were recommended by the Committee. The Conference aptly focuses on the tools and techniques for the developments on current technology.

We are indebted to the efforts of all the reviewers who undoubtedly have raised the quality of the proceedings. We are earnestly thankful to all the authors who have contributed their research works to the conference. We thank our Management for their wholehearted support and encouragement. We thank our Principal for his continuous guidance. We are also thankful for the cooperative advice from our advisory Chairs and Co-Chairs. We thank all the members of our local organizing Committee, National and International Advisory Committees.

Message from Vice-Chancellor

I am delighted to know that the Department of Computational Science, Brainware University, Kolkata, in collaboration with Institute for Engineering Research and Publication (IFERP) and IEEE Student Branch, Brainware University, is hosting its second International Conference on Emerging Technologies in Computing (ICETC-2022) on February 24th and 25th, 2022.

I congratulate the organizers for providing the platform for necessary interaction in different aspects of contemporary interest relating to Computer Science and Engineering. It is also my great pleasure to welcome all the delegates and the participants.

I am quite confident that the knowledge shared in this conference will generate a foundation for a better tomorrow.

I wish all success to this International conference.

With regards

Prof. (Dr.) Sankar Gangopadhyay
Vice Chancellor, Brainware University, Pune, India

Message from IFERP

On behalf of Institute For Engineering Research and Publications (IFERP) and in association with Brainware University, Kolkata. I am delighted to welcome all the delegates and participants around the globe to IMERT for the "2nd International Conference on the Emerging Technologies in Computing (ICETC-2022)" Which will take place from 24th & 25th February, 2022.

It will be a great pleasure to join with Engineers, Research Scholars, academicians and students all around the globe. You are invited to be stimulated and enriched by the latest in engineering research and development while delving into presentations surrounding transformative advances provided by a variety of disciplines.

I congratulate the reviewing committee, coordinator (IFERP & Brainware University, Kolkata) and all the people involved for their efforts in organizing the event and successfully conducting the International Conference and wish all the delegates and participants.

With regards

Er. R. B. Satpathy

Chief Executive Officer, Institute for Engineering Research and Publication (IFERP).

Keynote Speaker

I am honored to be part of '**International Conference on the Emerging Technologies in Computing (ICETC-2022)**' organized by '**Brainware University, Kolkata, West Bengal'** and 'Institute For Engineering Research and Publication **(IFERP)**'.

Its great to see people from the different corners of the globe come together to exchange knowledge on cutting-edge technologies and Innovations happeing across various industries and make Engineering & Technology impactful for our next generations.

In today's fast paced world, technology is evolving more rapidly than our imagination. Emerging technologies like Cloud Computing, IOT (Internet of Things), AI (Artifitial intelligence), ML (Machine Learning), DL (Deep Learning), mobile 5G, AR(Augmented Reality), VR(Virtual Reality), Blockchain and automations going to play vital role in major transformations across the industries.

Our great scientists dream about doing the great things and Engineers ensure them. Without Engineering and Technology evolutions we can't even think about getting so modernized world . What we design, invent, innovate ,create and build today, will be the engineering heritage of tomorrow. It's important that we get it right.

My message to all the participants is Share your knowledge (Take best out of open source community and contribute whatever you can that may help others interested in similar things)

"Knowledge shared is knowledge squared"

I would like to extend my best wishes to all the participents and **ICETC-22** team.

Best wishes,

Sai Satish Babu.N
Senior Manager R&D - Data Science and AI Engineering, Mavenir, Bangalore, India.

2nd International Conference on the Emerging Technologies in Computing

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Kolkata, West Bengal

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ABSTRACTS

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An Optimized Aperture Antennas for Near Field Sensing Applications

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[1]Post Doctoral Fellow, Srinivas University
[2]Vice Chancellor, Srinivas University

Abstract
In the world of modern wireless communication, engineer who wants to specialize in the communication field needs to have a basic understanding of the roles of electromagnetic radiation, antennas, and related propagation phenomena. These papers discuss on the performance, characteristic, testing, measurement and application of antennas in modern wireless communication systems. Antenna is an important part of any wireless communication system as it converts the electronic signals (propagating in the RF Transreceiver) into Electromagnetic Waves (Propagating in the free space) efficiently with minimum loss. We use antennas when nothing else is possible, as in communication with a missile or over rugged mountain terrain where cables are expensive and take a long time to install. The performance characteristics of the parent system are heavily influenced by the selection, position and design of the antenna suite. In this paper, among the most punctual sort of receiving wires underway was aperture type. These radio wires were unbending and comprised of an explanatory, paraboloidal, tube shaped, or circular shape. A noteworthy restriction of this kind of receiving wire comes from the reality they could just give one specific radiation design, and on the off chance that one needed to filter the signal starting with one point then onto the next, at that point the entire structure must be moved which implied the satellite must be realigned. This significant weakness prompted the improvement of the all the more expensive staged cluster innovation and different advancements where pillar examining was misused. The aperture is characterized as the zone, arranged opposite to the bearing of an approaching radio wave, which would catch an indistinguishable measure of intensity from that wave from is created by the receiving wire accepting it. Anytime, a light emission waves has an irradiance or power motion thickness which is the measure of radio power going through a unit territory of one square meter.

Keywords
Antenna, wireless communication, Reflector aperture

INTRODUCTION

Antennas are basic components of any electric system and are connecting links between the transmitter and free space or free space and the receiver. Thus antennas play very important role in finding the characteristics of the system in which antennas are employed. Antennas are employed in different systems in different forms. That is, in some systems the operational characteristic of the system are designed around the directional properties of the antennas or in some others systems, the antennas are used simply to radiate electromagnetic energy in an omnidirectional or finally in some systems for point-to-point communication purpose in which increased gain and reduced wave interference are required.

ANTENNA DEFINITIONS

There are several definitions of antenna, and are as follows:
• The IEEE Standard Definitions of Terms (IEEE Std 145-1983):
A means for radiating or receiving radio waves
• "An antenna is any device that converts electronic signals to electromagnetic waves (and vice versa)" effectively with minimum loss of signals as shown in Fig.1.

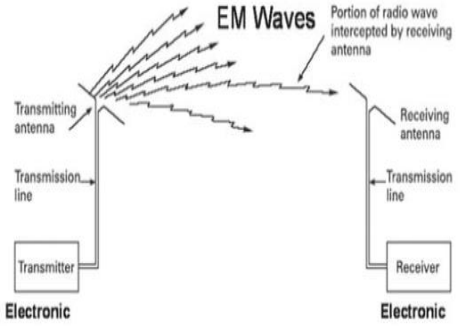


Figure 1. Wireless communication system.

- An antenna is basically a transforming device that will convert impedance of transmitter output (50/75 Ohm) into free space impedance (120pi or 377 Ohm).
- Region of transition between guided and free space propagation
- Concentrates incoming wave onto a sensor (receiving case)
- Launches waves from a guiding structure into space or air (transmitting case)
- Often part of a signal transmitting system over some distance.

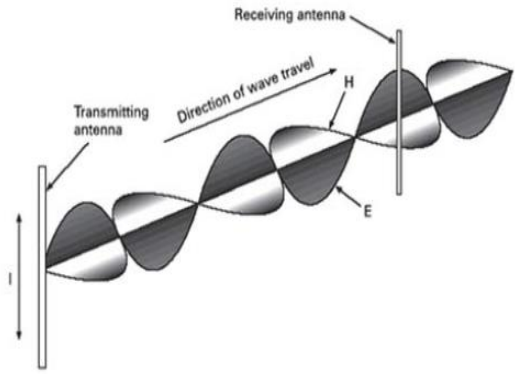


Figure 2. Propagation of EM waves.

1.1 Antenna Definitions

•The radiation pattern and radiation resistance of an antenna is the same when it transmits and when it receives, if no non-reciprocal devices are used. So, Same antenna can be used for Transmission and Reception of Electromagnetic Waves

• Does not apply to active antennas.

NB: Antenna is a passive device, it does not amplify the signals, it only directs the signal energy in a particular direction in reference with isotropic antenna.

APPLICATIONS OF ANTENNAS

2.1 Importance Of Antenna In Airborne Application:

As shown in Fig.3, different frequency band antennas are placed on aircraft/missile body for different communication.

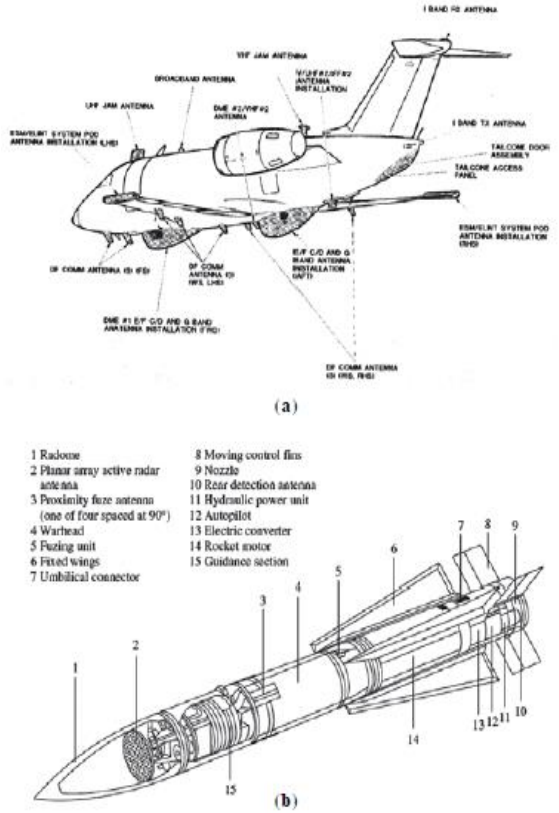
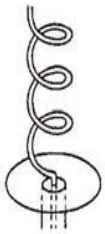


Figure 3. Application of airborne antennas.

Antenna placed at nose of the aircraft is a part of guidance RADAR system, which will guide the aircraft. Various jamming antenna are placed on different parts of aircraft for jamming the enemy signals. Antenna placed at the belly of the aircraft for data link application. All these antennas are operated on different frequency bands, so care should be taken that to avoid the interference of radiation pattern of all these antennas. Also when these antennas are placed on the aircraft body, its radiation pattern gets distorted, so one should design an antenna such that it will meet our application.

Astronomical Antenna:



Helical Antenna

1. Highly Directional Antenna
2. Circularly Polarized Antenna
3. Use in Radio Astronomy

CLASSSIFICATION AND CHARACTERISTICS OF ANTENNA

3.1 Classsification Of Antenna:

Antenna can be classified on the basis of:

1 Frequency - VLF, LF, HF, VHF, UHF, Microwave, Millimeter wave antenna

2 Aperture - Wire, Parabolic Dish, Microstrip Patch antenna

3. Polarization - Linear (Vertical/Horizontal), Circular polarization antenna

4. Radiation - Isotropic, Omnidirectional, Directional, Hemispherical antenna

3.2. ANTENNA CHARACTERISTICS

Before designing an antenna one should know its performance parameters or characteristics of antenna for particular applications. The beam pattern of any antenna is shown below in Fig.4 and 5.

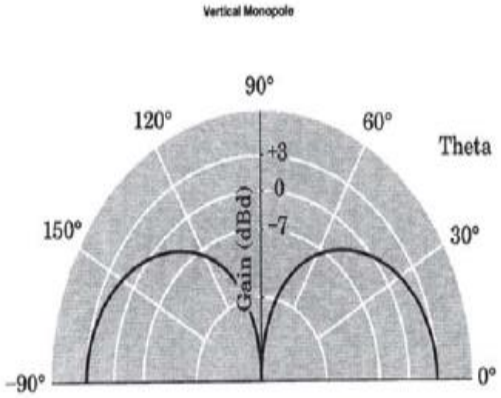


Figure 4. Upper hemispherical radiation pattern.

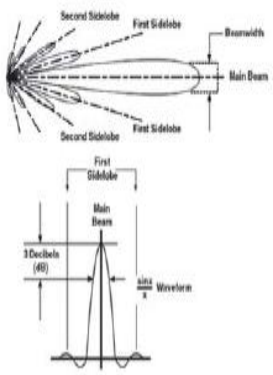


Figure 5. Antenna pattern showing main beam and side lobes.

DESIRED APERTURE DISTRIBUTION

For a more general case, the optimal aperture (in terms of both the size and the distribution) for the maximum penetration is investigated by two approaches: optimization and direct solving.

4.1 Optimization

Global optimization algorithms (such as Genetic Algorithm, Particle Swarm, Pattern Search, etc.) are widely used in electromagnetic problems. Genetic algorithm (GA) is applied to find the optimal aperture distribution in this work. To find the optimal aperture in this case, it is assumed that the aperture radius is fixed and only the distribution is optimized. For different aperture distributions of the same radius, 3dB near-field beam radius is calculated at a range of distances. This range is selected around expected best focus distance from the case of uniform aperture. Then, the minimum 3dB near-field beam radius in this range is selected as the fitness function which will be minimized by the means of GA. As for parameter to be tuned, low-order Fourier coefficients of current distribution are chosen. The purpose of this choice is to ensure the continuity and smoothness of resulting distribution. A sample of GA results, by using the above assumptions is presented here, for an aperture of radius equal to one wavelength (i.e. a = λ) in free space.

In this case a population of 20 genes is used and the algorithm converges after 51 generations. The amplitude and phase of resulting current distribution is shown in Fig. 6. Near-field co-polar component produced by such distribution is demonstrated in Fig. 7 at distances between 0.4λ and 0.8λ, also the 3dB near-field beam radius of this current distribution is plotted in Fig. 8.

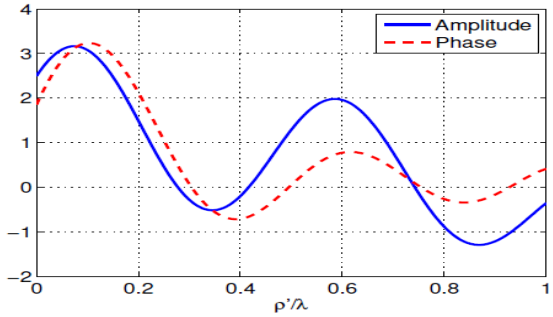


Fig. 6: Amplitude and phase of current distribution from GA.

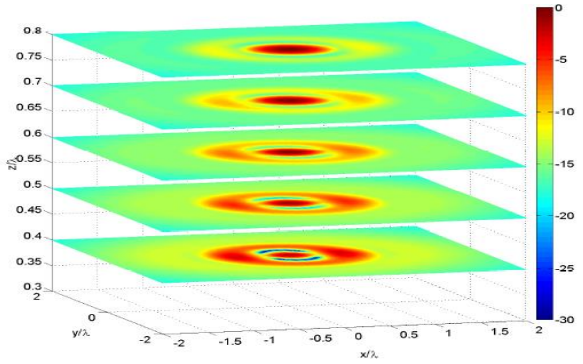


Fig. 7: Near-field co-polar component of GA optimized aperture.

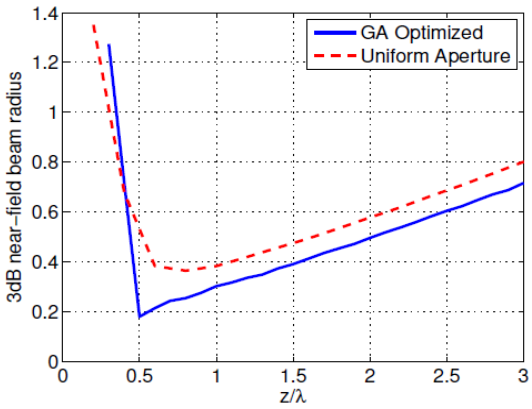


Fig. 8: 3dB near-field beam radius of GA optimized aperture.

4.2 Direct solving

Due to the linear nature of the problem, it is also possible to solve directly for the aperture distribution to have a desired field distribution at one or more z-cuts in the space. In order to do this, following approach is adopted. First, a discrete aperture distribution Jdis(ρ) and a desired field **E**goal are selected.

$$J(\rho') \approx J_{dis}(\rho') = \sum_{n=1}^{N} J_n \psi_n(\rho')$$

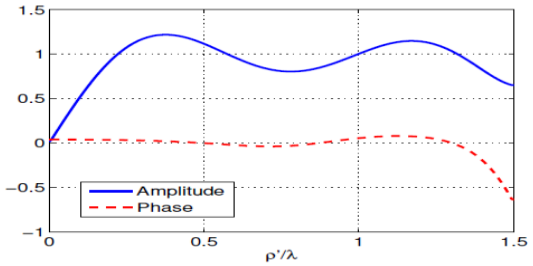


Fig. 9: Calculated amplitude and phase of current distribution by using the direct solving method.

CONCLUSION

In this paper, an optimized aperture is explored to accomplish the most extreme end fire directivity for a persistent line source with a uniform stage movement. It has been shown that the optimal aperture size for near field sensing applications depends on the spacing between the transmit and

the receive antennas and the material properties of the medium between the two, as the minimum near-field beam radius varies with both aperture size and loss for a uniform aperture distribution. For a more general case, the optimal aperture can be determined by two approaches: optimization algorithms and direct solving. The optimization algorithms are more useful when just the 3dB near-field beam radius is required to be small and there is no restriction on the actual field distribution. On the other hand, direct solving method can be used in cases where the field distribution also matters for the specific application.

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Cyber Terrorism: Threatful Purposes

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Abstract
The increasing dependencies on ICT have made the world a soft target for cyber terrorism. The electronic interface of all sets of information is easy to trace, interfere and interrupt. Cyber terrorism is an act of crime with a political agenda. The entire globe is on the target of cyber terrorists with their political agenda to create a new world order. The facilities that are providing convenience to the life of the public are being used to disrupt the lives of many. India is very prone to cyber terrorism. The present situation and location of India is putting it in a more threatful position. Age old threats from Pakistan & new tussles with China and its allies are challenging the sovereignty of India. CBI is continuously warning about the cyber-attacks. India has to combat smartly with these challenges through effective cyber-security and punishment legislations, better awareness, safe cyberspace and alert mechanisms. The present paper is descriptive in nature and deals with the different aspects of cyber terrorism. It tries to aware all about upcoming threats and patterns of cyber terrorism. The paper is a secondary data-based study.

Keywords
Cyber Terrorism, Pure Terrorism, Cyberspace, Cyber Security

INTRODUCTION

The advent of computers and information technology is indeed a second industrial revolution. It gripped everyday life so quickly, so strongly and so easily irrespective of one's location on the globe that a single moment cannot be spared without it. But the increasing dependencies on ICT have made the world a soft target for cyber terrorism, too. The electronic interface of all sets of information is easy to trace, interfere and interrupt. Sometimes cyber terrorism and cybercrime are mis understood as one and the same thing. Cybercrime is an act of crime committed for individual gain or reason to give a psychological or physical harm. Cyber terrorism is an act of crime with a political agenda.

The journey of development is full of threats. The world is gaining new heights of achievement daily. But the threatful purposes of cyber terrorists are not sparing anyone whether they are from any direction. Awareness and proper control are the only key to save oneself from such threats. The present paper is descriptive in nature and deals with the different aspects of cyber terrorism. It tries to aware all about upcoming threats and patterns of cyber terrorism. The paper is a secondary data-based study.

1.1 Terrorism

'Terrorism' is a well-defined and documented term. Prevention of Terrorism Bill, 2000(India, 2021) interprets terrorism as the use or threat for the purpose of advancing a political, religious or ideological cause of action which –
involves serious violence against any person or property,
endangers the live of any person, or
creates a serious risk to the health or safety of the public or a section of the public.

1.2 Cyber Terrorism

Terrorism is a heinous crime but Cyber terrorism is evil of evils. Cyber terrorism is using the technological dependency of the world as a tool for creating world disorder so that its malefic agenda may be operated. There are new methods, unfamiliar weapons and unknown locations by unidentified attackers with the 'harm' motive. Cyber terrorism is result in violence against person or property that led to death or bodily injury, explosions, severe economic loss, attacks against critical infrastructures depending on their impact(Denning, 2000).

Therefore, government of India framed and implemented Information Technology Act, 2000. The act was notified on 17 October 2000. It is the primary law in India dealing with cybercrime and e-commerce.

The act, unfortunately could not stop the unlawful attacks through and against ICT to coerce a government or its people. ICT was being used to prepare and distribute tool kit, to raise funds and to spread terror. Therefore, to prevent cyber terrorism, Information Technology Act, 2000 was amended as per global standards. Thus, Indian Information Technology (Amendment) Act, 2008 was laid down. However, no clear definition of cyber terrorism is mentioned in the said act. Section 66F of the Information Technology (Amendment) Act, 2008 reads as -

"(1) Whoever, —(A) with intent to threaten the unity, integrity, security or sovereignty of India or to strike terror in the people or any section of the people by—
(i) denying or cause the denial of access to any person authorised to access computer resource; or
(ii) attempting to penetrate or access a computer resource without authorisation or exceeding authorised access; or
(iii) introducing or causing to introduce any computer contaminant,

and by means of such conduct causes or is likely to cause death or injuries to persons or damage to or destruction of property or disrupts or knowing that it is likely to cause damage or disruption of supplies or services essential to the life of the community or adversely affect the critical information infrastructure specified under Section 70; or
(B) knowingly or intentionally penetrates or accesses a computer resource without authorisation or exceeding authorised access, and by means of such conduct obtains access to information, data or computer database that is restricted for reasons of the security of the State or foreign relations; or any restricted information, data or computer database, with reasons to believe that such information, data or computer database so obtained may be used to cause or likely to cause injury to the interests of the sovereignty and integrity of India, the security of the State, friendly relations with foreign States, public order, decency or morality, or in relation to contempt of court, defamation or incitement to an offence, or to the advantage of any foreign nation, group of individuals or otherwise, commits the offence of cyber terrorism.
(2) Whoever commits or conspires to commit cyber terrorism shall be punishable with imprisonment which may extend to imprisonment for life."
Physical Terrorism has two basic elements i.e., technological and instrumental elements. Technological element describes that terrorism is a political agenda for altering the constitutional order of the legitimately elected government of a country. While instrumental element describes that execution must be in such a manner that can create impressions of an inbound mental terror of human loss, disabilities or similar conduct. Now the *modus operandi* of instrumental element has shifted from human loss or disability to destruction and disruption through viruses, hacking, falsifying, blocking and mal-functioning of ICT based activities with the same objective.
On the other hand, cyberspace works as a platform for cyber terrorism. Cyberspace gives them global reach, risk free easy operation and quick result. Cybernetic attack can be cheaper and easier to execute than a physical attack, they are less dramatic and effective dam attack carried out in the real world (Weimann, 2004).

1.3 Pure Cyber Terrorism

The concept of 'pure' cyber terrorism — that is, terrorism activities that are carried out entirely (or primarily) — in the virtual world through internet. The Internet provides many different ways of anonymously meeting (as Darknet) with 'like-minded' individuals in a (comparatively) safe way.

IDENTIFYING CYBER TERRORISM

Cyber terrorism as mentioned earlier uses new and unidentified methods. These methods are based on the anomalies and weaknesses in the electronic data- languages. Some expected methods are –
A conventional weapon attack on a data transmission line (like JIO underwater line) or a computer facility.
An electromagnetic weapon attack through electromagnetic pulses to disrupt server, inter-connections, internet and software functionality.
A malicious code weapon attack to exploit the anomalies in software, to enter restricted areas, to hamper security and to damage circuits.

FORMS OF CYBER TERRORISM

3.1 Privacy Violation

The landmark case of Justice K.S. Puttaswamy (Retd.) vs. Union of India (Justice K.S. Puttaswamy (Retd.) vs. Union of India, 2018) gives due recognition to the right to privacy. It was not considered a fundamental right under the Indian Constitution before this case. Now, it is recognized as a fundamental right which is intrinsic under Article 21. Article 21 in the constitution of India, 1949 reads- "Protection of life and personal liberty. No person shall be deprived of his life or personal liberty except according to procedure established by law." Each person must be able to exercise a substantial degree of control over that data and its use. Data protection is legal safeguard to prevent misuse of information about individual person on a medium including computers (Singh, 2011).
Thus, individuals have a right to have in-violated personal cyberspace constitutionally. But the technology and cross-cultural influence made the human life sensitive enough for privacy to maintain. Section 66E of Information Technology Act, 2000 provides the protection of privacy of an individual and fixes the punishment. Therefore, violation of privacy is a cybercrime if dealt personally and a cyber terrorism if dealt for a political agenda.

3.2 Mal-information appropriation and Theft of Data

Information and Communication Technology can prove to be a powerful tool to misuse and steal valuables confidential government information and individuals' personal data. Some countries, put a check on the usage of computers and internet in order to protect valuable defence and sovereign secret information and data.

3.3 Violating E-Governance Base

Article 19(1)(a) of the Constitution of India reads that "all citizens shall have the right to freedom of speech and expression. This right also helped them to exercise their right to receive and impart information. Although, this is neither absolute nor intrinsic right. Through e-governance, government provides various public-information to the citizens and excesses their grievances. The cyber terrorist can take it as an opportunity to disrupt the ountry's integrity by attacking on e-governance system.

3.4 Destruction and Disruption of Network

ICT can be a smart weapon of destruction and distraction as seen in various terrorist attacks through GPS tracking of movements. ICT can be used in remote bombing, auto-pilot aircraft attacks, drone attacks, nuclear power plant mis-management, rail and flight network blockage, manipulation in bank and UID records, Income tax data and other similar patterns. WTT attack on 9/11 (Wright, 2006), Madrid on 11/3 (11 March 2004 Madrid Train Bombings), Bombay on 26/11 are some examples of destruction and distraction by cyber terrorists. The combination of internet

and computers can bring the security vulnerabilities at more fragile end.

CYBER TERRORISM IN THE WORLD

The developed countries are more vulnerable for cyber terrorism threats than other countries. Developed countries largely depend on ICT and its allied activities. Cyber terrorism is more fatal because methods are unidentified, weapons are unfamiliar and location is unknown. Such attackers use only one known location i.e., cyber space. Cyber space whereas brings in new opportunities, it also gives attackers a convenient access and society a new threat. Easy access of cyber space is a big problem. It can not be restricted. It is highly vulnerable to attacks. Hackers can control cyberspace and can disrupt stored data, misuse information because cyberspace updates itself automatically and continuously. These can impact a severe and dangerous dent to a country's integrity and sovereignty. Misuse of cyberspace can also bring in a stoppage in the ongoing developmental process of a country.

The large middle-class population in developing countries has low income and small savings. The cyber terrorism attempts can create a fear of loss of their hard-earned income and savings. This fear will restrain them from any digital financial inclusion. And, it is an established fact that without digital financial inclusion, a country with large population base will become only a crowd packed place.

This way, the entire globe is on the target of cyber terrorists with their political agenda to create a new world order. The facilities that are providing convenience to the life of the public are being used to disrupt the lives of many. Therefore, it becomes very necessary to secure cyberspace. Alone cyberspace, if protected, can bar multiple attempts of cyber terrorism attacks.

CYBER TERRORISM THREATS TO INDIA

India is very prone to cyber terrorism. The present situation and location of India is putting it in a more threatful position. Age old threats from Pakistan & new tussles with China and its allies are challenging the sovereignty of India. CBI is continuously warning about the cyber-attacks. CBI website was hacked by hackers in 2010 by 'Pakistani Cyber Army' (Correspondent, 2010). IGI faced cyberattack in 2013. A Virus named 'technical snag' attacked operations of T3 (Raman & Sharma, 2019). Bombay attacks on 26/11 were also backed by cyberspace supports. These are some popular examples, thousands of cases are there that may by quoted here. Recently, computer systems at one of country's nuclear power generation plants had been attacked by malware (singh, 2021). Following are some worth some points that show the vulnerability of India:

India is a welfare state. The delivery of development and welfare to every Indian is the responsibility of the government. The strong urge for standards of living and political commitments have created an urgent need for the ICT based delivery of services. Everything is linked with the internet and ICT.

India is a developing country. Most of the Indian citizens are from middle income group for lower income group. They have less capital and less savings that lead to less income generation. The security of their less income capacity for the drives them to draw back from Technology interfaces. They are severely grade of cyber frauds attacks. These situations hamper the development speed of India. Therefore, cyber terrorism directly and indirectly bars the development and growth process of India.

India's near future is vested in effective dissemination of education to all. There are remote and hill places where teacher and school can not reach in time. Government in this move, is planning to distribute tablets and laptops so that every child can be armed with the power of education irrespective of location. Therefore, this hardware and software-based power can be disarmed with a single attack of cyberterrorism.

The latest covid vaccination drive of India is fully backed up by the cyber support. Fresh threats of another variant of covid are coming. Without proper cyber support, no further drive is possible to handle. Therefore, disruption in such cyber supports can cause big loss to India.

Military equipment is largely operational with the digital technological and ICT setups. Weak security systems and errors in ICT can cater to the 'harm' motives of the cyber terrorists.

CONCLUSION

Time is very crucial for India as well as for world. The ongoing process of India's development is also not being digested by many other countries. Cyber terrorism and pure cyber terrorism are easier and have more strong 'harm' motives. India has to combat smartly with these challenges through effective cyber-security and punishment legislations, better awareness, safe cyberspace and alert mechanisms.

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Using a Suggested Strategy for Electronic Hajj Reservation

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Abstract
Everyone knows the extent of the importance of Hajj in the life of every Muslim, as it is one of the obligations of Islam and one of its five pillars, and it is imposed on every adult Muslim who can perform Hajj for once in his life and it is a command from God that will not change and will not change and will not stop and use all methods to facilitate this obligation and all modern technologies and techniques to serve the pilgrims in a continuous manner forever. On the other hand, to keep the Hajj away from all worldly subjects and make the Hajj ritual with the utmost transparency, also Permission to perform Hajj must be not permitted Hajj to a specific group according to a party or official in the state or those have money and influence or granted to people who performed this duty more than once time at the expense of other people that did not perform Hajj before due to the lack of an opportunity to perform the Hajj rituals due to the use of the lottery mechanism in the distribution. This was the idea of this application for the Hajj and Umrah Authority in the Kingdom of Saudi Arabia to be responsible or for this body to be a global Hajj organization whose representatives are chosen from every country in the world, and the Muslim registers directly in the application and gets the result directly without interference by any party Official and according to the points obtained through the information entered by any person who registers in Al-Hajj Registration Application.

Keywords
Hajj, Reservation, Application, Registration, Hajj Rituals, Permission.

INTRODUCTION

Hajj in Islam is a place that Muslims intend to perform the obligatory rituals and perform the legal rituals specified in the Qur'an and the Sunnah and in the months that God Almighty has assigned to perform the obligatory duty, and the existence of an application such as the registration application for Hajj needs and calls for focusing on training and preparing technical and technical cadres, including specialists in electronic media, technicians, experts, and consultants, preparing field studies and specialized research, developing performance and monitoring the volume of interaction or electronic turnout on these projects by opening comments.[6][7] And that the efforts of media projects (newspapers, websites, groups, activists) should be grouped and unified as much as possible into collective enlarged activities, instead of being dispersed into similar and repeated activities that waste effort and disperse competencies, and does not make the money spent in these similar competing activities an added value, unlike what Western entrepreneurs are doing it right now, Where the idea of grouping activities, alliance and merging between similar projects is spread in developed countries, to benefit from pooling investments, competencies and funds in mega projects that control the largest number of minds in the world.[3][5] At the last Hajj season and amid strict health measures due to fears of the spread of the Coronavirus among the pilgrims, about 10 thousand only residents participated in the rituals, compared to about 2.5 million Muslims who attended the previous year, after a selection process carried out by the authorities that some considered vague, as it witnessed the acceptance of requests and the rejection of numbers Another great.[4][8][9]

2.PROBLEM DEFINITION:

Previously, the Ministry of Awqaf used to select pilgrims according to their ages, i.e. the oldest then the youngest, and so on. Then the lottery mechanism was introduced in the selection process, and the lottery mechanism takes place because the number of requests submitted by citizens, in most years, exceeds the number agreed upon with the Saudi authorities, and therefore the lottery resolves this congestion in submitting applications by those wishing to perform Hajj.
The procedure of the lottery is accompanied by many observations about its implementation, sometimes some problems that weaken the required transparency and the necessary publicity, and this is illustrated by the following points:
1- The use of the lottery every year, regardless of the year in which the citizen applied for Hajj, deprives citizens who have wanted to perform Hajj for years and were not lucky in the lottery, and it may give the opportunity to a person who applied for Hajj this year only, as who applied for several years ago, Thus, the lottery in this way cancels the idea of priority for the seniority of the application and equalizes between those who applied for Hajj once and those who repeat the application every year.
2- The lottery mechanism, regardless of age, reduces the chances for the elderly, as the lottery in this way gives the same opportunity to the elderly and young people, which may deprive adults of Hajj later because of the increased possibility of illness, death or old age, or force them to repeat the request, The same conditions, in the following years.

3- The lack of an international website and international application concerned with the matter of the pilgrims through which every Muslim can apply for the Hajj, and follow up his data and the extent of his obtaining permission to perform Hajj directly after registration in the application. The Hajj and Umrah companies, some of these agencies or companies do their work to facilitate the task for the pilgrim and take over the matters of his registration and obtain the necessary approvals to perform the rituals of Hajj for a certain amount of money.[1][2][10] This matter encourages some weak souls in several countries to convert it into private trade and obtain from it on the exaggerated money led to the decline of the Hajj and the difficulty of performing it, especially for those with limited income. For this reason, the existence of the Hajj Registration application eliminates the presence of these intermediary companies and the pilgrim will be responsible for his data and follow-up to obtain a Hajj license.

Since Hajj is one of the pillars of Islam and a basic obligation, it means that the data that every person enters for Hajj must be correct, else the Hajj is considered invalid because it was established on a false basis such as lying and fabricating facts, and this is contrary to the true goal of Hajj and obtaining the pleasure of God, so there is no need to request identification documents for the person, but it can be requested for verification in the event of an inadvertent error.

3. APPLICATION STEPS:

1- The application starts from the first interface through which registration in the application or login is done in order to know the situation and is his name for those who are allowed to perform Hajj for that year.

Figure (1)

2- The following interface is in which the pilgrim's name, age, gender, and whether there are previous visits and the number of previous visits are entered, and there is an accompanying pilgrim.

3- After entering the data, it will be processed to fulfill the conditions of the Hajj, for example, if the age is less than 15 years, its data will be rejected and deleted, and the other case, if it is over 75 years, must have an accompanying person. If the age is less than 45 and the gender is female, there must be an accompanying person. If the pilgrim has a chronic disease or has a disability, he needs an accompanying person.

4- An interface for entering the data of the accompanying person.

5- After completing this data, it is stored in the database to serve as a bank of information on all pilgrims, which is modified every year by every pilgrim wishing to perform the rituals of Hajj.

6- The processing of this data begins and the new idea here is to give each paragraph a certain weight, where the person who is more than 75 years old is given 10 points to be in his balance and the person between 75 and 71 gives 9 points and between 70 and 71 gives 8 and so on to the lowest age is between 20 and 13 years have three points, which show in the table no. (1):

7- Every person who wants to perform the rituals of Hajj and does not have any previous experience, or the first time that he will visit the holy places will give 10 points. As for the person who has one visit and wants to repeat it, he gives 9 points, and the person who has two visits gives 8 points, and so on until we reach people They have seven or more pilgrimage visits, where they are excluded and are not allowed to visit in order to give a chance to those who were not able to perform the Hajj as in the following table.

The age	weight	No. of visits	weight
Age > 75	**10**	**0**	**10**
75 – 71	**9**	**1**	**9**
70 – 61	**8**	**2**	**8**
60 – 51	**7**	**3**	**7**
50 – 41	**6**	**4**	**6**
40 – 31	**5**	**5**	**5**
30 - 21	**4**	**6**	**4**
20 - 13	**3**	**7**	**3**
13 > Age	**-**	**more**	**-**

Table no. (1)

8- A person who has a companion is given two degrees of preference over one who does not have a companion.

9- Those that have a group of companions who were three, five or more are given 5 points, and one of them (who know that his score is the best among them) are be in the table of pilgrims and the rest in the table of companions.

10- Those with low incomes are given 5 points (to encourage the poor and those with limited incomes to perform the Hajj).

11- A person with a disability is given 15 points.

12- A person with chronic illness is given two points for each disease.

13- If his profession is a doctor, a person is given 10 points to be accompanied by the medical team for the pilgrimage caravan.

14- After completing the calculation of the balance of each person, then they are arranged according to the amount of the balance for each one.

4. EXPERIMENTAL RESULTS:

After entering the data of any person who wishes to register to perform the rituals of Hajj, he chooses the name of the country to which he belongs, for example from Iraq, the data will be stored in a special table for this country as in the following table no.(2):

The Republic Of Iraq
Al Hajj Season For 1942 Or 2020
List Of The Names Of The Pilgrims Who Obtained Permission To Perform The Hajj
Congratulate You, And May God Accept Your Deeds

Pilgrim's Id	First Name	Second Name	Third Name	Birthday	Gender	No. Of Visits	Address	Chronic Diseases1	Chronic Diseases2	Chronic Diseases3	The Type Of Disability, If Any	Companion Id	Companion Name	No. Of Companio n
2579	Asma	Salem	Fathy	11/ 5/1965	Female	0	Mosul/Hi Al-Shrta	_	_	_	_	7883	Ayad Ali	1
2580	Kyss	Lukman	Faysal	9/4/1999	Male	0	Wasit/Alnor	_	_	_	_	_	_	_
2581	Ahmad	Yunis	Ibraheem	7/12/1960	Male	2	Bahgdad/Alamrya	Diabetic	_	_	_	_	_	_
2582	Mazin	Waleed	Raeed	8/8/1975	Male	0	Bahgdad/Aljadrya	_	_	_	Hemiplegia	2218	Saad Mazin	1
2583	Mahdya	Sulyman	Naji	5/3/1966	Female	0	Thikar/Alsamiya	Blood Pressure	Diabetic		_	133	Marym Ashraf	5
2584	Muhamad	Hassn	Muhamad	21/5/1988	Male	1	Bahgdad/Alaathamya	_	_	_	_	_	_	_
2585	Gasim	Syed	Ali	23/4/1978	Male	1	Dyala/Khansaad	_	_	_	_	_	_	_

Table no. (2)

After the data of hundreds or thousands of those who wish to perform the rituals of Hajj are stored, processing begins the data and setting weights for the entered data and then calculating the balance of each person and storing it in the database. The next step is to arrange the names in descending order according to the balance of each person. Table No. (3) Represents a sample of the table obtained by any person who enters his data into the application.

The Republic Of Iraq
Al Hajj Season For 1942 Or 2020
List Of The Names Of The Pilgrims Who Obtained Permission To Perform The Hajj
Congratulate You, And May God Accept Your Deeds

Sequence	Pilgrim's Balance	Id No.	First Name	Second Name	Third Name	Birthday	Gender
3010	15	222	Fathy	Salem	Yunis	11/ 6/1965	Female
3011	15	3070	Ali	Faysal	Haydar	22/2/1999	Male
3012	15	2011	Faeza	Ibraheem	Saleem	17/1/1960	Female
3013	15	1180	Zhraa	Zyad	Ahmad	5/5/19765	Female
3014	14	1066	Layla	Sami	Nagm	5/12/1961	Female
3015	14	2584	Muhamad	Hassn	Muhamad	21/5/1988	Male
3016	14	3300	Samir	Syed	Waad	3/8/1972	Male

Table no. (3)

5. DISCUSSION:

1- In case of two persons have the same balance for differentiation between them can based on the date of birth and in the worst cases that the date of birth is identical. The choice between them is made on the basis of the alphabetical order of the name.
2- The weights that are given to each person registered in this application are experimental weights that can be changed according to a field study carried out by a specialized committee for the data of pilgrims for the past years that have been adopted in setting the appropriate weights for each case.

6. RECOMMENDATIONS:

1) The necessity of having a team to work behind the scenes in this application, where its members are specialized, each according to his field, to achieve integration and success in the end, and successful work requires a technical team, a media team, a consulting team, and the application of the Hajj needs a legitimate team as well.

2) Staying away from sectarian and political differences to achieve the greatest amount of universality and spread.
3) Availability of institutional and technical support specialized in work written by the Saudi government.

7. CONCLUSIONS:

Creating an electronic application for Hajj is not a new and unfamiliar matter, but the aim of designing such an application is to use a new idea to differentiate between the pilgrims and to give each case a certain weight so that the differentiation between them will be based on a great deal of transparency and fairness by which the shares of each country are distributed and the fairness of distribution in any country depends on The data of the person applying for the Hajj without any interference from any official or unofficial authority and without imposing additional fees for intermediaries and reducing opportunities for corruption through which some mediators give permissions to people who do not meet the special conditions but are granted for intermediary's private interest only. In the end, the result is lists of names of pilgrims who get the Approval to perform the rituals of Hajj so that each pilgrim knows his position and sequence in the list and the percentage of obtaining this approval to perform the rituals of Hajj for this year or the next year.

8. FUTURE WORKS:

1) Add another corner for fatwas on matters of Hajj and Umrah.
2) Working on adding services for the possibility of reservation for Umrah as well.
3) It is possible to add another service, such as providing a flight reservation service or road vehicles for a pilgrim who has obtained permission to perform Hajj?
4) As well as providing a reservation service for hotels and places of residence and various offers, each according to his financial capabilities.
5) It is possible to add educational angles that include text files or video files and others in order to teach the rituals of Hajj in order to avoid many of the mistakes that are made by the pilgrims due to the lack of information.

Multilingualism of this content in order to facilitate registration for the Hajj by the largest number of Muslims with different languages.

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A Robust Approach to detect Real Time Facial Emotions of Multiple Faces Using Deep Learning

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Abstract
Facial expression is a gesture developed with the facial muscles that communicates the individual's emotional state to the observer. As AI technology advances, robots/machines must learn to recognize human emotions in order to communicate effectively. Using the Deep Convolutional Neural Network (DCNN) technique, we examine the face expression to detect emotion using deep learning. The proposed system is trained and evaluated in real time using the ADFES-BIV dataset. In the training phase, transfer learning technique is used to extract features from pictures as well as video and a haar-cascade classifier is employed to detect the presence of face/faces in a frame. The Facial Action Coding System (FACS) recognizes five universal emotions: happy, sad, neutral, surprise and anger in addition to it some micro emotions such as contempt, embarrass, fear, disgust and pride also can be detected by a person's face. It can recognize many facial emotions at the same time. The system achieved a training accuracy of 81.67%.

Keywords
Convolutional Neural Network, Classifier, Feature Extraction, Face Detection, Facial emotion, real time, multiple faces, Image, video, Transfer Learning, multiple faces

INTRODUCTION

Facial expression is a way of expressing our feelings, thoughts, and emotions without having to speak to others. Facial Expression is a type of non-verbal communication. When we travel around the world and meet individuals who speak various languages, our facial expressions and gestures play a significant role in bringing us together. Developing an automatic Facial Expression Recognition System (FERS) for facial activity analysis is a constant source of inspiration for image processing researchers. Machine Learning is now a basic component of Artificial Intelligence, and Emotion Recognition in photos and videos is the most popular use of AI. As technology advances, robots/machines will be required to comprehend human emotions in order to communicate effectively. Since the use of emotion recognition has grown over the last decade, there has been a lot of research in the field of picture processing. Using Transfer Learning, this research study focuses on the deep learning notion of recognizing a person's emotions in real time as well as through images. The standard Facial Expression Recognition (FER) process consists of three major steps: image preprocessing, feature extraction from the image, and expression characterization. The placement of the facial areas is taken into account when detecting faces. The quantity of resources required for feature extraction processing is minimized, and the output must be vital and useful information for future analysis, increasing the learnt model's correctness. When an observer expresses his or her emotions, certain crucial face characteristics alter frequently. As a result, comparable components in diverse representations of emotions have different placements, which aids in accurately re-cognizing the emotions. Such system can be used in monitoring applications.

2.LITERATURE REVIEW

Face-regions-based facial expression recognition [1]: They developed an Interface technique to recognize facial landmarks using basic states of emotion recognition in their work. The ROIs are then enlarged and partitioned into blocks in the preprocessing stage before executing the feature extraction to create a face feature as a multiclass Support Vector Machine for emotion detection. The database used in this case is CK, and the accuracy achieved is 89.85%.

Deep Networks are used in a new method for automatic face expression recognition and classification [2]. They employed a three-layer CNN network, followed by max pooling and ReLU, to recognize emotions. The FER2013 dataset was used to train the network, and the RaFD dataset was used for testing. The model achieves a 68 % accuracy rate.

Based on Personalized photos dataset, Online Facial Expression Recognition system [3]: They used an online facial expression recognition framework based on a customizable display in their article. The network was trained using a Personalized Gallery of 9 people, with 85 percent accuracy for familiar people and 65 percent for strangers.

Face Detection and Recognition [4] is a method for detecting and recognizing people's faces. It is demonstrated in this work that by combining the two techniques, the Jones algorithm and principle component analysis, fast detection and great accuracy can be achieved. They used a dataset of over 1000 photos to test their system, and the accuracy was 90%.

The Six Facial Expressions Hexagon (SFEH) Model was used to identify facial expressions [5]: They suggested a model that depicts six facial emotions on six edges of a surface hexagon at the exterior border of the face. In this study, around 900 points are used for the full face, and coordinating is completed by taking the contrast between the

corresponding pixels. AR and grammatical facial expression datasets were employed, and accuracy was 81% with AR.
The features that include SIFT, HG, and MFs were retrieved after preprocessing in this research. GEMEP-FERA is the database used, and the overall accuracy is 80%. Recognize the temporal periods of facial motions completely automatically [6].
Deep Learning for Detecting Human Emotions from Facial Expressions [7]: They used a dataset including a
variety of facial expressions to train the machine. As a classifier, a three-layered CNN is used, as CNN neural networks have the highest accuracy rate when compared to other neural network-based classifiers. The database used was FER2013, and the accuracy was found to be 79.8%.

3. METHODOLOGY

In the proposed method, initially system is trained using the ADFES-BIV dataset with Transfer learning, which contains roughly 653 photos and ten different emotions (Happy, Sad, Anger, Neutral, Embarrass, Fear, Contempt, Pride, Disgust and Surprise). Transfer learning for AlexNet is used to train the dataset by fine-tuning the pre-trained model. The model is then used to predict emotions in real time via the webcam as well as from static images provided manually once trained.

3.1 Dataset

The model is trained using the Facial Expression Recognition (ADFES-BIV) dataset. 13 frames were extracted from the video and converted to gray scale. To train our model, we used 223 pictures of ten emotions. Happy, Sad, Angry, Surprise, Pride, Embarrass, Fear, Contempt, Disgust and Neutral are the ten emotions that our model can detect. 70% of photos are used as training data, while 30% of images are used as validation data, out of a total of 653 images. Figure 2 shows various photos from the ADFES-BIV dataset.

Fig.1. Sample photographs taken from ADFES-BIV Dataset [8]

3.2 Convolutional Neural Network

The model employs the Convolutional Neural Network (CNN) method, which provides the highest level of accuracy when compared to other neural networks. CNNs are commonly used in image detection, object detection, image recognition, and face recognition, among other applications. The input image is seen by computer as array of pixels. When CNN receives an input image, it will resize it, preprocess it, and then classify it using the data collected during the model's training. Figure 3 depicts the CNN neural network's design.
AlexNet is a convolutional neural network (CNN) architecture created by Alex Krizhevsky, Ilya Sutskever, and Geoffrey Hinton in cooperation. AlexNet had eight layers: the first five were convolutional layers, followed by max-pooling layers in some cases, and the final three were fully linked layers. It employed the non-saturating ReLU activation function, which outperformed tanh and sigmoid in terms of training performance.

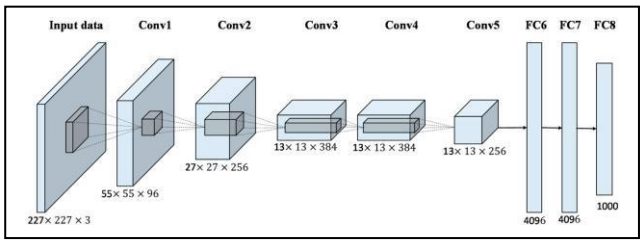

Fig.2. Architecture of AlexNet [9]

Maxpooling The pooling layer is a component of a convolutional neural network, and max pooling is the most well-known way of pooling. It selects the greatest number of features from the feature map. As a result, the feature map created after the max pooling layer contains the most relevant features from the prior features map. Figure 2 shows how to use the maxpooling layer (4).

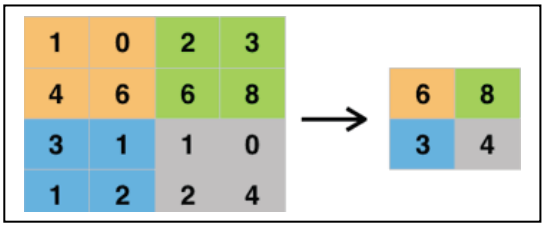

Fig.3. Maxpooling layer [10]

Exponential Linear Unit (ELU) is the abbreviation for Exponential Linear Unit. Elu was employed to set the threshold value in our suggested model. It is an activation function that gives accurate results and tends to converge the cost to zero faster. In comparison to other activation functions, ELU has an additional constant alpha, which must be positive. Except for the negative inputs, it's comparable to RELU. When ELU's output equals alpha, it begins to smooth slowly, whereas RELU smoothes quickly.

$$R(z) = \begin{cases} z & z > 0 \\ \alpha.(e^z - 1) & z <= 0 \end{cases} \quad (1)$$

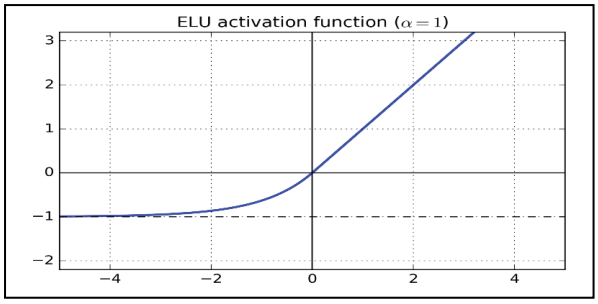

Fig.4. ELU activation function [11]

The **SoftMax** layer is utilized as the last layer at the conclusion of the network in Deep Learning, notably in Convolutional Neural Networks, to produce the actual probability scores for each section or class label. It's quite

valuable because it transforms to a normalized frequency distribution, which can then be used as an input by other systems. Just before the output layer, it's implemented. The softmax formula can be seen below. Many researchers have studied and did experiments and observed the validation accuracies with different training options.

$$\sigma(\vec{z})_i = \frac{e^{z_i}}{\sum_{j=1}^{K} e^{z_j}}$$

(2)

Fully-Connected Layer Each node in a Fully-Linked Layer is connected to all nodes in the preceding layer, whereas the convolutional layer creates local connections.

3.3 Transfer Learning

Transfer learning is frequently used in deep learning applications. We can opt a pre-trained network and use it as a starting point to learn a new task. Fine-tuning a network with transfer learning is usually much faster and easier than training a network with randomly initialized weights from scratch. We can quickly transfer learned features to a new task using a smaller number of training images. By fine tuning pre-trained AlexNet i.e. replacing fully connected, classification and Softmax layers.

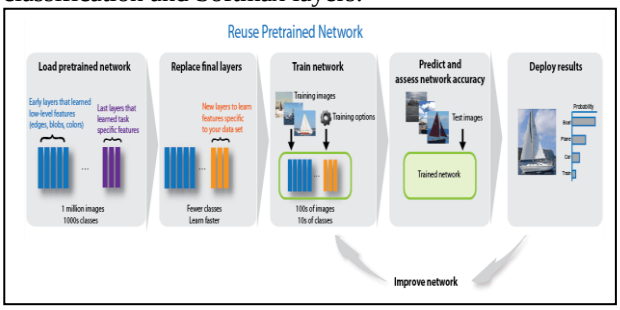

Fig.5. Transfer learning [12]

Below are the accuracies based on architecture used using Transfer Learning:

TABLE1. TESTING ACCURACIES OF CNN ARCHITECTURES

Architecture Used	Pre-trained with Dataset	Accuracy (%)
GoogLeNet	With ImageNet	62.96%
CaffeNet	With ImageNet	68.05%
VGC16	With ImageNet	68.24%
Residual Network	With ImageNet	69.65%

4. IMPLEMENTATION

As per proposed model explained in the figure (6), we have started with training process to train the network with pre-trained model by replacing some layers of AlexNet network with some training options. Once model is trained with given data then Face detection, facial feature extraction and emotion prediction of multiple faces in live feed or through webcam is achieved. Performed steps are elaborated below:

4.1 Pre- processing of data

To create a dataset, 13 frames were extracted from each input video of ADFES. The extracted frames were converted to grey-scale. Histogram Equalization was applied to the frames to adjust the contrast and get an image clearer than the original.

4.2 Training Model

To Train model with particular dataset we had to execute below steps:

1) *Load Data* Above set of images are copied to a Train folder which is pre-processed in 227x227x3 size as AlexNet requires input size in the same format.
2) *Replacement of Layers* Replace the last three layers Fully Connected layer, Softmax layer and Classification layer.
3) *Training Dataset* After replacing layers, Dataset is trained with pre-learned AlexNet and results are saved.

4.3 Face Detection

Faces are detected in the live video frames using haar cascade classifier. Same method is applied in case of face detection in the static images to detect multiple faces in image.

4.4 Resize detected faces

In the previous process, faces regions are detected in a live video taken from webcam are cropped to extract an actual face region. It will be cropped in size 227x227x3 to extort most accurate facial features to predict emotion.

4.5 Emotion prediction

Using pre-trained model, on basis of the extracted facial feature emotion is predicted. Later, if there are more faces in the live feed taken through webcam then it detects through Viola Jones algorithm and above process is repeated. Same process is followed when until webcam is ON. In case of static images, above process is followed and program is ended once all faces are detected and emotions are predicted for them.

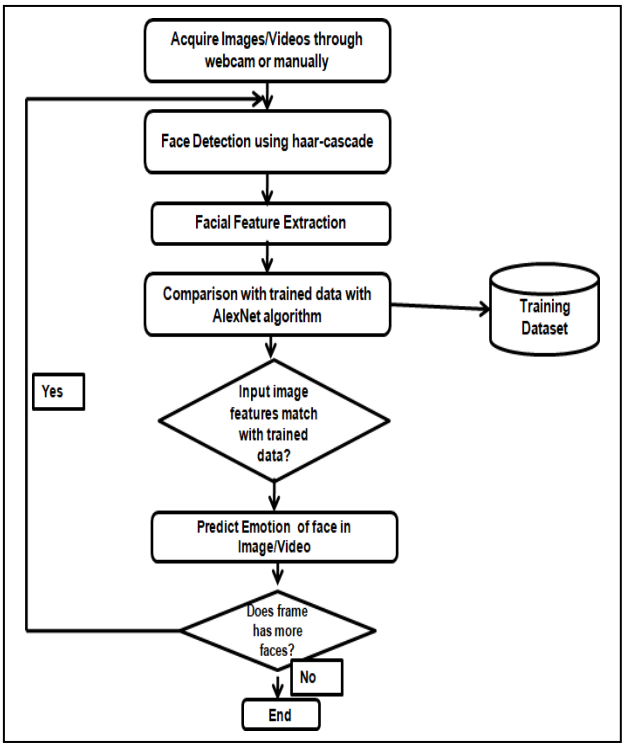

Fig. 6. Flowchart for real time facial emotion detection system for multiple faces

5. EXPERIMENT RESULT

In the final run of the model, the proposed model is trained for 40 epochs at a learning rate of 0.0001. Our model was trained with 653 photos in MATLAB 2020a. For validation 30% of the given data is selected. This model has used pre-trained AlexNet and the Haar-cascade classifier to categorize the emotions captured live from the webcam. Happy, Sad, Angry, Surprise, Pride, Disgust, Contempt, Embarrass, Fear and Neutral are the five emotions that our model can detect. The model's accuracy during training is 81.67%. We ran the Convolutional Neural Network numerous times to assess the model's accuracy, and we completed our final run on a device with a CPU and 4GB of RAM.

TABLE2. ACCURACY FOR PROPOSED MODEL

Architecture Used	**Pre-Trained with dataset**	**Accuracy (%)**
AlexNet(Proposed Model)	With ImageNet	81.67%

Here is the Confusion Matrix of the training model which defines the performance of training model. The accuracy of the model is 81.67% and gives better results.

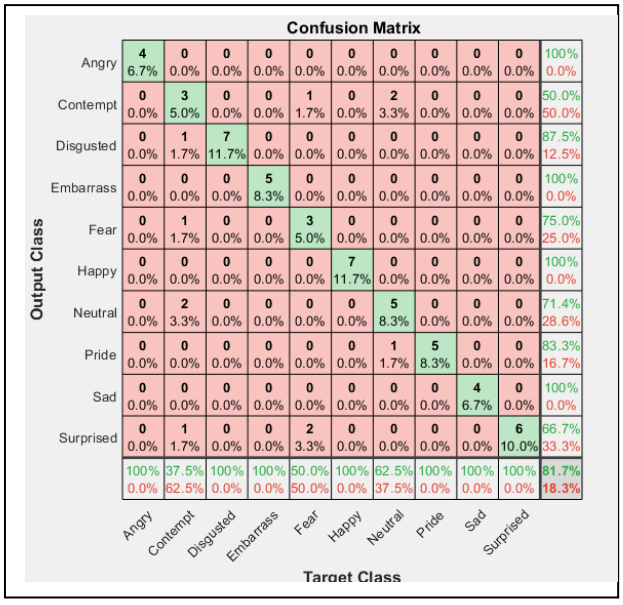

Fig 7. Confusion Matrix after Training ADFES-BIV dataset

Below is the training graph where we can see the training accuracy and validation accuracy. The other graph shows the data loss which defines the performance of the model. Dark blue line indicates the smooth training graph and light blue line indicates normal training progress.

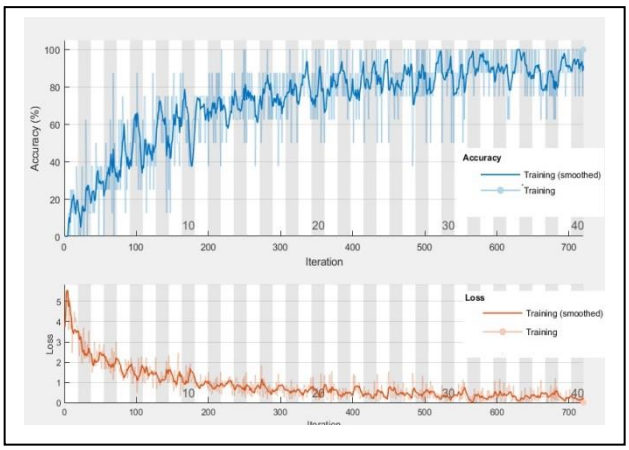

Fig.8. Training progress graph

Some testing results from the webcam video/live feed and static images is as below:

Fig.9 (a) multiple faces detected in a frame and recognized as „Happy" emotions in an input image

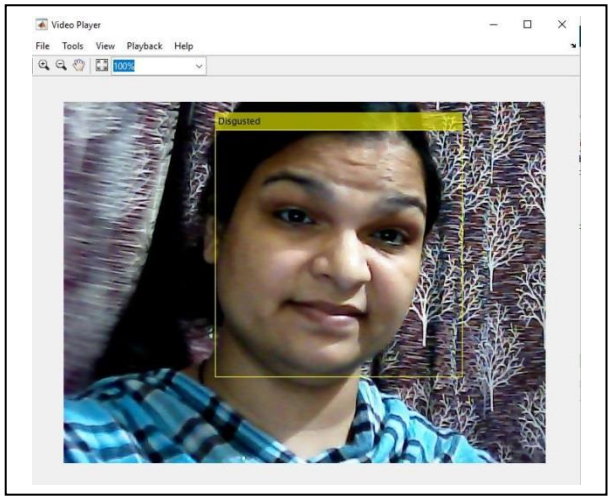

Fig.9 (b) A face detected in a frame of real time video and recognized "Disgusted" emotion

VII. FUTURE WORK

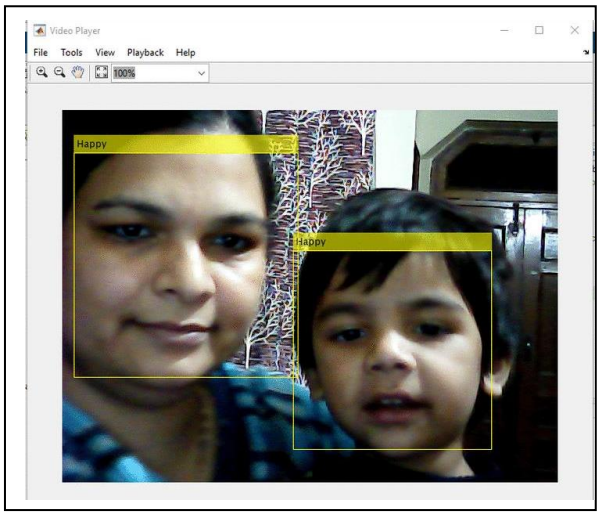

Fig.9(c) Two faces are detected in a frame of a real time video and recognized "Happy" emotions

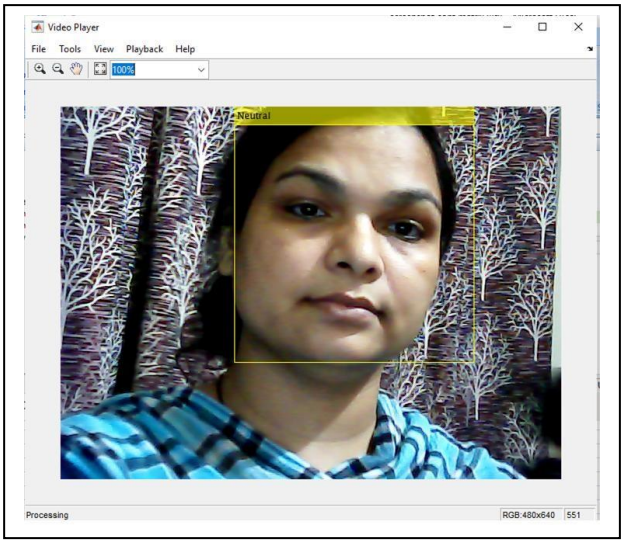

Fig.9 (d) A face is detected in a frame of real time video and recognized "Neutral" emotion

CONCLUSION

FERS (Automatic Facial Expression Recognition System) offers a wide range of applications, ranging from security to engaging with people who are verbally challenged. With the proposed approach we can detect emotions of the multiple faces real time as well as from static images with improved accuracy. During testing it has successfully identified the different 10 types of emotions i.e. happy, angry, sad, fear, disgust, contempt, pride, neutral, embarrass and surprised in a single frame.

The proposed system cannot detect emotions when face is tilted or at different angle due to lack of the database. We will employ this approach on larger datasets in the future, as well as different machine learning algorithms such as reinforcement learning so that system can learn in real time.

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Design and Implementation of Social Distancing Monitoring Robot with Face Mask and Temperature detection using IoT and its Applications

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Abstract
COVID-19 transmits when people breathe in air contaminated by droplets and small airborne particles containing the virus. The risk of breathing this is higher when people are close. So, we come up with a low-cost internet of things (IoT) compliant social distancing monitoring robot that ensures physical distance, monitors body temperature, Detect Face Mask and warns attendees and managers of violations. The problems found in existing ideology were that the system for social distancing monitoring was distributed and was not easy to set up. The system was also immovable without manual support and can monitor fix distance only. Therefore, our present research focuses on building social distancing monitoring robot that is not distributed and is easy to set up. The robot contains multiple sensors that connect to the central server using IoT. Server data can be used to process compliance, real-time monitoring, and planning purposes.

Keywords
Social distancing, Queue management, Face mask detection, Temperature detection, IoT, COVID-19

INTRODUCTION

The COVID-19 pandemic has caused significant disturbance to daily life around the world. As of October 1, 2021, there have been 233 hundred million confirmed cases worldwide with more than 4 million deaths. One of the best ways to prevent contracting COVID-19 is by preventing the exposure to coronavirus. This can be done by following a few steps. The Centers for Disease Control and Prevention (CDC) have recommended many guidelines including maintaining a social distancing of at least 2 meters, using a facemask, and washing your hands frequently. Coronaviruses are spherical RNA viruses with protein spikes protruding from the surface providing it a crown-like look. It is extremely contagious with a 1–14 days incubation period (this is the time during which the patients exhibit no symptoms); technically termed as SARS-CoV-2 or β-coronavirus.
Keeping all these in mind, we concluded to work on a project that is reliable enough to prevent extracting COVID-19 to a greater extent as per the guidelines.A social distance measuring robot is essential in crowded places and even with the surrounding of more than 2 individuals. Also, it will check the individual with the face mask along with the temperature detection. The project is brought into action with the help of the Internet of Things and its applications.
Design and Setup

The robot is considered for the queue management checks with social distancing, face mask detection, temperature checks. It also keeps a check for the number of people entering the space, also if any COVID-19 symptoms found before entering, their face mask detection, their body temperature, the distance between the queued customers, and distance between the customer and the official counters, as shown in the Figure. Infrared obstacles detectors are used in order to keep a count of the incoming and exiting individuals at the entrance and the exit points, specifying a required measure of the number of people per square meter. As soon as the individuals enter the halls, they are required to answer the COVID-19 symptom-related questionnaire which is further linked to the dashboard. They are then allowed to move on for the body temperature measurement using a non-contact IR temperature sensor. When queuing at the customer service or payment counter, addressable LED is used to visually display the permissible locations of the queues. As soon as the robot encounters people entering in the area to form a queue, it specifies the given distance of about 2 meters to stand apart from each other.
Individuals and managers are sent an alert if the minimum distance between people is violated in the queue. A Raspberry Pi (RPi) wide-angle camera module is also used in the project to detect any violation in

minimum distance between the queued individuals. The system alerts if an individual strays into an impermissible area for more than 5s. As real distance measurement is not required, this setup is sufficient to ensure social distancing compliance. All the data is stored in the Cloud and further sent to the server.

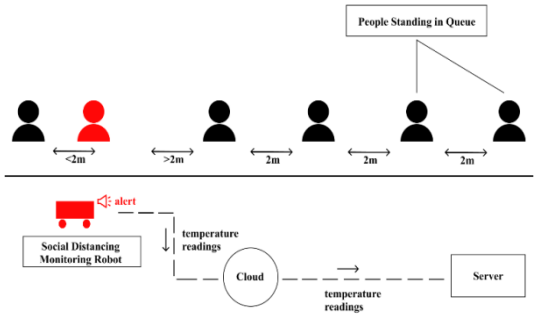

Fig.1. Design Layout for Social Distance Monitoring

2. Technical Description

2.1 Camera

Camera will be used to for detecting whether the person standing in a queue is wearing a face mask or not.

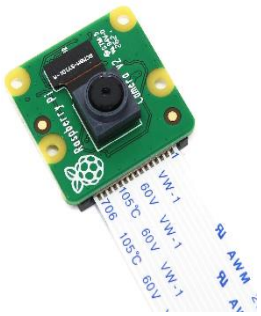

Fig. 2. Camera

2.2 Infrared Temperature Sensors

We use IR sensors for non-contact temperature readings. These sensors work by focusing the infrared energy emitted by an object onto one or more photo detectors. These photo detectors convert that energy into electrical signal, which proportional to the infrared energy emitted by the object.

Fig. 3. Infrared Temperature Sensors

2.2. Ultrasonic Temperature Sensor

Ultrasonic sensors work by sending out a sound wave at a frequency above the range of human hearing. The sensors determine the distance to a target by measuring time lapses between the sending and receiving of ultrasonic pulse. We use this for distance measuring between the consecutive individuals.

Fig. 4. Ultrasonic Temperature Sensor

2.3 Buzzer

Buzzer makes the sound when it receives a signal. The buzzer will make a sound when person is not maintaining social distance.

Fig. 5. Buzzer

2.4 Raspberry Pi

Raspberry Pi is a series of small single-board computers. Its low cost and enough powerful to control our robot. It works on python language and best fits for other components to create an environment and also operates on low power consumption hence fits best for our system.

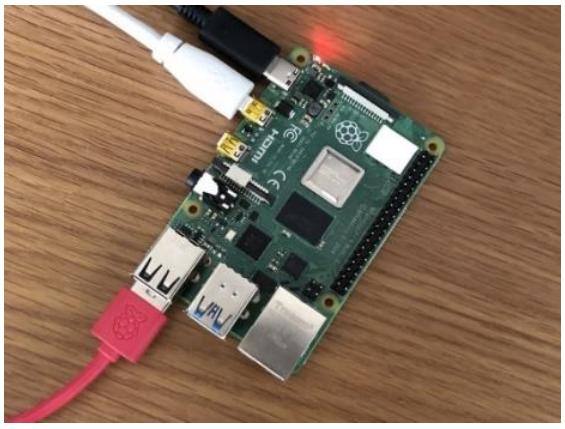

Fig. 6. Raspberry Pi

2.5 Application / Website

By using Application/Website the temperature readings of individuals standing in queue will be sent to server.
Implementation and Results

To test the prototype, we asked volunteers to stand in a queue. We placed black cello tape on floor in a straight line besides the queue and placed our prototype robot at the starting point. The black cello tape is the route reference for line following Infrared sensors, which is driven by Arduino UNO set up at the base of the robot. The Arduino UNO controls the line following module and distance measurement between two individuals. The temperature sensor and face mask detecting module are placed at head part of robot which is driven by Raspberry Pi.

A rechargeable battery of 12V is connected at base to power Arduino UNO. And a buzzer for correction on violation of social distancing. And a 5v power supply at head to power Raspberry Pi. A speaker is connected to Raspberry Pi to speak up the output.

Fig. 8. Prototype Image

"Fig. 8" shows the robot moving towards volunteer at distance of one meter using line follower module and implementing social distancing protocol as shown in figure, if volunteer is not standing at proper distance, then Arduino UNO sends the signal to buzzer and buzzer starts making sound. The volunteer reacts to it and maintains proper distance.

Fig. 8. Volunteers Standing in Queue

"Fig. 9" shows temperature readings of Volunteer that brings hand near temperature sensor of robot which senses temperature and sends the reading to Raspberry-Pi, temperature is displayed on computer screen using any desk software and temperature read python algorithm namely mixread.py. If temperature is more than the optimum temperature 98F, Raspberry Pi sends a message at screen "Temperature High" else "Temperature OK" with respective temperatures.

Fig. 9. Temperature Readings of Volunteer

"Fig. 10" shows the face mask detection output. The camera on robot shows the face of volunteer and using face mask detection algorithm named "detect_mask_picam.py" the facemask is detected, incase person is not wearing facemask, then Raspberry Pi sends the signal to speaker of voice "face mask not detected" else "face mask detected".

Applications

Fig. 10. Face mask detection

Health Care
Malls and Movie Theaters
Queues
Surveillance
In Railway Stations
In Airports

3. Conclusions

We have tried to present a solution which can be reliable enough to ensure COVID-19 safety. Also, an open-source application is used with sensors in the system in order to make a cost-effective and configurable set-up. The project uses real-time information and scenarios which is further sent to the dashboard for further assistance in the queue management. Future changes will be further implemented to improve the projects to be able to handle real time scenarios and the limitations detected.

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Digital Simulation using Sensor Technology for Industrial Applications

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Abstract
Smart applications have been developed with Internet of Things (IoT) technology, including home automation, a smart aquarium, an intelligent campus, precision agriculture, interactive art and entertainment, and more. However, it is seldom mentioned how they are correctly implemented, especially for the existing or envisioned applications in remote sensing using sensors. Miniaturisation and improvements in battery lifetimes have led to small computational devices that can interact and communicate among themselves and with the environment through the Internet giving birth to the Internet of Things (IoT) paradigm. The Internet of Things is one of the most important and promising technological topics today. Some market researchers estimate that there are more than 20 billion connected devices and counting. Around us, there are smartphones, wearable, and other devices, all of which use sensors.

Nowadays, sensors play an important role in our everyday life and in IoT. Sensors monitor our health status (e.g. a heartbeat), air quality, home security, and are widely used in the Industrial Internet of Things (IIoT) to monitor production processes. For these reasons, it is important to know how they work and how we can use them to acquire information. As the Internet of Things (IoT) industry grows, so do the opportunities to utilize sensors. Sensors are utilized in various applications in miniaturized packages, multi-sensor modules, ultra-low power designs, and packages for harsh environments. Reliable, accurate sensors create a foundation for engineers to understand the various properties in applications from motor bearings to patients under home care.

Keywords
Internet of Things, sensors, Reliable

INTRODUCTION

The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs)
and the ability to transfer data over a network without requiring human-to-human or human- to-computer interaction.
A thing in the internet of things can be a person with a heart monitor implant, a farm animal with a biochip transponder, an automobile that has built-in sensors to alert the driver when tire pressure is low or any other natural or man-made object that can be assigned an Internet Protocol (IP) address and is able to transfer data over a network. Increasingly, organizations in a variety of industries are using IoT to operate more efficiently, better understand customers to deliver enhanced customer service, improve decision-making and increase the value of the business.
An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they acquire from their environments. IoT devices share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analysed or analysed locally. Sometimes, these devices communicate with other related devices and act on the information they get from one another. The devices do most of the work without human intervention, although people can interact with the devices -- for instance, to set them up, give them instructions or access the data.
The connectivity, networking and communication protocols used with these web-enabled devices largely depend on the specific IoT applications deployed. IoT can also make use of artificial intelligence (AI) and machine learning to aid in making data collecting processes easier and more dynamic.
The internet of things helps people live and work smarter, as well as gain complete control over their lives. In addition to offering smart devices to automate homes, IoT is essential to business. IoT provides businesses with a real-time look into how their systems really work, delivering insights into everything from the performance of machines to supply chain and logistics operations. IoT enables companies to automate processes and reduce labor costs. It also cuts down on waste and improves service delivery, making it less expensive to manufacture and deliver goods, as well as offering transparency into customer transactions.
As such, IoT is one of the most important technologies of everyday life, and it will continue to pick up steam as more businesses realize the potential of connected devices to keep them competitive.

SENSOR

Some of the researchers in the market estimated that there are a billion devices are connected with sensors like wearables,

smartphones, etc. Currently, every sensor plays an essential role in the Internet of Things. These sensors are mainly used for detecting or monitoring the quality of air, health status, home security, etc. Similarly, these sensors are used in IoT for monitoring the process of production, so named as IoT sensor. Because of these reasons, one has to know about its importance, working, and its usage to obtain information.
Industries and organizations have been using various kinds of sensors for a long time but the invention of the Internet of Things has taken the evolution of sensors to a completely different level. IoT platforms function and deliver various kinds of intelligence and data using a variety of sensors. They serve to collect data, pushing it and sharing it with a whole network of connected devices. All this collected data makes it possible for devices to autonomously function, and the whole ecosystem is becoming "smarter" every day.
By combining a set of sensors and a communication network, devices share information with one another and are improving their effectiveness and functionality. Take Tesla vehicles as an example. All of the sensors on a car record their perception of the surroundings, uploading the information into a massive database.
The data is then processed and all the important new pieces of information are sent to all other vehicles. This is an ongoing process, through which a whole fleet of Tesla vehicles is becoming smarter every day.

ROLE OF SENSORS

IoT innovation made it possible to connect everyday things to the internet. Nowadays, almost all entities, such as houses, office buildings, factories, and even cities are connected to the network to collect data and utilize the information for various purposes. The importance of data has increased greatly, with many experts saying "data is the new oil."
Sensors play an important role in creating solutions using IoT. Sensors are devices that detect external information, replacing it with a signal that humans and machines can distinguish.
Sensors made it possible to collect data in most any situation and are now used in various fields
- medical care, nursing care, industrial, logistics, transportation, agriculture, disaster prevention, tourism, regional businesses and many more. With the expansion of the fields in which sensors play an important role, the market is still growing with a variety of sensors.

TYPES OF SENSORS PROXIMITY SENSOR

A device that detects the presence or absence of a nearby object, or properties of that object, and converts it into signal which can be easily read by user or a simple electronic instrument without getting in contact with them. Proximity sensors are largely used in the retail industry, as they can detect motion and the correlation between the customer and product they might be interested in. A user is immediately notified of discounts and special offers of nearby products.
Another big and quite an old use-case is vehicles. You are reversing your car and are alarmed about an obstacle while taking reverse, that's the work of proximity sensor. They are also used for parking availability in places such as malls, stadiums or airports.

Fig 3: Vehicle Proximity Sensor

PROGRAMMING USING proximity SENSOR INTERFACE

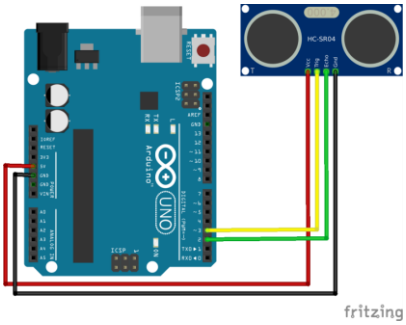

Fig 13: Ultrasonic Sensor Interface with Arduino

```
int trigPin= 9;
int echoPin= 10; void setup ()
{
pinMode(trigPin, OUTPUT); pinMode(echoPin, INPUT);
Serial.begin(9600);
}
void loop ()
{
//Serial.println("loop"); long duration, distance;
digitalWrite(trigPin,HIGH); delayMicroseconds(1000);
digitalWrite(trigPin, LOW);
duration=pulseIn(echoPin, HIGH); distance
=(duration/2)/29.1; Serial.print(distance);
Serial.println("CM")
delay(10);

}
```

GAS SENSOR

Gas sensors are similar to the chemical ones, but are specifically used to monitor changes of the air quality and detect the presence of various gases. Like chemical sensors, they are used in numerous industries such as manufacturing, agriculture and health and used for air quality monitoring, detection of toxic or combustible gas, hazardous gas monitoring in coal mines, oil & gas industries, chemical

laboratory research, manufacturing – paints, plastics, rubber, pharmaceutical & petrochemical etc.

Fig 5: Methane Gas Sensor

PROGRAMMING USING GAS SENSOR INTERFACE

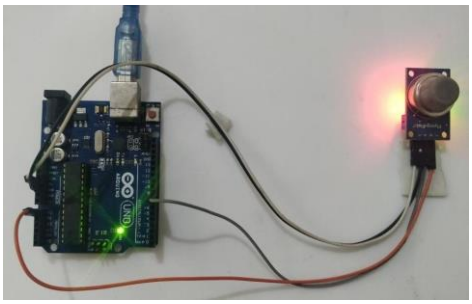

Fig 15: Gas Sensor Interface with Arduino

```
#include <LiquidCrystal.h> int Contrast = 10;
int gasPin = A0; int led = 13;
// initialize the library by associating any needed LCD interface pin
// with the arduino pin number it is connected to const int rs = 12, en = 11, d4 = 5, d5 = 4, d6 = 3, d7 = 2; LiquidCrystal lcd(rs, en, d4, d5, d6, d7);

void setup()
{
pinMode(led,OUTPUT); pinMode(gasPin,INPUT);

Serial.begin(115200); lcd.begin(16,2);

}


void loop()
{
int analogsensor = analogRead(gasPin); lcd.setCursor(0,0);
lcd.print("Gas level: "); lcd.setCursor(10,0);
lcd.print(analogsensor); Serial.println(analogsensor);
delay(500);
if
(analogsensor >= 200)
{
digitalWrite(led,HIGH);
}
else
{digitalWrite(led,LOW);
        }
}
```

IR SENSOR

An infrared sensor is a sensor which is used to sense certain characteristics of its surroundings by either emitting or detecting infrared radiation. It is also capable of measuring the heat being emitted by the objects. They are now used in a variety of IoT projects, especially in Healthcare as they make monitoring of blood flow and blood pressure simple. They are even used in a wide array of regular smart devices such as smartwatches and smartphones as well.

Fig 6: IR SENSOR

Other common use includes home appliances & remote control, breath analysis, Infrared vision (i.e. visualize heat leaks in electronics, monitor blood flow, art historians to see under layers of paint), wearable electronics, optical communication, non-contact based temperature measurements, automotive blind-angle detection.

Their usage does not end there; they are also a great tool for ensuring high-level security in your home. Also, their application includes environment checks, as they can detect a variety of chemicals and heat leaks. They are going to play an important role in the smart home industry, as they have a wide-range of applications.

PROGRAMMING USING IR SENSOR INTERFACE

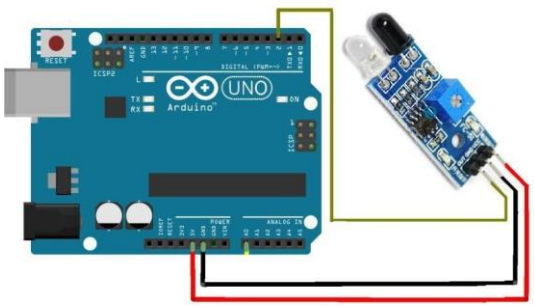

Fig 14:IR Sensor Interface with Arduino

```
#define s 7
#define led 13 void setup()
{
pinMode(s,INPUT); pinMode(led, OUTPUT);
// put your setup code here, to run once:
}
void on()
{
digitalWrite(led,HIGH);
}
void off()
{
digitalWrite(led,LOW);
}
void loop()
{
if (digitalRead(s)==0)
{
on();
}
else
{
off();
}
}
```

CONCLUSION

The session has covered with simulation mechanism can be integrated well into an IoT application development platform for correct implementation and behaviour investigation. We use an IoT application development platform called Arduino Programming an example to describe how the simulation mechanism can be built into this IoT platform. Firstly, elaborated on the various types of sensor and its applications in the real world. Secondly, the session is on how to interface sensor with Arduino board. Also, few sensors like IR, UV, Gas sensor has demonstrated in real time programming and interface with Arduino.

Many smart applications have been developed with Internet of Things (IoT) technology, including home automation, a smart aquarium, an intelligent campus, precision agriculture, interactive art and entertainment, and more. However, it is seldom mentioned how they are correctly implemented, especially for the existing or envisioned applications in remote sensing using sensors.

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Developing a Recommendation based Comparative Grading Tool using Gap Analysis

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Abstract
The grading system is one of the most commonly used form to evaluate academic achievement of the learners in educational system. Earlier, the Indian education system was based on the percentage system. But, the Indian education system has taken a step forward towards reviving the education system with the introduction of grading system in session 2009-10(PATEL, D. R. G., 2013). The Central Board of Secondary Education (CBSE), a national level education board, decided to abolish the percentage system and made shift towards the grading system. The factors to be considered in grading system are that it should be impartial and fair enough to convey the students' performance. There should be an approach for the grading system, which is trustworthy for the students and the teachers both. Therefore, the objective of this research paper is to develop a recommendation based comparative grading tool using gap analysis with the class performance graph using macros. This tool is developed to calculate the grade of the students of a course and analyze the appropriate and significant gap between the two grade points. In case of inappropriate gap between the grade points, recommend the minimal update in the marks to obtain the sufficient grade gap. This tool also shows the class performance graph along with the statistical analysis of the test scores for the entire class to evaluate the class conduct or the achievement. The main aim of this study is to give an attempt to make the comparative grading system more reliable and an ethical system.

Keywords
Comparative grading; Comparative grading system; Recommendation based system; Gap Analysis

INTRODUCTION

The grading system is one of the widely used system to evaluate the performance of the students at school and university both the levels. One of the major problems in grading system cited by the students is lack of "fairness in grading" (Holmes, L. E., & Smith, L. J., 2003). The trust and the non-bias approach in grading system are required for fair and reliable assessment and evaluation. There are number of researches to propose different methods for fair assessment and evaluation. However; after assessment of students' assignments, the fair and reliable grading system is equally important.

In this paper, comparative grading is used to assess the student's performance. The comparative grading is basically relative grading. It is the process to permit the teacher to assign grades based on the student performance as compared to the others in the entire class (Stake, J. E., 2002). The comparative grading system is being used by many schools, colleges and universities. Some definite rules of how a teacher can assign grades and how the institute decide the grade scale should be there in the educational grading system (Draper, N., Giles, D., Schöffl, V., Konstantin Fuss, F., Watts, P., Wolf, P., ... & Abreu, E., 2015).

The grading system should be such that it satisfies the student as well as the teacher. This system should be reliable and dependable. Now the main part that comes is how to justify that there is significant gap between the two consecutive grade points. This gap calculation in grade points is very important for students to understand their position and get convinced with the grades assigned to them. Sometimes this gap between the grade points comes naturally but in some cases we have to adjust these gaps to justify student's performance. To adjust grade gaps, we have to make a little ammendment in the total marks of the student. The adjustment in the total marks should be such that:

a) the significant grade gap is made with the minimum change in the total marks and
b) there is no shift in the grade of the student from one grade point to another.

To adjust the gap with a little change in the total marks, the recommendation was made to incorporate that difference in any of the test scores based on the teacher's reasoning. This type of recommendation based systems are designed to filter the information that need to be suggested for the better course of action. The recommendations in any system, may assist in particularly interesting items, in addition to indicating those that should be filtered out(Resnick, P., & Varian, H. R., 1997). Recommendation can be user input based or algorithm based. Recommendation has great scientific depth and combines diverse research fields which makes it interesting for interdisciplinary researchers (Lü, L., Medo, M., Yeung, C. H., Zhang, Y. C., Zhang, Z. K., & Zhou, T., 2012).

The highlights of the developed tool are:

1. It calculates- the significant gap between the grade points,
2. upgrades- the total marks of the student with a minimal calculated difference to adjust the gap without changing the grade letter for the student, and
3. Recommends- change in test score, based on the tests data analysis to balance the gap. This makes

the tool more logical for the educational grading system.

METHODOLOGY-

The method is based on the following steps:

1. Data entry of test scores:

Excel is commonly used software for data entry and data manipulation related work. The data regarding different test scores were entered in excel sheet by the teacher. Here the different tests that we considered are two class tests(ct1 and ct2) of 40 marks each, two daily home assignments(dha1 and dha2) of 40 marks each, one additional assignment(aa) of 20 marks and attendance of 10 marks.

2. Calculation of total marks:

In this study, best two scores out of both the class tests and dha1 was considered along with dha2, additional assignment and attendance to calculate total marks. So the formula used to calculate the total in this study is:

Sum(ct1, ct2, dha1, dha2, aa, attn) – min(ct1, ct2, dha1) (1)

ASSIGNMENT OF GRADES:

In the proposed system 11 grade points, starting from A+ to F were selected. The grading was assigned based on the predefined criteria for different grade points. These criteria in this paper are the minimum marks range, out of maximum marks for the different grade points.

Grade Points	Marks range out of 150	Percentage range
A+	130-150	86.67%
A	120-129	80.00%
B+	110-119	73.33%
B	95-109	63.33%
C+	85-94	56.67%
C	75-84	50.00%
D+	65-74	43.33%
D	45-64	30.00%
E+	30-44	20.00%
E	15-29	10.00%
F	0-14	0.00%

Table 1: Letter grade scale

GAP ANALYSIS BETWEEN THE GRADE POINTS:

After assigning grades, the gap is analyzed between the two consecutive grades. The gap signifies the difference between the expected and the actual state or the current practice and the best practice (Balm, G. J., 1996). The recommendations can also be provided to fill the gap in the particular chosen area (Mineraud, J., Mazhelis, O., Su, X., & Tarkoma, S., 2016). The factors on which the grade points depend are the total number of grades, the class size and also the maximum marks that can be achieved by the students. Therefore; the given formula is applied to calculate the significant gap between two consecutive grades:

$$Grade\ gap = \frac{Total\ number\ of\ grade\ points * class\ size}{maximum\ marks} \quad (1)$$

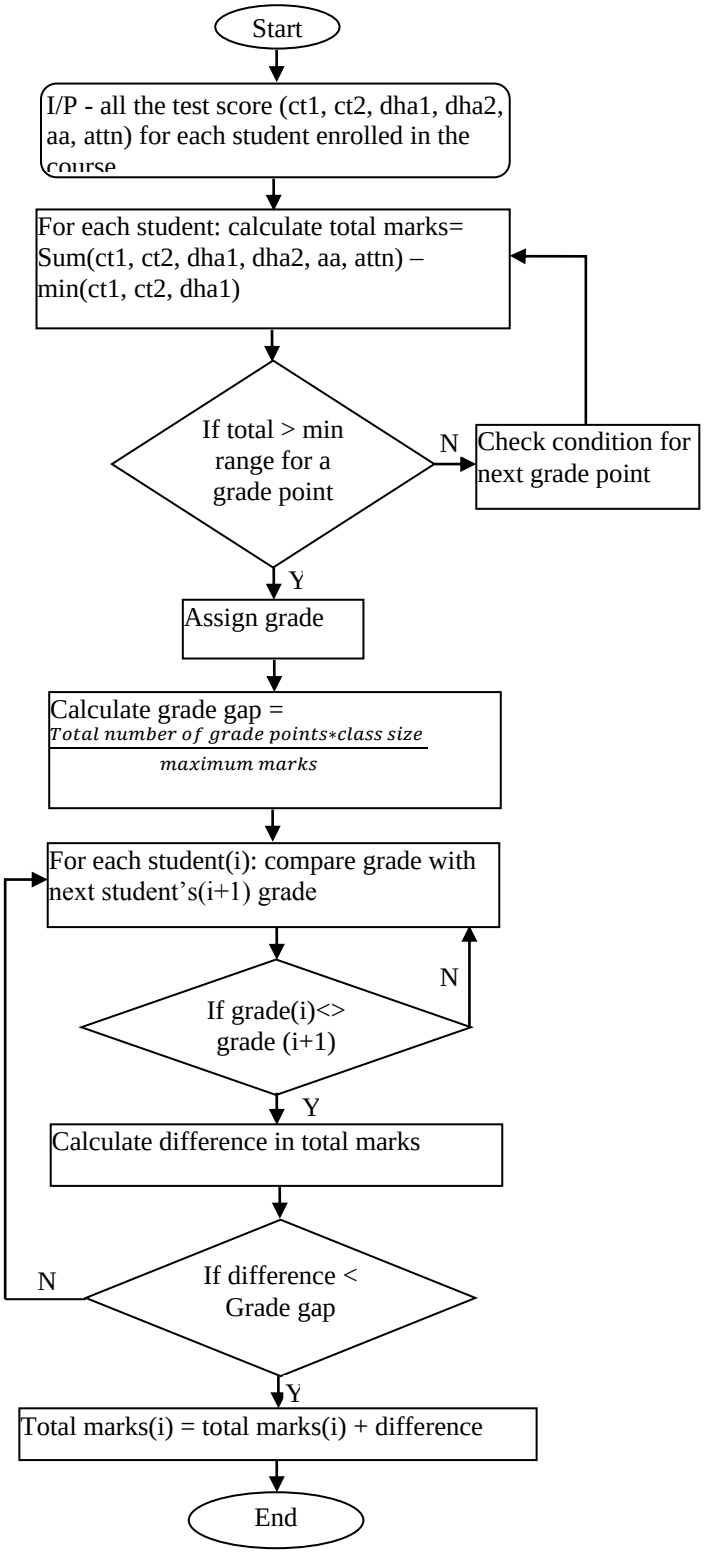
In this study:
Total number of grade points = 11
Class size = 30
Maximum marks = 150
By putting the values in the formula we got following value:
Grade Gap = 2.2
So the gap between any two grade points should not be less than 3.
We put this formula for different courses having different class size and found this formula best suited for our tool as it recommends minimum ammendmend in the total marks of the student to make a significant gap between the grades. The proposed grade gap formula is suitable for the class where teacher students ratio is not very large as large class size negatively affects students' academic performance(Adunola, O. M. O. T. E. R. E., 2011).

RECOMMEND THE UPDATES REQUIRED IN THE FIELDS:

If the gap between the grades is not appropriate then update total marks using grade gap fomula and recommend to balance this difference through any test score. The difference in total can be recommended to add as grace numbers in one of the test scores based on the statistical analysis of test scores and the teacher's reasoning.

TEST DATA ANALYSIS:

The graph for all the students in that course is then generated to give an easy understanding of overall class performance. The graph is generated between all the grades and percentage of students' population falling in each grade.
The applied algorithm for the tool is shown below in the form of the flow chart:



Results - To develop the tool, first the data of students' roll number, name and test scores were entered in the excel sheet and the total number was calculated.

Roll No	Name	ct1	ct2	DHA1	DHA2	AA	ATT	total
1	Student 1	35	31	34	32	19	10	130
2	Student 2	31	31	29	30	18	10	120
3	Student 3	26	22	34	31	18	10	119
4	Student 4	24	30	30	28	17	10	115
5	Student 5	12	23	32	30	19	10	114
6	Student 6	29	32	21	24	19	10	114
7	Student 7	10	26	30	28	18	10	112
8	Student 8	22	26	28	30	17	10	111
9	Student 9	24	27	29	26	18	10	110
10	Student 10	14	30	27	22	17	10	106
11	Student 11	23	25	26	28	17	10	106
12	Student 12	5	22	27	29	18	10	106
13	Student 13	19	25	24	28	18	10	105
14	Student 14	9	22	28	24	17	10	101
15	Student 15	6	24	26	24	17	10	101
16	Student 16	11	23	28	22	18	10	101
17	Student 17	15	19	25	28	17	10	99
18	Student 18	9	21	23	24	17	10	95
19	Student 19	6	22	22	24	17	10	95
20	Student 20	16	27	15	22	17	8	90
21	Student 21	0	20	10	27	18	10	85
22	Student 22	10	23	10	25	17	10	85
23	Student 23	19	0	15	24	17	8	83
24	Student 24	11	23	0	17	18	8	77
25	Student 25	5	22	13	15	17	8	75
26	Student 26	13	17	10	12	17	8	67
27	Student 27	0	14	12	14	17	8	65
28	Student 28	8	17	0	15	17	8	65
29	Student 29	8	22	0	0	0	8	38
30	Student 30	8	0	0	0	0	8	16

Table 2: Students marks in different tests and their total marks

After entering all the data, the grades were assigned as per the criteria decided for each grade point. The change in the total marks as per the grade gap analysis is also highlighted with the difference in the marks. This recommends that difference in the total marks can be adjusted in any of the test fields decided by the course teacher.

Roll No	Name	ct1	ct2	DHA1	DHA2	AA	ATT	total	grade	grade gap
1	Student 1	35	31	34	32	19	10	130	A+	
2	Student 2	31	31	29	30	18	10	122	A	difference = 2
3	Student 3	26	22	34	31	18	10	119	B+	
4	Student 4	24	30	30	28	17	10	115	B+	
5	Student 5	12	23	32	30	19	10	114	B+	
6	Student 6	29	32	21	24	19	10	114	B+	
7	Student 7	10	26	30	28	18	10	112	B+	
8	Student 8	22	26	28	30	17	10	111	B+	
9	Student 9	24	27	29	26	18	10	110	B+	
10	Student 10	14	30	27	22	17	10	106	B	
11	Student 11	23	25	26	28	17	10	106	B	
12	Student 12	5	22	27	29	18	10	106	B	
13	Student 13	19	25	24	28	18	10	105	B	
14	Student 14	9	22	28	24	17	10	101	B	
15	Student 15	6	24	26	24	17	10	101	B	
16	Student 16	11	23	28	22	18	10	101	B	

17	Student 17	15	19	25	28	17	10	99	B	
18	Student 18	9	21	23	24	17	10	95	B	
19	Student 19	6	22	22	24	17	10	95	B	
20	Student 20	16	27	15	22	17	8	90	C+	
21	Student 21	0	20	10	27	18	10	86	C+	difference = 1
22	Student 22	10	23	10	25	17	10	86	C+	difference = 1
23	Student 23	19	0	15	24	17	8	83	C	
24	Student 24	11	23	0	17	18	8	77	C	
25	Student 25	5	22	13	15	17	8	75	C	
26	Student 26	13	17	10	12	17	8	67	D+	
27	Student 27	0	14	12	14	17	8	65	D+	
28	Student 28	8	17	0	15	17	8	65	D+	
29	Student 29	8	22	0	0	0	8	38	E+	
30	Student 30	8	0	0	0	0	8	16	E	

Table 3: grade assignment and updated marks with the difference in total after adjustment in the grade gap

The class population in numbers as well as in percentage falling into particular grade was also calculated for further analysis.

Grade	Number of students falling into a perticular grade point	Percentage of students falling into a perticular grade point
A+	1	0.03
A	1	0.03
B+	7	0.23
B	10	0.33
C+	3	0.10
C	3	0.10
D+	3	0.10
D		0.00
E+	1	0.03
E	1	0.03
F		0.00

Table 4: the grades with number and percentage of students falling in those grade

Using the above data a graph was generated to analyze and understand the class performance as a whole.

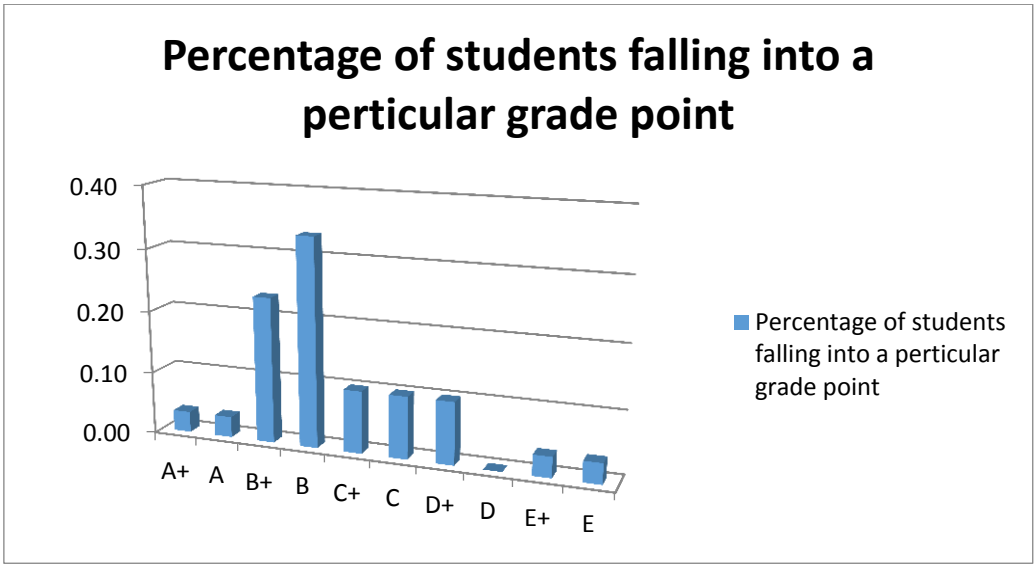


Figure 1: graph showing the class performance through percentage of students falling into different grade points.

Data analysis of different test scores, based on the statistical calculations are given below.

Tests	Minimum	Maximum	Range	Count	Sum	Mean	Median	Mode	Standard Deviation	Variance
ct1	0	35	35	30	428	14.266667	11.5	8	9.0817488	82.478161
ct2	0	32	32	30	666	22.2	23	22	7.4110821	54.924138
dha1	0	34	34	30	608	20.266667	24.5	0	10.789309	116.4092
dha2	0	32	32	30	683	22.766667	24	24	8.1226942	65.978161
aa	0	19	19	30	491	16.366667	17	17	4.4989143	20.24023

Table 5: Statistical analysis of different test scores.

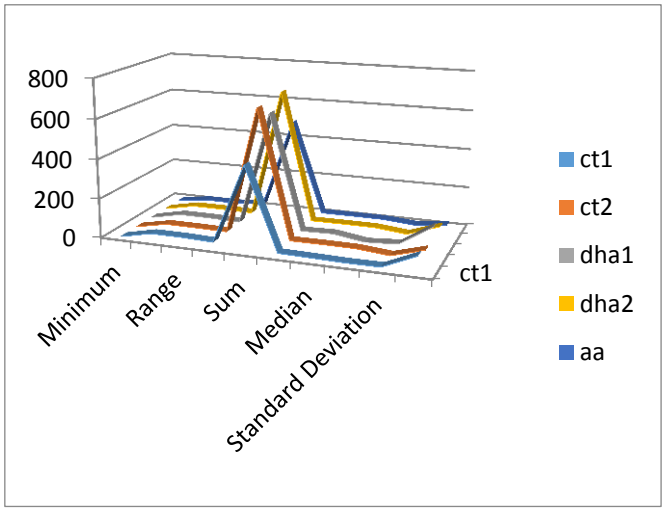


Figure 2: graph showing the statistical analysis of different test scores.

The statistical analysis of test scores gives the reasoning to the teacher that which test score should be adjusted for appropriate gap in the grades.

5. CONCLUSION AND FUTURE SCOPE

Our developed tool focuses on automated Grading System for more satisfactory approach in the traditional grading system. The developed tool ensures a reliable, dependable and principled system rather than manually managed error prone and biased system. The proposed tool is developed for theory courses which can further be modified for other course types like practical courses. The proposed grade gap formula is suitable for the class where teacher students ratio is not very large. This formula can be customized for the large class size. Using this developed tool and enhancing it more, a system for deciding the test field that can be modified or adjusted based on some algorithm can be developed. Furthermore, the class performance data can also be optimized for an improved and better class performance.

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A Study on Shift in Consumer Behaviour Towards Internet Banking Services During Pre & Post Covid

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Abstract
In order to combat the COVID-19 epidemic, the Indian government declared total lockdown across the country on March 24, 2020, which was later extended until the third week of May 2020. Despite the fact that the lockdown was necessary and unavoidable in order to prevent the spread of Novel Coronavirus (Covid-19) and save lives, it had a significant impact on our economy's many divisions. India's economy is supported by banking and non-banking money organisations.
This is an attempt to evaluate consumer behaviour toward the banking sector, such as online and mobile banking, as a result of the lockdown, which has led to the conclusion that banks in India were able to reduce their overall damage and are attempting to recover well from the hit, thanks to efficient planning and provisions. Mobile banking is defined as using a mobile phone to do various banking operations such as fund transfers, balance inquiries, investments, and bill payments.
All banks with a licence and a branch in India are permitted to offer mobile banking to their customers. Customers can use this service to transfer money from one account to another in real time using a mobile network. Customers gradually began to use mobile banking for their numerous banking transactions, and mobile banking began to gain popularity in India. However, as a result of this pandemic, the whole manner of using technology is changing. For example, in a country like India, where mobile users are large, the option of giving numerous financial services via technology is underused. Banks must recognise this and boost their involvement in the technology sector.
Customers will receive better service as a result of this, and banks will be able to expand their reach and profit margins. The study is being carried out to see if there is a change in customer behaviour when it comes to using online banking services during a pandemic.

Keywords
Retail market, Offline, Online shopping

INTRODUCTION

Mobile banking has become a major differentiator for banking leaders, since it allows consumers to make deposits, account transfers, and track their spending and earnings. Nearly 80% of those who have used mobile banking claim it is their primary method of accessing their bank account. Consumers, particularly Gen Zers, are driving the future of banking technology. They perceive technology as something that improves their lives. The use of an application programming interface (API) to make proprietary data available to anybody with the consumer's permission is a frequent trend in banking technology.
Digitalization is transforming how people interact and conduct business on a daily basis, and advances in banking technology are influencing the future of financial services all around the world. The banking industry is being transformed by millennials and Gen Zers' increased demand for a digital banking experience. Technology has a hand in nearly every element of the banking sector, from retail and mobile banking to neobank startups, and its influence will continue to propel banking into a digitised future.

2. Future of Retail Banking

Technology aimed at increasing the operational efficiency of retail banks is having a favourable impact on the market. According to Insider Intelligence, 39 percent of retail banking executives believe technology has the largest influence on cost reduction, compared to only 24% who believe it has the most impact on improving customer experience.
To stay competitive, retail banks are establishing platforms in the Banking-as-a-Service (BaaS) area. For example, UK neobank Starling used to just offer B2C retail banking services; however, after developing a BaaS platform, Starling was able to diversify its product and revenue sources, allowing it to stay relevant in the neobank industry.
Meanwhile, mobile banking has cemented its position as a must-have tool for financial institutions looking to stay competitive, especially among technologically savvy millennials and Gen Zers. In fact, according to Insider Intelligence's fourth annual Mobile Banking Competitive Edge Study, over 45 percent of respondents rank mobile as a top-three consideration in deciding which financial institution to use.

3. Future of Mobile Banking

Mobile capabilities have been a more important feature in bank selection among respondents since the commencement of the coronavirus pandemic than they were last year. Financial institutions should know which mobile banking services customers enjoy the most and where they stand in

comparison to their competitors so they can focus on certain areas.

Consumers' top concern when it comes to mobile banking is security. The fear of a data breach drives up demand for services that protect users' data–allowing customers to put freezes on their credit or debit cards, set up travel alerts, and submit and review card transaction disputes are just a few examples of successful security banking features.

The complete experience of banking through digital channels, including mobile apps, desktop, live chatbots, and more, is referred to as online banking, which includes mobile banking.

4. Future of Online Banking

Mobile banking has eclipsed online banking in popularity, and the global number of online customers has decreased. Mobile banking is increasing at five times the rate of online banking, according to Insider Intelligence, and half of all online clients are also mobile banking users.

Despite the growing popularity of mobile banking, several banks are still unable to meet demand for mobile chores such as bill payment and incentive redemption, forcing customers to switch to online banking. However, if millenials and Gen Zers continue to gravitate toward the mobile market, even this drive will not be enough to promote internet banking.

Neobanks, or digital-only banks, are altering the future of banking all across the world. Despite a sluggish start in the United States because to high regulatory obstacles, recent developments and regulatory easing suggest that US neobanks are poised to take off.

5. Future of Digital-Only Banks

A key aspect driving US neobanks' meteoric ascent is sophisticated mobile banking tools, which have gained even greater relevance in the wake of COVID-19. In order to scale their operations, incumbent financial institutions, neobanks, and digital companies can all benefit from understanding how leading neobanks are increasing the bar for client expectations and trust.

Chime, the largest neobank in the United States, with over 7.4 million account holders as of 2019 and is expected to reach 19.8 million by 2024. The emergence of more neobanks in the United States will raise awareness of digital-only banking and, eventually, drive traditional banking institutions out of business.

6. Banking Technology Trends

Banks are employing artificial intelligence to simplify client identification and authentication, as well as to imitate actual staff via chatbots and voice assistants. The Android Community APIs could be used to provide customer account information to a bank's mobile app. Fintechs have also relied on API technology to run their operations, and their success has prompted competitors to create their own APIs.

Furthermore, according to Insider Intelligence, 48% of banking executives predict that emerging technologies such as blockchain and artificial intelligence (AI) will have the greatest impact on banking by 2020. Banks are looking at blockchain technology, according to Insider Intelligence, with the aim of streamlining processes and lowering costs.

Most banks are already using AI in their front offices, as seen by chatbots. Banks are employing artificial intelligence to simplify client identification and authentication, as well as to imitate actual staff via chatbots and voice assistants.

7. Online banking status in India

The Reserve Bank of India (RBI) claims that India's banking system is adequately capitalised and regulated. The country's financial and economic conditions are significantly superior to those of any other country on the planet. According to credit, market, and liquidity risk analyses, Indian banks are generally robust and have fared well during the global slump. Innovative banking concepts such as payments and small finance banks have lately been introduced in the Indian banking market. The RBI's new policies may go a long way toward assisting the domestic banking industry's reform.

India's digital payments system has advanced the most among 25 countries, with India's Immediate Payment Service (IMPS) ranking fifth in the Faster Payments Innovation Index (FPII).

FIGURE 1: Mobile and Internet banking growth in India

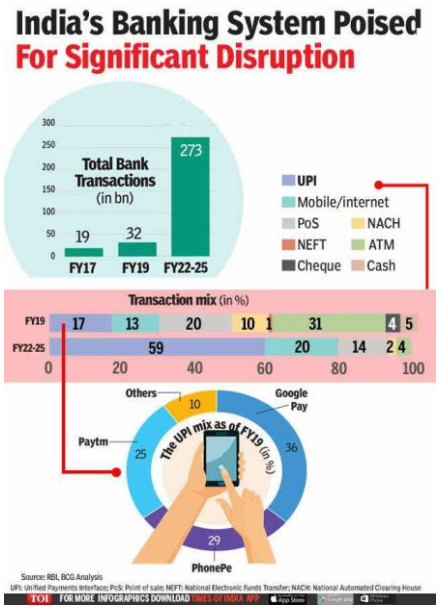

FIGURE 2: Penetration of Mobile banking in 2021

7. Review of Literature

The review of literalure is presented in two dimensions TAM model and relationship between intention to use online banking services and e-payment systme.

II a) Technology Acceptance Model (TAM):

Davis (1989; Davis et al., 1989) established the Technology Acceptance Model (TAM) based on the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980). According to TAM, a person's belief is determined by his or her attitude toward thinking, which has a positive impact on behavioural intention and ultimately results in real behaviour. TAM goes on to say that two unique beliefs, perceived utility and perceived ease of use, are crucial in shaping users' intentions. The degree to which an individual believes that utilising a specific system will increase his or her job performance is defined as perceived usefulness, whereas perceived ease of use is defined as the rate at which an individual believes that using a certain technology will be free and straightforward.

Perceived ease of use is thought to be a good predictor of perceived usefulness in theory. As a result, the current study uses the TAM model to see how much the COVID-19 pandemics compel users to use online banking and e-payment services.

8. Intention to Use and Online Banking and E-Payment Usage:

The intention to use a technology is a crucial driver of its actual use, according to theory (Davis, 1989; Davis et al., 1989). In the online banking literature, a consistent and strong positive relationship between intention to utilise online banking and e-payment services and actual usage has been identified. The intention to utilise internet services, for example, has been demonstrated to be a strong predictor of actual utilisation (Goyal, et al., 2013; Hong, Thong, and Tam, 2006; Kang et. al 2006 Kang,Lee, Park, Chung, and Blakeney, 2012).

Objectives of the Study

The Primary objective of the study is to explore pandemic impact on the usage of online banking.

Secondary objective

➢To explore the shift in consumer behavior towards online banking services during pre and post Covid .

➢To examine the effect of the Covid-19 pandemic on using online banking services.

- To find the important factor influencing the consumer to use online and mobile banking services.

Findings of the Study

Profile of the respondent

This research has taken Gender, Marital status, Age, Occupation, Annual Income as socio-demographic variables and type of retail medium used for purchasing. The below table present the profile of the respondents.

Table 1: Profile of the Respondents

Variables	Categories	Number of responde	Percentage of respondents
Gender	Male Female	181 119	60.3 39.7
Marital status	Married Single	208 92	69.3 30.7
Account	Private Public Donot have	154 146 0	51.3 48.6 0
Occupation	Student Employed Business	30 145 125	10.3 48.3 41.4
Annual income	Upto 2.5L 2.5L to 5L 5L to 10L More than 10L	47 124 103 26	15.5 41.4 34.5 8.6
Usage of Internet and mobile banking of retail medium using for purchase	Often Rarely	170 130	56.6 43.4

Kind of services are you using in online banking

The below table presents the results of factors influencing the respondents to use online and mobile banking services and the most preferred services in the online banking.

Table 2: Online Preference

Online Services	Mean Score	Interpretation
Online bill payment	1.75	Highly
Online fund/money transfer	2.02	Rarely
Online Bookings	2.07	Rarely
Online payroll direct	2.67	Rarely
Mobile recharge	2.53	Rarely
International payment	1.01	Not at all
Online purchase	2.10	Rarely

Table 3: Factors for using online banking

Factors	Mean Score	Interpretation
Time saving	2.07	Agree
Cost saving	1.94	Agree
Flexibility or Convenience	2.33	Agree
Easy to use	1.51	Agree
Security	1.74	Agree
Reliability of Bank	2.41	Agree

From the above table, it is found that respondents have prefer the online banking services because of cost, time savings and convenience factor.

Factors inflencing the usage of online banking services

Factor analysis is used to find the influencing factors of respondents in using online banking services after pandemic. The table below presents the result of factor analysis:

Table 4: Result of Factor analysis

Factor name	Statement	Factor loading
Considerable Advantage	I find online banking to be more convenient than other banking options.	0.5806
	I can complete banking transactions more rapidly with online banking.	0.7806
	I can conduct transactions 24 hours a day with online banking.	0.5575
	Online banking allows you to save time by avoiding trips to the bank.	0.6059
	I have a clear picture of my financial activity when I use internet banking.	0.8241
	Using online banking is less expensive than using conventional banking methods.	0.9891
Harmony factor	I enjoy putting new technologies to use as quickly as possible.	0.5893
	I am accustomed to using modern technologies	0.5477
	I have a need to use online banking services.	0.8111
	Online banking is a good fit for my way of life.	0.9766
	Online banking is appropriate for my profession	0.5994
	It corresponds to how I prefer to manage my financial affairs.	0.7311
Continuation of internet banking services	I'd like to try out online banking.	0.9693
	In the future, I'll increase my use of online banking	0.587
	I'll add online banking to my favorite links.	0.745
	To conduct my financial transactions, I will continue to use internet banking.	0.555
Normative beliefs	I strongly advise you to use online banking.	0.652
	Friends have affected my decision to use internet banking services.	0.785
	Family influences my decision to use internet banking services.	0.896
	Colleagues, peers, and clients have affected my decision to use online banking services.	0.522
	My decision to use online banking is critical to my life and career.	0.982
	Most of my important people would agree if I used the internet to do my banking.	0.874
Self Perception	I feel confident using internet banking on my own.	0.625
	I feel confident using internet banking on my own.	0.587
	I could use online banking services even if no one was available to assist me.	0.569
	I could use online banking services even if I had never used a system like this before.	0.824

Comparison of pre-covid and post –covid usage of online banking services of respondenst

The table below presents the pre and post Covid comparison of respondent's usage of online banking services. The results clearly presents that the availed services are increasing after Covid pandemic

Table 5: Pre and post-Covid comparison

S.No	Services	Pre- Covid		Post-Covid	
		Aware	Availed	Aware	Availed
1	Account information and balance inquiry	202	105	202	182
2	Summary report of transaction	235	103	235	201
3	Electronic bill payment	252	154	252	240
4	Cheque cancellation	285	104	285	110
5	Cheque book application	269	103	269	150
6	Loan application	296	121	296	246
7	Share trading	214	80	214	157
8	E-mobile recharge	266	156	266	223
9	Online tax payment	289	114	289	264
10	Fund transfer	280	96	280	247
11	Ticket booking	266	152	266	159
12	Online shopping	287	146	287	263
13	Online donation	203	0	203	0
14	Insurance payment	248	0	248	148
15	Pay utility bills	236	124	236	201

9. CONCLUSION

Covid-19 will accelerate some existing trends in the banking sector, will temporarily reverse others, and will influence the private and public players in the sector. Most importantly, it will accelerate the digitalization and restructuring of the sector. New technologies in the payment infrastructure allows other players to enter the business of connecting consumers to other consumers, or consumers to businesses, to facilitate payments. Electronic wallets used for retail and peer-to-peer payments are one of the most prominent thing.

The opinions expressed above mentions the following points in a crux about the banking sector pre and post Covid-19scenario: -

1. The banks in India with the use of efficient planning and provisions, they were able to reduce their overall damage and are trying to recover well from the hit.
2. Customers banking practices and ways have also changed a lot, their trust in the online banking services has increased and have started using that more than going to the bank personally to get things done.
3. The online banking infrastructure has improved a lot and the interface has become more user friendly during this pandemic.
4. RBI has infused $6.5 Billion Further, as fresh measures, the RBI infused $6.5 billion of additional cash for banks to lend to shadow lenders and small borrowers. Moreover, RBI has relaxed the timelines for bad loan rules, and barred lenders from paying dividends for the year ended March 31, 2019.
5. In the coming future, online banking, e-wallet and UPI payments are the way forward as they reduce the human contact and are becoming very safe as more money is being spent to develop the apps with better safety features.

The research has been conducted with an objective to compare the pre and post Covid behavioral changes in the usage of online banking services. The research outcomes specify that the usage level has increased and lot of factors have influenced the respondents for the shift during pandemic.

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Clustering-based approach for identification of Brain Tumor in Brain MRI Images

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Abstract
Brain tumor detection is a significant analytic measure in the clinical field. MRI (Magnetic Resonance Imaging) is the prime method for the identification of tumors n Brian. It depicts the structure of the tumor present in the Brain. For the identification of tumors, various brain MRI images are analyzed to predict the structure and category of the tumor. Segmentation cycles are required to do the process. A brain tumor is the rarest disease to be detected in its early stage. Research done in various countries has revealed that most of the deaths due to Brain tumor has occurred due to incorrect diagnosis. Diagnosis merely depends on eye recognition whether we use a CT scan or MRI scan. To avoid that a computer-based approach is depicted in this paper. The segmented Brain image is processed using Binary format for the estimation of the tumor area. For the nature of the development of tumor gray adaptation is used which separates the textual and shading-based elements. The final estimation of the tumor is done by processing the outcome of the segmentation for calculation of the tumor and its border. A comparative analysis of all three methods is done for accurate analysis of tumor area extraction.

Keywords
Brain Tissue Segmentation, MRI, K Means, CT scan, Edge Detection

INTRODUCTION

Brain tumor detection is the most prominent issue in the current medical scenario. The detection and identification of tumors at an early stage can save the life of humans if the tumor is detected at an earlier stage an accurate precision. The tumor can be detected in 2 ways: CT Scan and MRI Scan (Singh, 2013). In children the tumor can be at the posterior fossa and in adults it can be at any place between the cerebral hemisphere. However, it can affect any part of the brain and can cause irreparable damage (Eman Abdel-Maksoud, 2015). The major problem in today's scenario is the identification and detection of the tumor. In this paper, an automated approach is used to identify and detect the size of the tumor with accurate precision (Sahil J Prajapati, 2015). The major problem in detection is that the tissue usually overlaps with the irregular tissues and therefore the precision of estimation is highly reduced. There are various techniques in Image processing to identify the tumor such as clustering methods, fuzzy-based methods, region-based methods, etc. (Abdulbaqi & Omar, 2014) For this the image needs to be segmented. For correct accuracy and precision of identification of tumor, the best technique needs to be selected. The techniques based on the cluster, histogram approach, and Fuzzy C means have been compared in this paper. A brain tumor can be of any shape and size (Vijayalaxmi, 2015) and can be located at any part of the Brain (Dina Aboul Dahab, 2012). The MRI scan image needs to be segmented to identify the tumor area. Now the major part is the separation of tumor tissues. According to WHO, brain tumors can be classified into two basic categories: Primary and Secondary. Primary tumors originate in the Brain itself while the secondary in other body parts. A proper biopsy (Archana Lala, 2013) process is required to get accurate tumor detection. In this paper, a comparative analysis of 3 different algorithms is done based on accuracy to predict the tumor at an early stage with correct precision. An open-source database BRATS is used for data collection and processing. After performing the procession and comparison, Fuzzy C means algorithm is proved to be the best algorithm among all three for accurate prediction of shape and size in a limited amount of time.

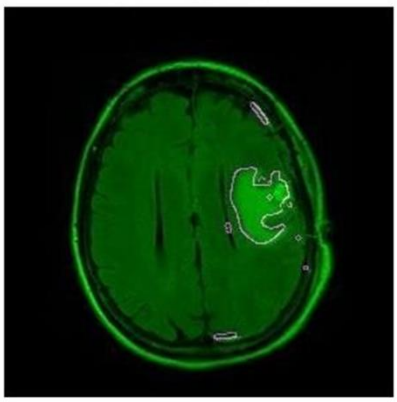

Figure 1: Brain Tumor

2. RELATED STUDY

The greater part of the current techniques simply works on prompt thresholding and locale developing with practically no strong division strategies.(Eman Abdel-Maksoud, 2015) introduced a picture parcel in which the k-implies grouping strategy is accompanied by the fluffy c-implies method. K - Implies the bunching method recognized the cerebrum tumor quicker.

(Sushmit Ghosh, 2015) introduced the division issue by utilizing the primary part examination and RI approval. The textural highlights are processed to affirm the tumor development.

(S. Allin Christe, 2010) proposed the k-implies grouping approach utilizing the lab - a*b shading approach. Be that as it may, the no. of groups is to be provided by the client in the event of k- implies bunching.

. (Marcel Prastawa, 2004) (2004) [4] proposed programmed mind division of MR pictures. The division process followed three stages distinguish the unusual districts; edema gives tumors in strange areas and mathematical and spatial limitations are applied to the recognized locales. The introduced work naturally identifies the edema yet strategy couldn't deal with the enormous distortion of mind structures. The programmed division showed preferable outcomes over manual division.

Weibei Dou et al. (Weibei Dou, 2007) introduced a fluffy division strategy utilizing fluffy combination and fluffy models to naturally section the tumor districts of the human cerebrum from multispectral MR pictures. The outcomes showed that a normal right recognition proportion was 96% and the normal bogus location proportion was 5%. The consequences of the proposed procedure were more productive.

(Sahil J Prajapati, 2015) acquainted morphological tasks procedure with recognizing tumors from MR pictures. Edge division was utilized to deal with a wanted piece of the picture. It additionally utilized NMF (nonnegative factorization) to separate the highlights of the tumor. Further in the future, the area developing procedure will supportive to order the of pictures of the cerebrum tumor and to track down the sort of tumor.

(Yash Sharma, 2015) proposed robotized computer-aided design framework for mind tumor discovery, division, and order. It utilized counterfeit neural organization to grade the tumor. This
procedure neglected to order every one of the grades of the tumor because of the absence of accessibility of information.

3. Proposed Method

The MRI pictures are separated for tumor detection from the BRATS database freely available on the web. The BRATS data set consists of large set of datasets for illness related diseases for regular investigation.The picture information must be perused in the mat lab as one of the essential advances in the work. The accessible instrument for perusing the equivalent is document watcher. X-ray information is extremely boisterous because of high attractive helplessness towards head development and other ecological conditions. In this way, spatial channels are needed to address the MRI information for investigation reasons. X-ray as gotten from the MRI information is an assortment of picture successions (outlines) played throughout some time. The MRI information is stacked into Matlab structure utilizing the order load x-ray.

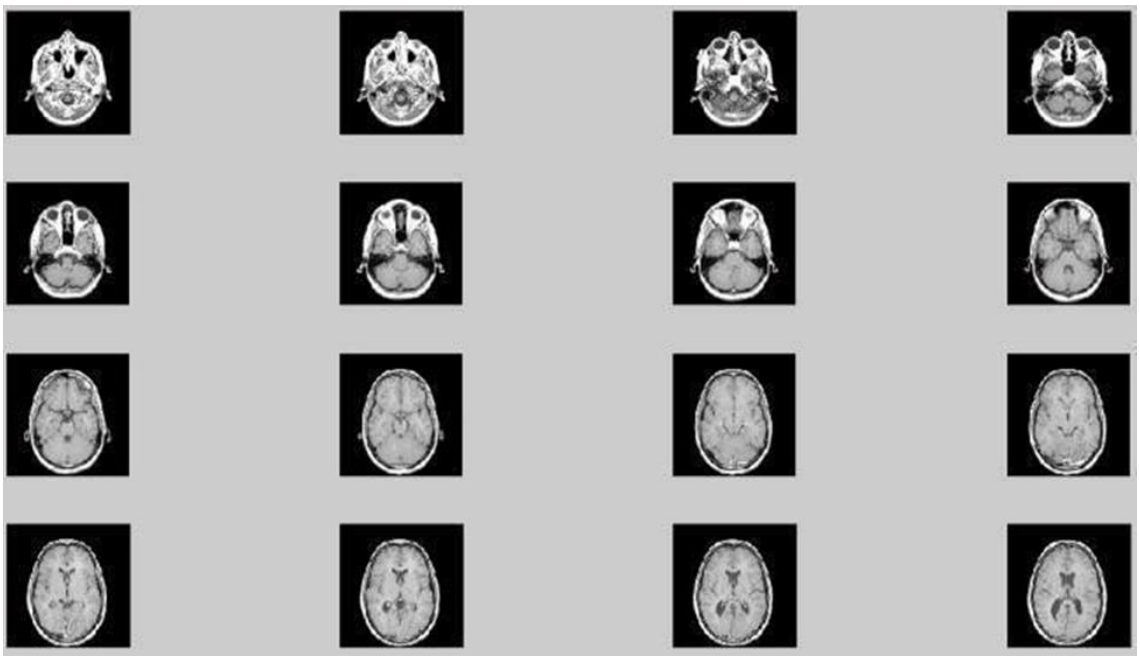

Figure 2: Sample MRI Images

3.1 K Means Clustering

The proposed method involves the methods where the disturbance in the image is wiped out for the most part by the usage of averaging or mean channel with default sorting out the part size of 3x3. Input is divided autonomously using K-suggests bundling computation. Usage of the Fast-ricocheting box strategy for region improvement is optional. Finally, space of the growth not set in stone close by endorsement in regards to ground truth pictures overcame BRATS (an open- source frontal cortex cancer informational collection for getting ready) and accuracy of the structure is calculated. The nonexclusive square diagram of the proposed system typifies all of the means, starting with picture acquiring, preprocessing, division by different packing procedures, feature extraction, and trim, area appraisal, and precision examination.

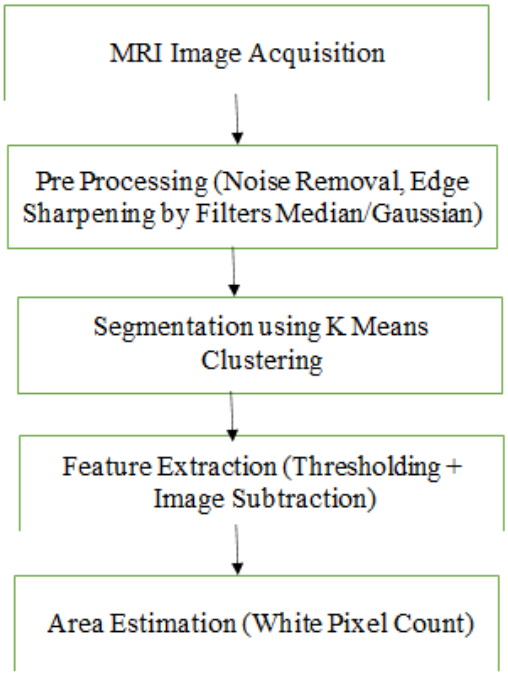

Figure 3: Proposed Work Flow

3.2 Preprocessing

After the securing of the MRI Image, the crude information should be preprocessed for commotion expulsion and erasure of undesirable information. For instance, the image is liberated from growth and ought to be taken out in advance to decrease the handling season of calculations on the skull region. In addition, smoothening of the picture is liked to stifle foundation data and make the dynamic region stand apart from the whole picture. Mean and middle separating is broadly utilized for this interaction. The mean average is based on the cover for smoothing the image which is moved in the middle pixel and is supplanted by the quality of the window.

Notwithstanding, this doesn't eliminate salt and pepper commotion and results in low clamor expulsion. Middle sifting is a non-direct separating method, which viably eliminates repetitive sound relieves the picture throughout. The yield of middle separating is displayed as follows:-

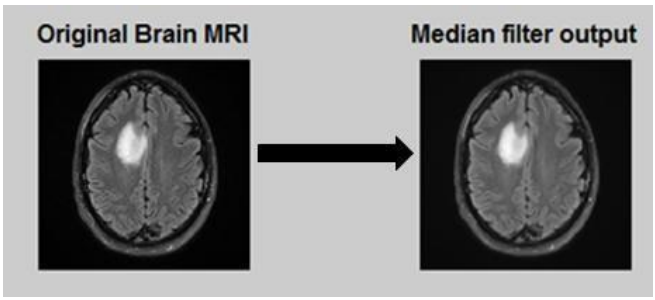

Figure 4: Filter Output

Parameter Name	K Means	Adaptive K Means	Fuzzy C Means
% of Tumor Detected	0.886	1.2840	1.845
Time Taken	0.145 Sec	0.045 Sec	0.245 Sec

In this procedure, K is taken as the centroid of the evaluation which focuses on the inside and outside of the group of bunches. These bunches together for a cluster of centroids and the lines along with the cluster is taken into account. Notwithstanding, it is an iterative interaction that accomplishes ceaseless bunching. The mean is taken as the reference for each point of pixel and then followed by each individual set of rounds. The best outcome is received in the last outcome. The calculation for the strategy is exhibited utilizing the accompanying flowchart.

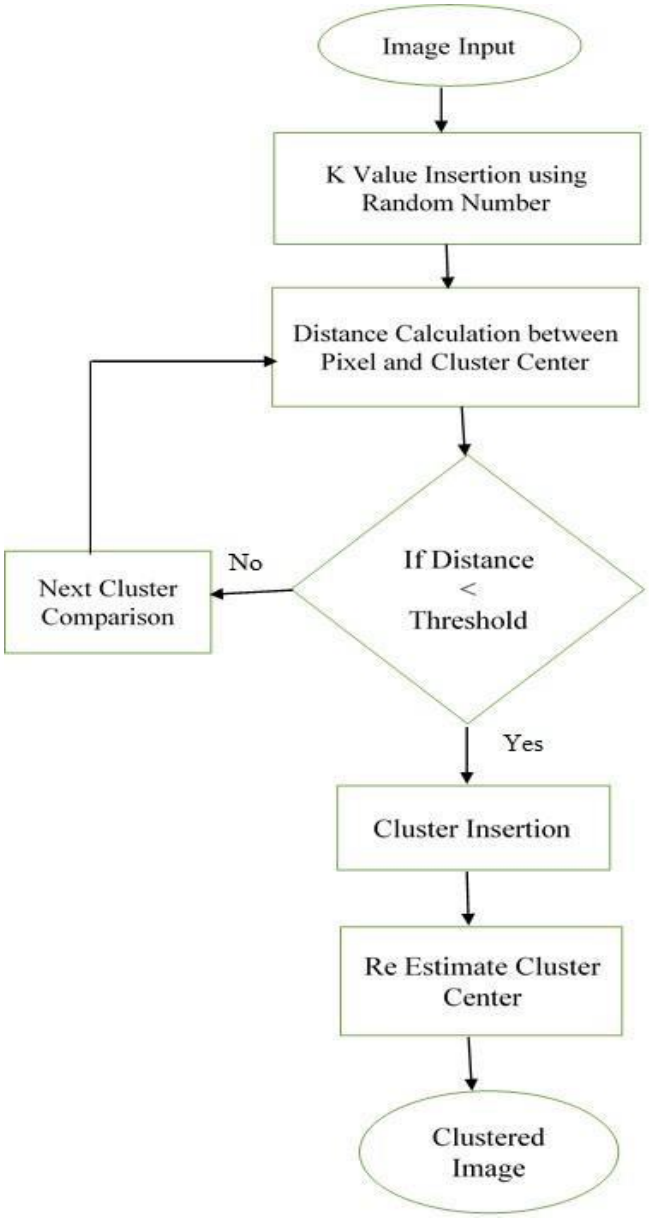

Figure 5: K Means Clustering Flowchart

The decision of worth of 'k's must be mentioned dependent on observable facts on an assortment of test MRIs.

Out of the multitude of qualities, k=2 compares to picture binarization. For a specific value of k, thresholding of higher group levels brings about wrong outcomes contrasted with ostensible upsides of 'k's. This reaction is plotted as displayed in Fig - 6. Notwithstanding, in a versatile k- implies grouping procedure, the worth of k isn't taken from the client and is consequently changed dependent on an edge worth of the picture's data transfer capacity. The best outcome comes by converging into a homogeneous region. In specific cases, the response region is additionally displayed for values having a place with a specific scope of bunches. Any worth higher than the larger portion is dismissed. The plot of k at each iteration is plotted in Figure 6.

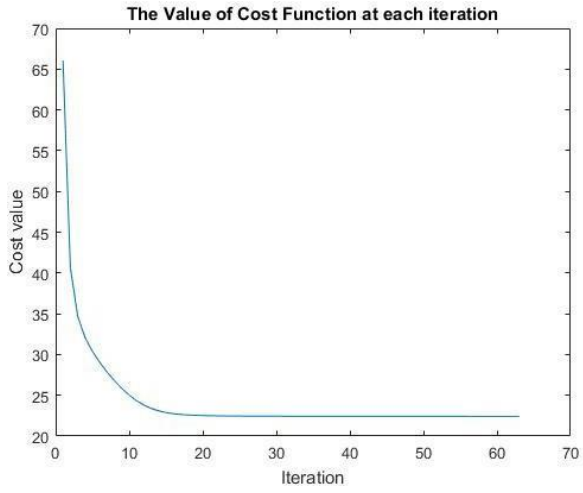

Figure 6: Value of Cost Function at each Iteration

4 Fuzzy C Means Clustering

Fuzzification of any procedure permits fractional participation worth to every information highlight fall in at least one bunches. That is, every pixel is allowed enrollment esteem because of which it can fall under more than one bunches, subsequently working on the exactness of the crude strategy. An individual from one fluffy set can likewise be the individual from other fluffy sets in a similar picture. The enrollment work characterizes the fluffiness of the picture and characterizes the data contained. The Fuzzy C Means for tumor distinguishing proof is applied on BRATS open-source information base for approval. Figure 7, 8,9 shows the recreation of Fuzzy C Means.

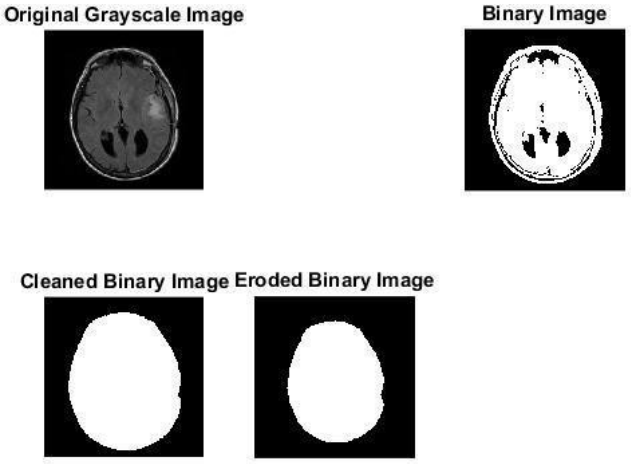

Figure 7: Binary Image Extraction from Gray Scale Image

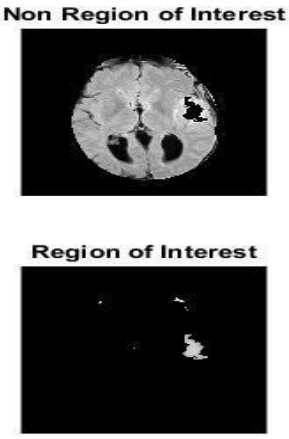

Figure 8: ROI Extraction

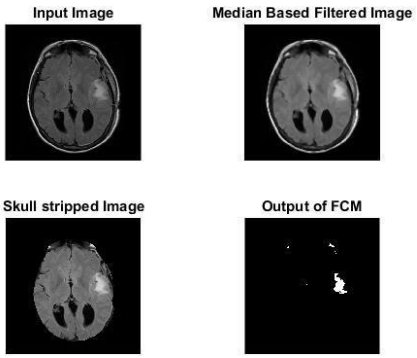

Figure 9: Fuzzy C Means Clustering

Table 1: Time and Area Accuracy Comparison

Parameter Name	K Means	Adaptive K Means	Fuzzy C Means
% of Tumor Detected	0.886	1.2840	1.845
Time Taken	0.145 Sec	0.045 Sec	0.245 Sec

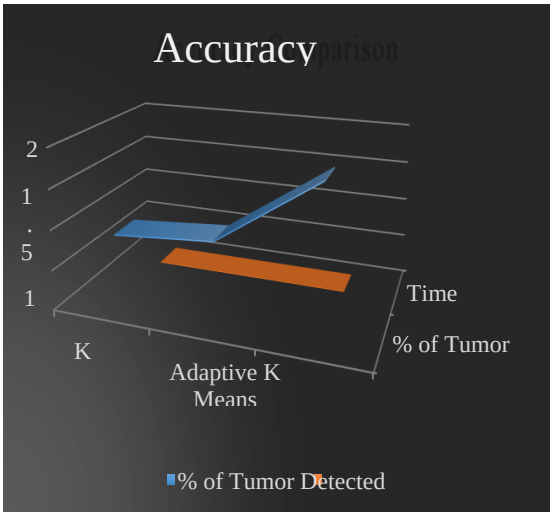

Figure 10: Accuracy Analysis

5 Conclusion

The paper contributes towards a comparative analysis of 3 different methods for Brain tumor detection. The comparative analysis shows that that the Fuzzy C Means algorithm gives the maximum output in terms of detection and analysis of Brain tumors on the area and time estimation comparison. However, the complexity of the system is high as compared to other methods. For a perfect diagnosis to predict the correct outcome is a challenging task in which FCM proves to be the better method as compared to other methods. The time taken for detection is more but the area estimation of the tumor is more and precise which leads to better precision. For testing the system an Open Source database BRATS is used and an accuracy of more than 95% is achieved for a sample of 500 images. The proposed method can be further improvised in the future by the use of certain more advanced methods, which can improve the accuracy of the system.

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Cloud Economics - Minimize Capital Expenditure as well as Operating Expenditure & Make a Secure Green Cloud

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Abstract
The appearance of making the potency of reckoning useful as well as development within data centre dependent reckoning overhauls requires an assessment of expenses connected with accommodation as well as supplying power of the calculation, networking and repository component. The price replica has to obtain financial credit for the intricacy in power transmission, cooling, as well as necessary point of superfluities for a specified overhaul point accord. The price of upholding as well as paying off of power transmission and cooling components has to get incorporated too. Such study establishes an effortless expense replica for the proper true cost of ownership (True TCO) which is able to get implemented by economic forecasters as well as elevated-height administrators for having the comprehension of each of the equipments of data centre prices comprises in investments as well as the cost of executions.

Keywords
True Cost of Ownership (True TCO), Data center, Capital Expenditure (CapEx), Operational Expenditure (OpEx).

INTRODUCTION

We have to keep in mind that a data centre is a major monetary intensive advantage of an enterprise as well as characteristically evaluating its real TCO does not make any achievement. Such expenses customarily get prevailed all over the enterprises within the Information Technology or networking as well as privilege or corporate real estate hubs, that causes the control of such expenses as well as evaluation of substitutes of an intricate network.

This research allows us to establish a procedure of the price prototype for making computation, apprehension and justification of Information Technology, networking and privileges Capex as well as Opex within a customary data centre. Evaluation of an archetypical data centre privilege assists trade proprietors assess as well as modify the fundamental potency as well as prices of such privileges or evaluates the expenses efficacy of substitutes, like ex-situ reckoning, devoid of privacy responsibilities connected with manifesting expenses regarding a specific privilege. This offers a systematic formation too, where informal information is able to be reviewed for firmness with additional illustration specification handling the expenses of the data centre.

The Emergence of Cloud Computing brings many benefits which are shifting the economics of Information Technology Enabled Service (ITES) [21]. Cloud technology standardizes and pools IT resources and automate many of the maintenance tasks performed manually today [22][23]. Cloud architecture facilitates elastic consumption and Pay – as – you – go pricing. As corroborated by Nitin Khanapurkar, Executive Director Advisory Services KPMG in India, the cloud seeks to replace the CAPEX component of the current IT infrastructure with a 'Pay-as-yougo' or OPEX model [23]. Cloud also allows core IT infrastructure to be brought into large data centers that take advantage of significant advancements of scale. This can be brought with the help of Direct Cost Saving, Productivity Improvements and innovation [22]. The link between business and IT has created unprecedented growth and opportunity across all industries, making IT a key discussion topic in the boardroom of most companies [24]. Conversion from Capex to Opex is a change in the basis of Capex usage as upfront and ongoing costs are changed by the Cloud Computing business model. The focus of our proposal is on the facility to maximize the leverage of that capital to acquire IT and business services as mere utilities while minimizing the risk to the business in Capex used for initial investment and Opex [25]. Perhaps the most effective forms of long-term outsourcing tend to focus on risk-sharing and collaboration [26]. While moving away from investments in long-term assets may be seen as context of Cloud Computing, this implies a move towards long-term Opex-style service where QoS and costs are still equally relevant regardless of asset ownership and custody. Cloud computing offers enterprises and governments the freedom to

manage their business, not their IT assets. In the theoretical world of cloud computing, businesses would no longer have to make costly capital and operational investments in building and maintaining their own back-end technology infrastructure [24]. The common factor is the business performance and SLA requirements [23][27] in addition to a remarkable degree of sustainability. A company with a high cost of capital and which would benefit from bringing in their tax shield is a candidate for shifting Capex to Opex – but other aspects of the business context may contradict that candidacy such as availability of appropriate solutions and security constraints on using shared services. If Capex to Opex is desired, then the company should be bearing in mind about the desired Capex and Opex and evaluating outsourcing solutions, including public Cloud solutions, hybrid Cloud, and Private Cloud solutions [28][29]. Cash flow can be an imperative pointer if Capex to Opex is the heart. Pay-as-you-go can be viewed as an easier on cash flow than pay-upfront. But in some cases both cash flow considerations may not necessarily exist in the same business scenario. For example, a business may want to improve cash flow through moving to a direct usage model but still retain investment in Capex for differentiated private business processes [30].

Cloud Computing is an important instrument that reflects the digital computing paradigm and business models for both software and hardware resources. Its economic advantage is that it provides an efficient way to minimize operating expenditures and capital expenditure. Despite Cloud Computing is providing solutions to the most problem faced by individuals and organizations, it has exposed many businesses to security and privacy threats and issues [46, 47]. Various researches have been done on privacy and security in Cloud Computing. Arjun et al in paper [48] stated that security issues are based on the cloud provider, service user, and instance. Another researcher in paper [49] argued that security issues are based on the delivery model, PaaS, IaaS, and SaaS. There exist four cloud deployment models namely: public cloud, private cloud, hybrid cloud, and community cloud and each has its own security and privacy concerns. To provide an overview of cloud security and privacy attacks, we briefly elaborate some key attacks and challenges faced in Cloud Computing for better understandability of the area under study.

Accounts hijack: In this type of attack, hackers attacks a CSP web service or application by installing their malicious software [50].

Cloud Computing abuse: Cloud security architecture considers it most serious attack because attackers attacks on Cloud Computing power [51].

Channel attacks: Such attacks interrupt the availability of services and disrupts privacy of data in IaaS layer of cloud[52].

XSS Attacks: In this kind of attack, Java script language is used and it is usually found in web application [53]

Malware attack: As the name suggests, hackers attack cloud systems by injecting malwares in this type of attack category [54]

DOS attack: Service availability is denied when requested by the user. E.g., Error 404 is considered as DOS attack [55]

Man in the middle attacks: This attack is usually performed on the secure connection between user and CSP without the knowledge of the attacker [56,57]

Insider attack: An attack would be insider attack when employees access services from CSP without the proper knowledge of security concerns [58]

SQL Injection attacks: SQL statements are used to deactivate the security of the web application [59]

Shared network attack: When multiple users share the same Cloud Computing infrastructure, there is a strong chance of data breaches. Furthermore, if there is any security concern in to customer's infrastructure, it will be considered as threat to the cloud [60]

Sniffer attacks: When unencrypted data is transferred then attacker can attack the network by using any application, or a device by sniffing network traffic[61]

Virtual machine (VM) attack: A rapidly increasing shared VM technology can be attacked because of existing vulnerabilities [62]

Anonymous risk: When cloud services are provided without considering any security and privacy protocols, data breaches can happen easily[63]

Zombie attacks: This attack occurs at the virtual machine or hypervisor layer. Due to this attack, provided services slows down and fake accounts appears [64]

Besides above mentioned attacks, Cloud Computing is also facing lot of challenges. Some common challenges faced by Cloud Computing are as follows

Network access: It is typically considered a big challenge by cloud service providers because attackers can take control of networks and data breaches usually occur because of it[65]

Security Management among CSPs: In cloud data management, maintaining and managing security specifications and complying with SLA is indeed a huge challenge. In order to meet the security criteria, CSPs can cooperate with each other [66]

Accounting: In order to achieve better network management, it is a challenging task for CSPs to estimate and analyse networks before deployment.

Shared Access: A challenge for service providers is to give access to the users. CSPs and consumers are responsible for taking measures to increase cloud security. There are still no effective solutions available e.g. in private cloud, users should be able to access the resources in a traditional way. So, the resources can be easily shared among the users depending on their needs [57]

Heterogeneous issue: Multiple technologies are used by the CSPs to deliver a large amount of services due to which heterogeneity occurs [49]

Security policies: Cloud infrastructure requires a strong security framework and guidelines to be applied [67]

Information loss: Losing gadgets or computers, such as phones or laptops, may allow an intruder to access personal information through theft [68]

Web browser security: Web brewers are not secure for using banking solutions. Such information can be hacked [69].

2. TCO METHODOLOGY APPLIED TO DATA CENTRES

On account of having an entire outline for the energy, expenses and viable issues of DCs, a TCO metric gets opted like a green presentation metric. It was 1987 when the idea of total cost of ownership (TCO) got initiated by Gartner. The TCO has been getting vigorously talked about in linguistics since that time. In the opinion of Ellram et al. (1993) [4], TCO is able to be implemented like: "all costs associated with the acquisition, use, and maintenance of a good or service". It was the observation of Gartner that the TCO evaluates Information Technology and other expenses covering the borders of companies with time. If folks want to come with an elucidation concerning two or more than two separate mechanisms then TCO gets beneficial. The primary objective of the TCO is to focus on the entire expenses in comparison with only focussing on the primary cost price. Furthermore, this is possible to distinguish the exertion of energy of various portions as well as mechanizations. In comparison with different pricing methods, TCO brings several utilizations. Initially, TCO has a suitable method by which it can assess the entire operation. Next, it comes with a resolve. Then this assists in the period of transmission, as prices get explained in an ordinary manner. After that this assists with constant development. On account of the malfunction of expenses, folks have perception in the procedure by which their expenses are split Ellram et al. (1993) [4]. Now, a guideline is regulated by the TCO. Finally, TCO produces an extensive apprehension of each of the prices associated with a specific finding [5]. This gets separated into capital expenditure [CAPEX] and operational expenditure [OPEX]. In the opinion of Cui et al [2017] [6], the entire price of proprietorship turns out to be an important part in the improvement of DCs. While distinguishing with various technologies such as novel vs present, TCO keeps an analytic elucidation regarding the entire prices of proprietorship. In the period of funding (CAPEX), though a specific mechanism may put a price on a lower amount of money, the mechanism may exert a greater energy.

Beyond the previous ten years, several writers recognized the TCO of DCs in various means, and most of the time introduced complicated as well as intricate metrics to resolve the TCO. Additionally, almost all the metrics got engaged in aiming at much particularised DCs or bazaars. That is why; this appears pertinent for the development of specific metrics for giving it appearance of better comprehensive, to the best of these research scholars' recollection, Patel and Shah (2005) [7] are the pioneer raising the question of such metric for the reckoning of the TCO regarding DCs. They did so for both the complicacy and vigorous modification of DCs throughout the world. The primary objective of them lay in the advent of a price metric to construct as well as execute a DC. Moreover, they offered some proposals about brisk layouts in DCs. It was 2007 when Kooney et al. [2007] [8] emancipated a program. The TCO was able to get a refund. If we made a distinction with the other writers, we could see that such a program was much simpler for the application and admittance. In such cases, this significant issue was observed that site framework capital prices got much more than the assumption before it had got distinguished with the capital prices of Information Technology hardware, on the basis of the DC they implemented in their case history. Referring to the very name Intel, Patterson et al. [2007] [9], manifested a white paper too, about the TCO of DCs. This research showed that they distinguished DCs with elevated density areas in comparison with the areas where less density was observed. The consequence of this research gave evidence that elevated density DCs decrease the TCO in comparison with a TCO that had less density. There was a suggestion from Hardy et al. [2011] [10] that stated that a rating of TCO got reckoned on the basis of four separate prices. After making the sum-total of the expenses of accession, servers, power and services, the TCO is able to get regulated. Furthermore, they kept an eye at hot as well as cold alternatives that approximate cold alternatives required for the server breakdown as well as the impression on surrounding temperatures. It was Grot et al. (2012) [11] who found out the TCO of a DC. He also distinguished such TCO among a variety of processors. That is why; they are regarded as the primary ones who distinguished among a variety of mechanisms as well as the impact on the TCO. Hardy et al. [12], in the year of 2013, clarified additional one on the metric that they initiated in 2011. In comparison with their former metric they put in a supplementary price feature, networking apparatus and expenditure. Such prices take in the amount used up for purchasing network apparatus. In addition, their metric was distinguished with two other metrics for making the justification of their outcomes. As the other metrics did not comprise in each of the variables akin to those metrics from Hardy et al. (2013) [12], this got complicated for making the distinctions among the results. It was none but Yang et al. (2017) [13] who primarily kept an eye at the TCO in DCs consisting of deliberation repository tools (SSD) as well as their intensification scale. This metric had a vivid knowledge about the workload features of sparkle repository tools. From their research, they proved that the lowest amount TCO can mitigate the TCO during the whole period of containing elevated outturn. Cui et al. (2017) [6] initiated for storing exertion of energy and decreasing expenses for power consumption, and for distinguishing diverse mechanisms a all-inclusive TCO gets required for having discernment in the diverse prices as well as feasible diminution. Nevertheless, their malfunctioning of expenses gets simpler for, their break-down of costs is easier to get executed. Furthermore, their TCO metric gets dependent on dollars per month, as it is tenure where most of the enterprises execute their work. On the basis of their erected TCO, Cui et al. (2017) made three dispositions. The subsequent sides consist of: unswerving liquid cooling elucidations, elevated well-organized power transmission with the application of 48VDC, as well as IDEC. After having a proper perusal of such case histories, they gave an effort for making the attachment of power consumption unswervingly to the operation of Information Technology as well as the entire operation of a DC. Ott et al. (2017) accomplished studies on the ROI as well as TCO of engrossment chillers in DCs. They showed that DCs are able to obtain a substantial sum of money while making application of diverse types of cooling elucidation but their metric is not well interpreted in such study. As far we know that Rokkas et al. (2017) [14] has

possessed the up to date TCO metric concerning DCs. In their paper, they aimed at the price diminution which is able to get produced on account of virtualization. It was shown by them that price savings between 13% and 25% is possible on account of lesser IT outlay as well as power consumption.

The Investopedia on Capex and Opex says that, the amount of capital expenditures a company is likely to have depends on the industry it occupies. Some of the most capital intensive industries include oil, telecom and utilities. In terms of accounting, an expense is considered to be a capital expenditure when the asset is a newly purchased capital asset or an investment that improves the useful life of an existing capital asset [25][27]. If an expense is a capital expenditure, it needs to be capitalized; this requires the company to spread the cost of the expenditure over the useful life of the asset [36]. If, however, the expense is one that maintains the asset at its current condition, the cost is deducted fully in the year of the expense [31]. It's no secret that IT and hardware can be one of the biggest CAPEX that businesses shell out for [32]. Additionally, the payment of employees' wages and funds allocated toward research and development are operating expenses. In the absence of raising prices or finding new markets or product channels in order to raise profits, some businesses attempt to increase the bottom line purely by cutting expenses [33]. While lying off employees and reducing product quality can initially boost earnings and may even be necessary in cases where a company has lost its competitiveness, there are only so many operating expenses that management can cut before the quality of business operations is damaged [27][31]. An Economist article explains the "Big Data" conundrum facing global enterprises. Data volumes are increasing faster than many companies have the capacity to store much less mine them for insights. In this exploding ―data revolution‖ many companies are also finding their internal processes—much less budgets—for acquiring technology are not keeping up with business user needs [28][29],hardware/software to buy upfront, thus companies can use operating expense budgets (Opex) to fund their needs, giving them plenty of budgeting flexibility. The alternative is to purchase needed hardware and software outright—thus capitalizing assets (Capex) [33][34]. According to Pritwis Mukherjee the possibility of reducing both capital and operating costs by migrating reams of data from private machines to the internet cloud is turning out to be a thrilling value proposition for companies [35]. On the surface, going the Opex route seems to be the better choice, but it's a more complex decision than it seems. One primary factor in the Capex vs. Opex debate really boils down to how much of each budget a company has (as determined by the CFO) [34]. Moreover, plenty of small to medium size businesses are capital constrained. They simply don't have tons of dollars to invest in assets. For these companies it makes sense to discover options such as leasing or cloud that can convert a given investment into an operating expense that would flow from SG&A on the income statement. While the initial impact of the Cloud has been primarily economic – better, faster cheaper – we are beginning to see the transformative effects of Cloud technology on businesses especially those run by larger companies . This is because larger companies usually have more significant capital budgets. That said they still must balance various and competing alternatives, seeking the best return on investment [33][28]. These companies have capital budgeting processes completed on an annual basis and they're usually only capital constrained for unexpected mid year requirements or restricted based on investor and or industry. We analyzed with the help of an assessment tool for a telecom company with a range of thousand employees in the following parameters.

1. Infrastructure Management
2. Service Delivery and Automation
3. Application Management
4. IT Maintenance
5. Improve IT Agility
6. Security and privacy
7. Operation Budget
8. Personnel Capacity Building

2.1 Infrastructure Management

When it comes for an industry infrastructure management it is the core component that must be taken care of. Infrastructure management for an organization is the management of essential operation components, such as policies, processes, equipment, data, human resources, and external contacts for overall effectiveness. Hence this plays a major role in India Inc_s Infrastructure Management which leads to the increase in the Capex as well as the Opex. It is well known that the insurance as a part of Capex is invested for infrastructure Management. Hence instead of building infrastructure from scratch every time India Inc can concentrate on building cloud based Infrastructure and getting them as a service (IaaS). IaaS model is highly scalable, provides for On-Demand services, and shifts IT expenditure from CAPEX to OPEX which is the most frequently cited, financial benefit of cloud computing [24] .

2.2 Service Delivery and Automation

In all Information Technology Enabled Services (ITES) the Service delivery and automation is an undeniable process. Consider that the delivery system needs to be building consuming the Human Resources, Technical Resources and Time this become a tedious activity. So instead of building new services India Inc can use the cloud based service delivery and automation which will make them as the more efficient users of the technology with the advanced new trend the activity like change, configuration, provisioning, release, and asset management helps a lot in reducing the cost and eliminating the errors.

2.3 Application Management

Application management is one of the most important activities that is need to be carried out in the IT industry Where the application act as the interface between a customer's business processes and their IT infrastructure. Overtime Application becomes more and more complex for example because of merges, acquisitions or global expansion. Different applications must be interconnected to enable information sharing across organizational boundaries. Hence the Application management when moved to the cloud environment will give relief from complex application management tool. With a randomized application clustering and classification, cloud can manage the application in a very perfect way thereby minimizing running costs.

2.4 IT Maintenance

When it comes for the IT maintenance in Cloud based Environment The India Inc can maintain the data in three different aspects namely.

2.5 Corrective Maintenance

This kind of maintenance technique involves the process of identifying the errors and rectifying it. This system also enables fault tolerance up to certain level ie. till the data meets the ―Big Data‖.

2.6 Adaptive Maintenance

This Special Maintenance Technique enables the India Inc's Customers Business to enable platform independency by creating a common cloud all over the business environment with a temporary relocation to virtual cloud.

2.7 Perfective Maintenance

This Specific Maintenance Solution provides Quality of Service (QoS) attribute which are non-functional of the IT industry such as the Reliability, Stability of the services of the cloud environment.

2.8 Improve IT Agility

There are many ways for an IT industry to increase its agility. This paper suggests the selection of agile services development which will provide strength to stabilize and will give more reliability for the IT Business in a volatile environment like cloud. To improve Agility the services that is delivered must be under gone through several tests is a good practice. Since the cloud environment provides both the exploration and exploitation impact service the India Inc will really grow more when the business activities are carried out through the Cloud environment.

2.9 Security and privacy

On security we discussed about the application management, infrastructure management and Service delivery Automation. These involves resource sharing and data transfer in a typical multi-tenancy cloud environment. Security issues must be weighed to make sure that confidential information remains protected from a cloud provider, or another cloud user, or even worse, a competitor [21]. These two aspects involve sharing a lot of business secret which should be shared in a secure manner on the cloud while replicating all the traditional administrative, physical and technical security counter-measures. Application management allows all the clients to access the data without no restriction constrains on such case a necessary security mechanism should be enabled by the cloud provider. In this case when the system becomes distributed it is hard to secure resources. Hence bringing all the resources to a central platform and securing it becomes easy for an business environment (when it has a very strong security procedure suitable for cloud environment).

2.10 Personnel Capacity Building

It is common knowledge that the strength of any organization has a direct proportionality with the expertise and ingenuity of its workforce. Especially in most Indian SMEs skilled IT manpower is required for handling and maintaining advanced IT applications and tools, and these skilled personnel are usually difficult to retain due to issues like lack of career progression, lower wages, etc [23]. This paper therefore further proposes that personnel development initiatives are very crucial to sustaining the sure benefits of the CAPEX-OPEX migration facilitated by cloud computing. Only an informed India Inc workforce can apply cloud technology knowledge in consistently lowering the cost of business operations.

2.11 *The Need for a Cost Model*

The data centre of the future gets imagined like that which has a great many sole board reckoning methods that are utilized in shelves. The shelf is a gallery of an Electronics Industry Association (EIA) whose height is 2 m or 78", width is 0.61 m or 24" and depth is 0.76 m or 30". A normal 78" shelf comprises 42 out-and-out sole board reckoning sectors as well as the dense shelf outlines of tomorrow, like "blade" servers comprising more than 200 similar reckoning sectors. The reckoning sectors comprise several microprocessors. Those waste almost 250w of power. The evaporation of heat from a shelf that comprises these kinds of reckoning sectors, surpasses 10 KW now-a-days., and beyond 30,000 sq ft, will be necessary beyond 10 MW of power due to the reckoning framework. The eradication of heat like an elevated power density data centre gets intricate enough. Traditional layout as well as handling methods on the basis of general guidelines for having the total over furnishing as well as inept layout of cooling assets. We have noticed that via research in the HP Laboratories Smart Data Centre, the management of cooling assets lead to 0.8 W of power exploitation by the data centre cooling component for every 1 W of power that i8s misused by the computer hardware. We initiate a superior method applying Computational Fluid Dynamics (CFD) that requires making layout of the air passing dissemination as well as correct supply of the cooling assets. In HP laboratories, this study group of thermo mechanics has developed CFD prototype methods. Then it has initiated an overhaul termed "static" smart cooling of data centres towards users [1]. In this study, the objective of the overhaul is nothing but supplying appropriate as well as well organized thermal control and mitigating the power that gets necessary by the cooling assets by twenty five percent. Every year, the gradual expense of power regarding the 30,000 sq ft. data centre stated above, gets profuse dollars. This is because of having more frugality of money; "potential" brisk cooling of data centres gets suggested via disseminated discerning as well as management [1, 2]. Furthermore, if there is the static as well as potential methods of the capability of laying by in periodic increment of expenses of electricity, the devaluation of the complicated transmission of power and cooling component have to get arrested for making flexible as well as "appropriate" furnished data centre which gets able to have potent data centre on the basis of controlled amenities [15, 16].

III. RELATED WORK

The advancement in the distributed systems and internet technology gave way for cloud computing, where the hardware resources were placed at a centralized data centre and the users could access the resources through internet [37]. Data centres comprise of high end resources for computing thus reducing the burden of resource maintenance at users' end [37]. Cloud infrastructure provides framework for manageable, scalable and reliable applications. Most of the cloud computing strategies implement virtualization, where the hardware resources namely the compute resources

such as Random Access Memory (RAM), Processor, Hard Disk, Network Interface Cards (NIC) etc., are shared between two or more clients. In traditional/legacy networks the network functions are tightly coupled with the infrastructure they run on. Network Function Virtualization (NFV) decouples the software implementation of the network functions from the resources (such as computation, storage and networking) they use, thus providing flexibility to move network functions from dedicated devices to generic servers. Thus NFV is considered to be economical, scalable, flexible and secure technology for shaping present day networks [38]. A framework for management and orchestration (MANO) of resources in the cloud data centre is defined by the European Telecommunication Standards Institute (ETSI). The ETSI NFV-MANO document discusses the management and orchestration framework for the provisioning of virtualized network functions (VNF) [38]. OpenStack is a cloud operating system that controls compute, network and storage components [46]. Relationship of NFV with Software Defined Network (SDN) and cloud is discussed in [39]. NFV abstracts network functions, SDN abstracts the network infrastructure and the cloud computing abstracts the compute infrastructure (such as CPU, RAM, etc.). It will be beneficial to use these three technologies since they share similar advantages of virtualization, cost reduction, agility, automation and dynamism [39]. The benefits of using OpenStack as the API framework for NFV are discussed in [40]. Several use cases of NFV are discussed in [41]. The authors in [41] consider reliability, stability and security asthe key performance parameters in both physical and in software based virtualized networks. The concept of network function centre (NFC), a cloud platform that delivers network services on subscription basis to the clients is discussed in [42]. The paper identifies that dynamic scaling up and down of resources for network resources upon the request from clients is a challenge. A Network Function enabled multi-tenant Cloud architecture, called NeFuCloud is presented in [43]. NFV is used to virtualize the middleboxes in the multi-tenant cloud. The architecture follows the principle of SDN to separate the control and data plane, thus providing flexibility, interoperability and adaptation to various strategies and policy changes. The authors in [43] consider network function deployment and policy enforcement, performance guarantee and isolation, and resource management as the major challenges for multi-tenant clouds. To study theeffect of network virtualization on CAPEX in a data centre, the authors in [44] have considered two deployment strategies namely vertical serial deployment (VSD) and horizontal serial deployment (HSD). A framework for virtual network function (VNF) management and orchestration in enterprise wireless local area network (WLAN) is presented in [45]. The goal of the work presented in [45] is to reducelatency in the wireless network through VNF.

IV. PROPOSED WORK

In this research, the suggested replica of expenses has been made, on the basis of the arrangement of the data centre that covers the entire area of 1500 square feet that comprises an area of server enclosure of 600 square feet. The volume of the data centre has been arranged for making space of 17 42U shelves for making the state needs in concern for the subsequent five years. Besides, this gets suggested for having a repository of 20 TB for making a constituent of the huge scalability necessities and offer elevated density accuracy cooling that is empowered via both ground and cooling [17]. With the implementation of this study's suggested expenses replica, it is displayed in it that the entire expense to make the establishment of this research is almost rupees three billion and nine million only. Out of this expense, for Capex it is almost rupees nine hundred twenty million only and for Opex for a span of 5 years, it is almost rupees 2.1 billion and 6 million only, devoid of bandwidth, advisory and SDC expenses. Nevertheless, those expenses do not have the price of establishing physical privilege. The following tabular representations display financial approximations of the Capex as well as Opex of this research's expense prototype. The tabular representation 1 as well as the tabular representation 2 displays Capex prototype and tabular representation 3 displays the Opex prototype for making the establishment of a suggested data centre [18, 19]. Such prices are the approximation of the prices regarding such study. Besides, these are dependent on the variation on the basis of precise length of the framework of the data centre. Such prices do not comprise the price of the physical privilege such as the civil price of erecting the structure of the data centre [20].

Table I: Detailed Breakup of Physical Infrastructure (Non – IT) Cost

Sr. No.	Item	Cost(In INR)	Remarks
Supporting Infrastructure Cost			
1.	UPS	8,000,000	2 UPS (2x150KVA) Capacity
2.	Precision AC	3,500,000	52 TR precision based cooling
3.	Diesel Generator Set	5,000,000	2x250 KVA Capacity
4.	Building Management System	2,000,000	Lumpsum Cost
5.	Fire Suppressor & Detection System (FM 200)	2,000,000	Lumpsum Cost
6.	Electrical Work	2,000,000	Electrical Works (patch panels, conduits, higher gauge electrical wires etc.)
7.	Site Preparation	3,750,0000	Site Preparation at the rate of Rs. 2500 per sq. ft. The total area od the proposed Data Centre is 1500 sq. ft.
8.	Access Control & CCTV	1,000,000	Lumpsum

9.	Audio Video Solution	1,500,000	Lumpsum
10.	Public Address System	500,000	Lumpsum
11.	Water Leak Detection System & HSSD	1,000,000	Lumpsum
12.	Sub Total	30,250,000	
13.	Any Other Component*	1,512,000	5% of the Sub Total above
14.	Total	31,762,500	

Table II: Detailed Breakup of IT Infrastructure Cost

Sr. No.	Item	Cost	Remarks
1.	Application Server	2,500,000	5 servers @ 500000 per server
2.	DB Server	4,000,000	5 servers @ 800000 per server
3.	Web Server	1,000,000	2 servers @ 500000 per server
4.	Enterprise Access Server	1,000,000	2 servers @ 500000 per server
5.	Firewall Server	500,000	1 server @ 5 Lakhs per server
6.	Management Server	500,000	1 server @ 5 Lakhs per server
7.	Directory Server	500,000	1 server @ 5 Lakhs per server
8.	Enterprise Backup Server	1,000,000	2 servers @ 5 Lakhs per server
9.	IDS Server	300,000	1 server @ 3 Lakhs per server
10.	Staging Server	500,000	1 server @ 5 Lakhs per server
11.	Integration Server	500,000	1 server @ 5 Lakhs per server
12.	SAN Storage	9,000,000	For 10 TB Storage scalable upto 20 TB in future
13.	SAN Switch	2,000,000	
14.	Tape Library	1,000,000	1 Tape Library with 2 drives
15.	Backup Software	500,000	Lumpsum
16.	Mid Size Router	4,500,000	2 mid-sized routers
17.	Racks	1,760,000	42 U Racks
18.	LAN Passive Components	350,000	
19.	8 port KVM Switch, 15" LCD Monitor, Keyboard	200,000	
20.	Security Management System	600,000	Lumpsum
21.	Network Management System	1,200,000	Lumpsum
22.	Firewall	9,000,000	2 Servers
23.	IPS	3,000,000	2 Servers
24.	HIDS	1,500,000	Lumpsum
25.	Anti-Virus Software	1,000,000	Lumpsum
26.	Agg. Core Switches	8,000,000	2 Switches in high availability
27.	App. Switches	1,000,000	5 Application switches
28.	Workstations	500,000	
29.	Other Components	2,870,500	
30.	Total	60,280,500	

Table III: Detailed Breakup of Operation and Maintenance Cost (OPEX)

Sr. No.	Item	Cost for 5 years	Remarks
1.	Manpower Cost (at State Level)	40,000,000	@8000000 per year
2.	Facility Management Expenditure for support infrastructure	18,750,000	@Rs. 2500 per year per sq. ft.
3.	Diesel Cost for DG set/ per annum, assuming the Dc runs on DG runs 20% of [24x7/ 365 Days] i.e 4 Hrs.	81,030,000	@ approximately 200 ltr per hour consumption and other maintenance cost and that DG set runs for 6 hrs everyday; price of diesel – Rs. 37/ litre, total period – 5 years
4.	Electricity Cost / annum, assuming the DC runs on electricity remaining 80% of [24x7/ 365 Days] i.e 20 Hrs.	58,500,000	Assuming that electricity runs for remaining 75% of time per day i.e. 18 hrs
5.	License and Software up gradation cost	18,408,600	At 20% of the CAPEX
6.	Total Cost	216,688,600	

V. CONCLUSIONS

Since making computation turns out to be a necessity, a huge convention of awareness has been axis around the expense of a data centre, with certain awareness of power necessary for handling the data centres. Such study establishes an all inclusive price prototype regarding data centre proprietorship as well as execution. Substantial prices associated with price of the transmission of power, workers along with software as well as authorization have got hold of like the specifications all over the study for making the suggested price prototype. Such study observes as well as integrates the expense of data centres applying ground occurrence as well as reckoned information as well as independently accessible software replicas. Such a prototype is able to get applied for speculating the real expenses of creating a novel scope, evaluates prospective growths in the arrangements of this kind of scope, or examines the expenses of prospective utilities of ex-situ elucidation of computation. The suggested prototype can make relative assessment of distinct data centre exercises as well as arrangements.

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Females' Use of Community Network to Overcome Depression & Psychological Stress

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Abstract
In the present situation, the Corona virus syndrome 2019, commonly known as COVID-19, is threatening the lifespan of human being and it has been declared as a pandemic. In addition, with affecting the economy and creating health hazards for people around the globe, it has also affected their mental health. The frequency of this condition is surprising and it is more difficult to evaluate. Every year, only few people out of millions of people get proper medical treatment of depression. In women, depression can be complicated by biological factors and social pressures. Researchers have started to examine informations about women's stress and sadness on Twitter, Facebook pages, and YouTube videos for the study. Connecting with the public, sharing useful information, and managing one's online presence are all feasible in social media platforms. The Social Norms Theory and the Agenda Setting Theory have been used to conduct this research. In order to determine the types of communications, tweets of Twitter and videos of YouTube (that addressed stress or depression-related material for women) have been examined. According to the study, traditional approaches such as physical exercise and yoga are suggested by social media users to relieve stress and despair.

Keywords
Facebook, Twitter, YouTube, stress, depression, public networking sites, females, Instagram

INTRODUCTION

Due to social media, people can communicate and interact with one another in ways they could never have imagined. It is impossible to deny that social networking sites (e.g., Twitter, Facebook) have altered how people communicate, socialize, and interact [1][2]. Report says that on average stress levels are higher in women with compare to men. Females who communicate with others using a range of digital devices, are less anxious. There is a link between social media use and being more aware of stressful events in their loved ones' lives [3]. Various social media networking sites like Twitter, Facebook, and YouTube, have become important tools for increasing women's awareness of stress and depression. Females are searching different social networking sites for their healthcare related information. Depression is a severe problem that affects both individuals and civilizations. According to De Choudhury in [4], every year tens of millions of individuals worldwide suffer from depressive disorders, where only a small percentage receives therapy. Owing to reproductive hormones and social pressures, women are more likely to struggle from mental illness.

In recent trends depression is the major cause of illness and it contributes significantly to the global illness impact. It is predicted that by the end of year 2025, in worldwide, women would be mostly affected by mental illness than men. Depression affects women of all ages, especially in south Asia where 1.30 billion people live [5]. When women live with stress or depression, they are impacted in every aspect of their lives. They impact their social lives, family relationships, and careers. If stress continues untreated, it can become chronic. Peoples are unaware that they have a problem until a heart attack or worse occurs as a result of intense stress. Stress begins to interfere with the capacity to live a normal life. The longer stress continues, the worse it gets for one's mental and physical health. The reduction of stress levels can not only improve one's wellbeing right now, but may also protect one's health in the long run. Indians are among the world's most depressed, according to the WHO (2017) [6]. Men suffer from substance abuse, aggressive behavior, and antisocial personality disorders, while women tend to deal with psychological distress and anxiety disorders more frequently [7][8]. Domestic abuse victims should be examined on a regular basis to avoid harm to their physical and mental health. In India, recent developments have demonstrated a transition in women's status from housewives to workers, which provides them with independence, financial freedom, and security. Women with long work hours and strict deadlines suffer from depression and general anxiety disorders. Working hours under deadlines lead to skipping meals and eating more unhealthy food. Moreover, few sectors are there, which demand a lot of work and does not allow to take sick leave also. Depression is often caused by several factors such as inadequate sleep, lack of exercise, poor nutrition, excess alcohol consumption and etc. However, due to use of social

media, access to the public can be instantaneous and vital information can be spread swiftly. More importantly, social networking may enhance customer loyalty and satisfaction, on the other hand, unjust criticism and inaccurate information can also be spread by the use of social networking sites. Many of the feedback on social platforms is anonymous,

which can result in polarized opinions, stances, and critiques. The field of social media is still growing. Researchers have focused much of their research on how women can use social media for health information in relation to depression and psychological stress.

According to the authors, the following are the key objectives of my work:

- To study women's social media accounts related to psychological stress and depression.
- To investigate the community network use by Indian women as a forum for interaction to cope with stress and depression.

This study analyzes a number of Twitter pages and YouTube videos in the Indian context for information about stress and depression among women.

The rest of the article is organized into four sections. Followed by introduction, in section two the extensive literature review has been discussed. The data analysis has also been done in the same section based on several parameters like depression Twitter post, user reactions in emotive icons, number of Twitter users in leading countries, etc. The framework study of stress and depression analysis and methodology of the proposed work have been represented in the sections three and four respectively. Finally, the work has been concluded in the section five.

LITERATURE REVIEW AND DATA ANALYSIS

Mason *et al.* [9] have distinguished between three distinct stress processes: both an internal energy state (strain) and an external event (stressor). Stress is experienced in the form of physical, psychological, and even biochemical responses. Stress, on the other hand, refers to upset, and regular stresses.Unresponsive physical environments, acute role strains, and cumulative adversity are some factors that contribute to stress. Psychologists study stress from a psychological perspective. According to Lazarus and Folkman in [10], psychological stress refers to "the correlation between a person and his or her environment that he or she perceives as being draining or exceeding his or her resources and endangering homeostasis" (p. 19). Moreover, according to Grant *et al.* [11] the definition of stress, for instance, is a series of environmental events or chronic conditions that threaten the physical and/or psychological health and well-being of individuals of a particular age within a particular society. In research, external life events that stress individuals are mediated by
interpersonal interactions between stress and the first component, i.e., organic, mental, or psychological conclusions. Outer oe external memory life events also serve as a explanation of stress [12].

However, according to Petersen *et al.* [13], boys and girls experienced depressive symptoms (The event lasts for more than two weeks) more often during teenagers. Depressive disorder refers to a cluster of feelings, behaviors, and thoughts that occur in conjunction [14]. A variety of studies investigate the relationship between stress and depression. Interviewers need specialized training to conduct a major depression assessment instead of a simple checklist of symptoms. Gibney *et al.* [15], have reported that the social sciences continue to place a strong focus on the link between social contact and mental health. They have looked the impact of social support network type on mental health using two opposing psychological models related to social influence and tangible resources. This effect appears to be mediated by loneliness and is comparable in magnitude to divorce. There is no proof that the presence of such a network enhanced the distress produced by stressful life events, according to the researchers. Strong spouse support reduced the risk of depression in women, but only in women. Sorting people according to their social networks has helped researchers to identify those who are most likely to develop depression. More than three-quarters of Twitter users (77%) say that they use the service on a daily basis whereas 58% use it many times in a day and 23% use it once in a day.Tthe percentage of users that log into in a daily basis, Instagram and Twitter are rated third and fourth respectively. About half of Instagram users (52%) use the platform on a regular basis whereas another 35% using it multiple times per day. Greenwood *et al.* [16], have claimed that 43% of Twitter users indicated that they visit every day.

Among the people, who use social networking sites (SNS) more frequently (83%), the people under age of 50 is more prevalent. Usage of social networking sites by people living in urban areas is also greater than the people living in rural areas. A study, conducted by Duggan and Brenner says that girls are more prone than males to suffer from mental illness to use Twitter, while younger adults use Twitter most frequently [17]. As social networks, such as Twitter and Facebook, pose particular promise for sustaining engagement, because of their strong retention and engagement, whether engagement with specific features of these networks (for instance, an app or Twitter group that delivers health information) matches this is unclear at the present time. Developing innovative methods for observing how people use social media sites on the internet (with friends and for fun), would be helpful for researchers in several fields, including health and human-computer interaction [18]. This strategy for social media marketing is an alternative method to increase consumer satisfaction through behavior change through integrated marketing. The Social Marketing plan guides the whole process from the perspective of the individual, increasing the chances of success, as well as decreasing a discrepancy between the planned and the achieved results. However, social marketing has emphasized a lack of customer-focused campaigns in health [19]. However, patient involvement is growing as they are more willing to share their experiences and rate their care. They are also use these technologies to connect with others who are suffering from similar ailments, share experiences and manage their conditions the use of natural language processing and sentiment analysis can provide valuable insight into healthcare performance from unstructured patient experiences on social media platforms, blogs and Twitter accounts [20].

Moreover, toward understanding whether friendship networks (such as Friendster and MySpace) affect adolescents' self-esteem and well-being, in the year 2006 Valkenburg *et al.* [21] have surveyed on 883 teenagers (11 to 20-year-olds) with online profiles on a Dutch friendship

network. This study has found that adolescents' use of the site affected their social self-worth and happiness indirectly. Friend networking increases the occurrence with which adolescents receive response on their profile and the tone (that is, encouraging versus negative) of the reaction. Adolescents who received favorable comments on their profiles had higher social self-esteem and well-being than those who received negative criticism. Additionally, in the year 2013 Choudhury *et al.* have reported that social media could be used in the detection and diagnosis of major depressive disorder in individuals. The researchers have used Twitter users who reported being diagnosed with depression to construct a Twitter data set based on a standard psychometric measure. Researchers have also used social networking websites to measure behavioral characteristics related to emotional engagement, language and linguistics styles, self-esteem, and mentions of anti- depressant medications. The study identified and empowered people who are depressed to take control of their mental health. On the other hand, multilevel models and a
path model have been used by Oh *et al.* [22] and an analysis of social networking websites has been conducted to determine the effects of supportive interactions. The Researchers have found that interactions with supportive individuals enhanced positive affect. The perception of social support indirectly enhanced the perception of sense of community and life satisfaction Positive impact improved one's sense of community and life happiness in an indirect way. The number of SNS friends, supportive interactions, affect, perceived social support, sense of community, and life happiness all have favorable relationships, according to the route model. It has been observed that supportive interactions on social networking sites mitigate the link between SNS use and the number of friends one has on the site.
Considering the potential benefits of social networking sites like Twitter for people with little confidence or interpersonal problems, Clerk et al. [23] have found that those with these difficulties tend to do better in their interaction plans, and thus sabotage their chances of benefiting individually. In this study we verified whether Twitter reassurance seeking negatively impacted self- esteem. The results show that Twitter reassurance seeking predicted lower self-esteem, which in turn predict increased feelings of not belonging and of being burdened. Best et al.
[24] have recommend reviewing empirical research on this topic, identifying both the beneficial and harmful effects of online communication and social media technologies among teenagers. They performed a systematic narrative review of research publications for the period February 2003 and May 2013, in which they have retrieved findings from eight databases. Online technologies have been reported as having positive effects on self-esteem, perceived social support, social capital, identity experimentation, and self-disclosure. This systematic narrative review has found contradictory evidence concerning the mental well-being of young people and a lack of strong causal proof. According to Jindani et al. [25], yoga may be effective in reducing post-traumatic stress

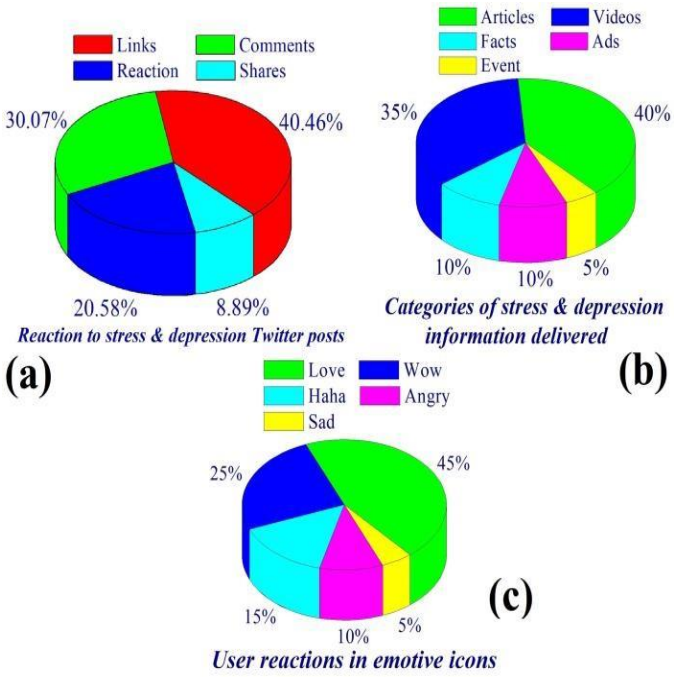

Fig. 1 (a) Stress and depression reactions Posts on Twitter. [26][27] (b) Information on stress and depression is offered in several categories. [28] (c) Emotional icons represent user reactions. [29]

disorder (PTSD) symptoms. The research has examined the effects of Kundalini Yoga (KY) on PTSD symptoms and overall wellbeing. Participants access a teacher through a 20-minute YouTube video for support and instruction as needed. The program includes a 15-min daily home practice. This practice is designed so that participants would learn tools to self-soothe in the program that they could use once it has finished. A trauma aware yoga program includes guidelines for participants who want to try poses, not remain articles, 35% are videos, 10% are about healthy lifestyles on a daily basis, 5% are training-based conferences, and 10% are about using Twitter advertising to promote the health industry. Because they have more space and time to deliver critical information, articles and videos make for a considerable portion of the total. Fitness is a prominent topic that was covered in around 20% of the messages, as seen in Figure-1c. It covers a wide range of themes, including daily life, a healthy and low-calorie diet, sleeping patterns, and so

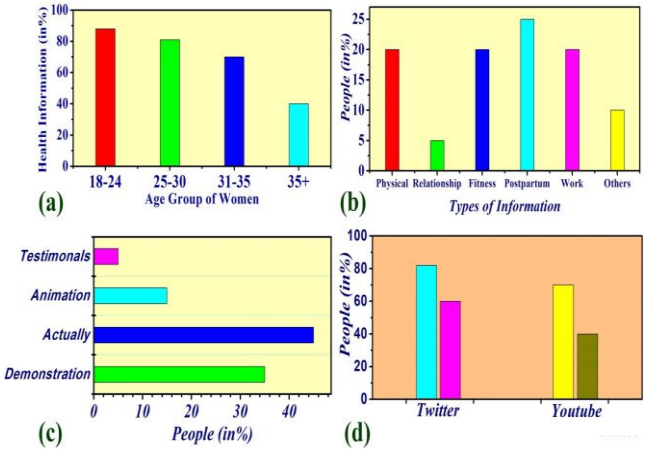

Fig. 2 (a) Women of a certain age range use social media [30] (b) Information about stress and depression that was covered [31] (c) Emotional icons represent user reactions (d) Twitter versus YouTube[32].

in ones that make them uncomfortable. According to the yoga study, significant changes are demonstrated in well- being scores and PTSD scores in comparison to the waitlist control group.

Here, the data analysis has also been done based on several parameters like depression Twitter post, user reactions in emotive icons, number of Twitter users in leading countries, etc. For example, figure-1a shows Twitter users' reactions to posts on the stress and depression sites. Users have access to a lot of features on Twitter, including a large number of likes, reactions, shares, and observations. According to a Twitter page analysis, ~ 40% of users view and "like" information that has simply been amended by businesses, while 30.1% react to the updated post. Furthermore, 21.6 percent of users express strong opinions, while the remaining 8.9 percent submit updated posts about stress and unhappiness. Moreover, Figure-1b depicts the many types of stress and depression content available on Twitter in the form of videos, facts, and articles. According to an analysis of various types of statistics distributed through Twitter and YouTube about healthy lifestyles, nearly 40% of them areon. Relationship material accounts for roughly 5% of stress, and this stress can be generated by egoism, miscommunication, and sexual troubles, among other things. About 10% of the data was made up of other stress-related information. Figure-2a shows that women under the age of 25 are the most active users (45 percent) of posts on social media about stress and depression, while women over the age of 35 are the least active users (5 percent). Social media usage is highly linked to age: those under the age of 31 have traditionally been heavy users (75 percent). However, stress- related illnesses are referred to be "physical." Relationship stress can be caused by harsh criticism, inattention, loneliness, and sexual troubles. "Fitness" refers to a type of stress brought on by dissatisfaction with one's physical appearance, such as obesity. Physically exhausted, a sense of hopelessness, and a lack of confidence are all prevalent signs of postpartum depression in new mothers. Figure-2b shows how these kinds of stress and despair are reflected on Twitter and YouTube. Around 25% of the information on post-partum depression has been discovered to be related to stress after childbirth. Moreover, figure-2c depicts how video formats have an important role in influencing the audience's attention while providing stress-related information. 45 percent of YouTube videos are actually talking about how to get rid of stress and sadness, and 35% of videos are demonstrating yoga or free-hand movements, with the rest being live videos to pique users' attention. Additionally, figure-2d shows the number of Twitter pages and YouTube videos with content and followers. Approximately 82% of content was distributed via Twitter, while 70% was delivered via YouTube Around 60% of the followers are on Twitter, whereas just 40% of the followers are on YouTube.

The data analysis related to digital population for one of the most leading countries like USA has also been done which has been shown in the figure 3. In figure-3a, it has been represented that, in January 2021, there are over 269.5 million mobile internet users in the United States, accounting for over 90% of all active internet users.

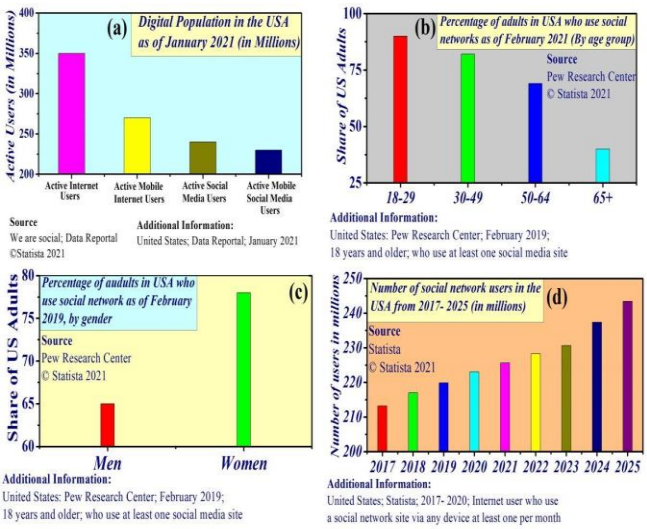

Fig. 3. (a) Digital Population in USA [33] (b) Percentage of adults in USA who use social network [34] (c) Percentage of men and women in USA who use social network [35] (d) Number of social network users in the USA [36].

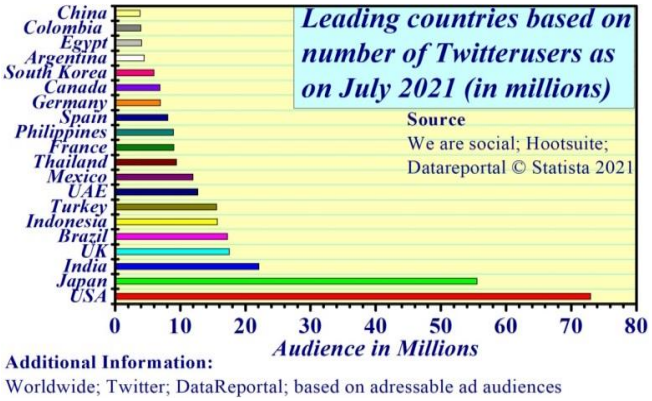

Fig. 4. Leading countries based on number of Twitter users as on July 2021 [37].

Moreover, in 2021, there are 295 million social network users in the United States, accounting for about three- quarters of the population. Figure3-b depicts the percentage of adults in USA who use social network as of February, 2021 by their age group. It is observed from the figure-3b that, the majority percentage of social network users are having age of 18-29 years and people having age of 65 years and more use social networks less. Additionally, 78 percent of adult women and 65 percent of adult men used social networking sites during that time period, which is shown in the figure-3c. finally, in the figure-3d, year wise number of social network users in the USA have been shown. According to platform statements, there are 215 million social media users in the United States in 2020, which means ~66 percent of Americans are actively utilizing sites on a monthly basis. However, it is predicted that by the end of year 2025, there would be 240 million social media users in USA, which is ~74 % of total USA's population.

In figure-4, twenty leading countries based on number of Twitter users as on July 2021 is shown. It has been observed from the figure that the Twitter is notably popular in the United States, where the microblogging site boasted a 73 million-strong user base as of July 2021. With 55.55 and 22.10 million users, Japan and India are ranked second and third, respectively.

In order to describe the category of female users based on their involvement in using Twitter, we divided them in different group (see Table 1) like age, gender, income and education. Here we divide the age in different age group to compare the involvement percentage, as well as we also categorize the income of the female users to see the involvement on Twitter. In education category we categorize it in three parts and compare the involvement also.

FRAMEWORK STUDY

Agenda Setting Theory and Social Norms [38] Theory are utilized in this study to describe how media can influence individuals in a variety of ways. People are more impacted by problems that are constantly stressed by the media, according to Agenda Setting Theory. It is well known that the media is very efficient at setting agendas. But the effect of media propaganda id low in those areas where people can easily deduce the reality on their own. Well informed people tend to argue and counter the media propaganda more frequently than the ill-informed people [39]. Social media, in particular, allows users to direct content share so that it may even neutralize the effect of mainstream media's propaganda, resulting in reverse agenda setting [40]. Agenda-setting of the mass-media may be the most celebrated theories in communication studies which settle a relationship between the media and mass-opinion. Nevertheless, social media's proliferation and expansion have gone against the role of mainstream media in creating the public opinion, as they are now allowing the public to put issues on the agenda, and the conventional media accepts this agenda as public agenda as well. An individual's attitude or behavior can change based on one's friend circle and social media. It could be a positive or negative change in behavior depending on the behavior that is adapted [41]. So social media is now playing a significant a role in stress and depression related health behaviors.

Table 1: Overview of Twitter users (in several categories)

Categories	***Several times A day***	***About once a day***	***A few times a week***	***Every few weeks***	***Less often***
Age					
18-28	51.60%	18.80%	17.20%	4.40%	8.00%
29-38	51.33%	24.34%	16.37%	2.65%	5.31%
39-48	52.97%	19.18%	12.79%	4.57%	10.50%
49-58	49.33%	27.35%	16.59%	1.79%	4.93%
59+	40.98%	23.71%	22.16%	5.67%	7.47%
Gender					
Men	45.10%	21.36%	20.03%	6.38%	7.12%
Women	51.37%	24.39%	15.09%	3.05%	5.64%
Income					
<$ 30,000	52.45%	20.75%	13.83%	3.75%	9.22%
<$ 30,000 - <$ 49,999	49.49%	25.25%	18.69%	3.54%	3.03%
<$ 50,000 - <$ 74,999	47.06%	25.49%	18.95%	5.23%	3.27%
<$ 75,000+	45.39%	23.46%	20.39%	6.14%	4.61%
Education					
High school and less	52.78%	21.67%	14.44%	3.61%	7.50%
Some college	51.71%	20.00%	17.56%	5.37%	5.37%
College+	45.22%	24.25%	19.53%	5.11%	5.90%

STUDY METHODOLOGY

The goal of this study is to look at social media material about women's stress and sadness. The quantitative method of content analysis, which is utilized in this research paper, can assess attitudes, views, behaviors, and other defined factors. The text in this study is made up of articles about a certain clinical issue, and it measures these messages and articles in a measurable way. In order to examine the content, the researcher divided the available contents into several groups like articles, repeat articles, comments, images, and videos. Messages from Twitter are analyzed, as well as Twitter and YouTube videos. Posts are analyzed by assessing the following factors: type of messaging, comment, shares, likes, interactions, and right message; and the type of message, including information, and the targeted age. The following parameters are investigated:

- Likes: The frequency of likes reflects the number of people has viewed it.
- Comments: These are the posts made by users.
- Shares: Any post that has been copied and pasted from a Twitter post onto an individual's Twitter page is referred to as "Shares".
- Reaction: A reaction can represent a favorite, a laugh, a wow, sadness, or anger.
- Followers: A "follower" on social media is somebody who subscribes to your own account so that they can be kept up-to-date.

The researchers categorize the articles by the number of characteristics, the amount of content, and the framing. The characteristics include, for example, the types of messages, the interactivity rate, the interaction rates, and whether the article gets likes or shares. This content can be divided into: the type of information covered in the message, and the age group intended for the message. The topics of the message can also be divided into types: the kind of information covered and the age group intended for the message.

4.1 Sample selection

From the beginning of November 2020 to the end of February 2021 (total of four months) the stress and depression related study among the people have been done. Stress and depression show higher increases in women. Basing the selections on popularity assessment, as key phrases, we used stress, depression, and women in order to choose YouTube videos, a similar method is used. During a four-month period, items are chosen using the statistical sampling techniques. “#verified” on Twitter was used to find the most frequently visited stress and depression-related pages. A blue label must be displayed on such pages, indicating that Twitter has validated the page's authenticity.

Twitter chooses to follow their own algorithm to display or propose post for viewing for its people. According to Twitter, "if a comment is liked, it is assumed that person wants to see more of that type of post". The pages are chosen based on the number of comments on the posts. To analyze the woman healthcare awareness and its trend, it has examined how women responded to healthcare information messages about stress and depression. It is taken into account the number of times women have visited the message board as well as how often they have responded. It is found that nowadays women are searching for stress relieving sites and Youtube videos more frequently than anything else. YouTube has topped for searching online videos, whereas Twitter comes second for its videos and interactive features. We used quantitative content analysis (as described in Appendix A) and qualitative interpretations. The list of 11 YouTube videos and Twitter pages that have been taken into account for analysis, is mentioned below.

(1) Motion Picture's major channel is BuzzFeed Video. It is always entertaining, whether it is hilarious or serious.

(2) On Glamrs.com, you can find the most up-to-date and popular make-up tips, healthcare, fashion ideas, nail art, everyday life hack films, and other motivating do-it-yourself (DIY) video clips.

(3) The most comprehensive source of information on pregnancy and parenting is Mom Junction Kids.

(4) The website is all about fashion, beauty, and lifestyle for a contemporary Indian woman. They publish articles that are largely on ordinary women's daily lives. The majority of the posts are on to-do items, remedies, and home tips.

(5) There are over eight hundred video topics on the site, ranging from health and beauty to yoga and fitness. It also carries a diverse selection of articles on beauty, health, fitness, and home remedies. In addition to make-up skills, mehndi [hand painting] skill, fitness programs, and yoga [trainings], you can use common household items to cure ailments.

(6) Children and families can benefit from Super Healthy Kids' healthy ideas.

(7) Its expert guidance covers a wide range of topics, including fitness, health, nutrition, weight reduction, relationships, beauty, style, and job. It delivers inspiration and knowledge to help you be the best version of yourself.

(8) Providing fitness specialists, women's health physiotherapists and women united by women's health with an opportunity to learn from world-renowned presenters and network with one another, the Women's Health and Fitness Summit was established to promote women's health and fitness.

(9) At Doyouyoga.com, yoga enthusiasts from all around the world may experience the best online yoga lessons, motivation, and inspiration.

(10) Among the official information on public health from WHO is the World Health Organization (WHO).

(11) Natural remedies with Homeveda help you deal with all of your concerns about health and beauty. We also provide extensive information on all health conditions, which aids in the detection and prevention of future health problems.

CONCLUSION

In last few decades, there is a growing concern regarding the mental health. Lots efforts are being put forward to get rid of mental illness, sudden bouts of stress etc. Gigantic amount of data is being circulated all over the Internet regarding a wide range of anxiety and mental illness. The first goal of this paper is to examine the content posted on social media in relation to women's stress and sadness. All over the world women are growing concerned about their mental health and choosing Yoga as an essential tool to relieve their stress as well as to maintain an attractive physical shape in long run. According to Jindani *et al*. Youtube videos are adopted as the highly popular medium to learn and practice Yoga in home. The relaxation techniques of Yoga are proved to be highly efficient to relieve stress and boosting up the immunity power in human body [42].

The second and last purpose of the study is to see how women may use social networking sites as a collaborative stand to deal with stress and unhappiness. Women use emotive icons to communicate a lot, according to the data. According to the research, it is found that mainly three categories of women are utilizing the social media most viz. elder ladies, mother of new born babies and young women [43]. Most of them are employing a few Twitter reactions like Love, Wow, Ha-ha, Sad, and Angry. A good many of them are using the heart emoticon "love," which is used when you enjoy the post or the person who wrote it. In case of expressing love most of them are using emoticons. Instead of writing laughing words, 15% of them are favoring a squinty-eyed grin. Wow, a shocked expression, was used by 25% of respondents. And 5% used a sad emoticon to express their sadness. A reddened angry face, is appearing increasingly in around 10% of the texts, is the same.

More women use Twitter to overcome depression than YouTube, owing to the medium's interactivity, which allows women to construct a counter-narrative for the mainstream media while also receiving reassurance from their peers about their concerns. On Twitter, users have access to a variety of tools, including hitting likes, reactions, comments and shares. Likes account for 40% of the total since they are easier to obtain among the other tools of Twitter, whilst comments account for 20%. The message is pushed to the top of Twitter users' pages by likes and comments, thus establishing the agenda. Among the various categories of Youtube videos, reality videos are gaining the top rank in the popularity list, where demonstration and testimonial videos are ranked behind. Number of messages regarding women stress after and during pregnancy is shooting high. Though Indian women are enjoying more care during pregnancy as they are usually living in joint family but nowadays the scenario is changing rapidly.

Several government agencies may prohibit various YouTube video clips in their office environments, which may explain why YouTube has fewer subscribers. Twitter and YouTube may have a mutually beneficial partnership, with both boosting the other. Despite this, both Twitter and YouTube videos are being utilized with efficacy to raise awareness about the need to address anxiety and depression in the female population, which will complement face-to- face activities supporting mental health among women.

APPENDIX A

Appendix A. Quantitative social networking content analysis and collaboration

S/N	Date	Content	Deliverable	Interactivity
I	Feb 23, 2016	29 stress-relieving strategies that are both simple and entertaining Slowly inhale and exhale.	Write-up	Like – 792 Retweet – 50 Share – 260 Reply – 67
II	Dec 23, 2018	Online self-manufactured care's closeness. We turn to the internet for comfort during stressful times, but does it count if the relationship is one-sided?	Write-up	Like – 15 Retweet – 2 Share – 0 Reply – 2
III	Dec 15, 2016	We already know what will help you relax this holiday season. It's that time of year when you're a jumble of anxiety.	Write-up	Like – 26 Retweet – 1 Share – 1 Reply – 3

IV	Dec 17, 2016	People are worried that the wristband that tracks stress isn't working. Caeden, a wearable start-up, is providing refunds and finally fulfilling orders after consumer complaints over non-working and no-show Sona bracelets.	Write-up	Like – 27 Retweet – 13 Share – 0 Reply –2
V	Jan 11, 2017	There are 20 students who are barely making it through finals week. A student comments, "Why study for exams when you can spend your time praying you don't get struck by a car crossing the street?"	Write-up	Like – 87 Retweet – 18 Share – 11 Reply –11
VI	Dec 10, 2015	During finals week, twenty students are just squeaking by.One student comments, "Why study for exams when you can spend your time praying you don't get struck by a car crossing the street?"	Write-up	Like – 950 Retweet – 130 Share – 238 Reply –120
VII	Jan 16, 2017	This woman shared her storey of postpartum depression in a beautiful way. "Here's to the knowledge that this, too, will pass! And everything will improve."	Write-up	Like – 303 Retweet – 40 Share – 25 Reply –7
VIII	Dec 27, 2016	2016's most sad science and health tales Increasing temperatures, medical failures, harassers, and denialists in addition to the giraffes' plight	Write-up	Like – 122 Retweet – 100 Share – 43 Reply – 6
IX	Dec 28, 2018	You'll only get these 27 Tumblr postings if you're depressed. "Strugggling with depression" implies that I am inept at being depressed, but in fact I am a master at it.	Write-up	Like – 2.3k Retweet – 204 Share – 888 Reply –116
X	Jan 1, 2018	By doing so, you can eat your way to a stress-free day! These five stress-relieving meals can help you reduce anxiety in five different ways!	Video	Like – 493 Share – 0 Reply – 4
XI	Jan 16, 2018	Caterer? No. Stylist? No. The most crucial person on your wedding guest list is a professional make-up artist. Our makeup artist demonstrates How to find your "Chosen One" and kill any outfit! Pressure? What kind of stress are you under? Here's some expert advise to help all brides-to-be relax! #You're Invited	Video	Like – 230 Retweet –2 Share – 0 Reply –2

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Judgment Phase of Lockdown due to the third wave in India during COVID-19

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Abstract
Various mathematical approaches have predicted that the COVID-19 infection in India would peak by August/September 2020 and it can be controlled by February 2021. But owing to opening up of educational institutions, other working areas/offices etc., and mutations of the virus altogether have spread the infection faster. However, for sake of economy, the Indian government has adopted a protocol, 'test-track-treat' not shutting down establishments and has increase the speed of vaccination. But in this situation, people should be careful about the third wave of COVID-19 and accurate predictions in various parameters like the culmination day of the pandemic, third phase of lockdown status and spreading trend of infection can manage us to take precautions to fight against pandemic. This work has investigated the virus transmission in relation to the rate of vaccination. In this work, first the spreading of the COVID-19 has been analysed using data collected from various platforms. Moreover, a predictive model has been presented and has analysed the probable future projections of this pandemic in India. Finally, based on the outcome of the predictive model, few strategies have also been suggested to the different administrations, medical management agencies and the government organization to fight against 3rd wave of this pandemic.

Keywords
COVID-19, Indian BBV152 (Covaxin), Ministry of Health and Family Welfare (MoHFW), Basic Reproductive Rate, Second Phase Lockdown, Vaccination Programme, SIR model, Oxford– AstraZeneca vaccine (Covishield)

INTRODUCTION

Nowadays, the most highlighted topic is COVID-19, which is spread worldwide. In December 2019, for the first time this novel corona virus has been found in Wuhan city of China. After that, in a very short span of time, this virus has been spread to 216 countries. However, according to the report the countries like United States, India and Brazil are leading in corona virus infected cases with compare to other countries in the globe. As stated by the World Health Organization (WHO), overall infected and death cases around the globe till date have been recorded as 207,860,544 and 4,373,091 respectively [1]. Owing to rapid growth of infected people and death in the period of January and March, 2020, the government of respective countries have taken the decision of complete and partial lockdown [2].

Since January 2020, numerous research articles have been published on different factors of corona virus [3-5]. For example, Kapasia *et al.* [6] have reported that during this pandemic, 70% of college students
(undergraduate and postgraduate) have engaged in online based education and various challenges have been faced. To control this corona outbreak, different techniques like mathematical modelling, data science, machine learning etc. have been proposed by Mahalle *et al.* in their article [7]. Mandal *et al.* [8] have mentioned in their article that the local outbreak can be prevented and delayed by applying restrictions on travel from abroad. The effect of travel restrictions to and from China has also been deliberated by Chinazzi et al in [9]. Moreover, Krishnakumar *et al.* [10] have mentioned few policies to battel with corona virus threat and also have highlighted the effect of this virus on aged (above 60) and people who are having respiratory problems. The effect of this pandemic on Indian economy has been reported by Ghosh *et al.* [11] in their article. Sarkar *et al.* [12] have proposed the $SARII_qS_q$ mathematical model, which describes the transmission dynamics of these diseases. Based on their experiment, the end dates of the pandemic for 17 provinces of India as well as for whole country have been predicted. In [13], Sharma *et al.* have contributed some plan of actions to the Indian government to make balance of sustain economy with saving lives. The Government of India has adopted several measures including 68-days lockdown to control the prevention from COVID- 19 pandemic, starting from 25th March, 2020 [14]. Seong *et al.* have published articles which analyze the different attributes of pandemic situations between second and third waves of COVID-19 of South Korea [15, 16]. Moreover, Mandal *et al.* [17] have discussed about a SARS-CoV-2 transmission model and four potential techniques for third wave have been examined. Additionally, Fisayo *et al.* [18] have illustrated the effect of virus on the social determinants of health, and its impact on the next generation. According to a survey report [19], during lockdown phase children from wealthy family have spent thirty percent more time in online learning with compare to

children from poorer families. Due to lack of electronic devices, internets etc., inequalities in educational outcome have also been observed among different classes of children [20]. The Susceptible cases (S), Infected cases (I), Recovered cases (R) model on daily infected cases in India has been applied by Kavitha *et al. to* predict the future trend of the pandemic [21]. The same analogy has also been adopted by Ghosh *et al.* [22] for fifteen countries to predict future projections of this pandemic. In their article the suggestions to the government agencies against this pandemic have also been discussed. To predict the peak time of a pandemic the integral form of SIR model [23] is required. Soriano *et al.* [24] have reported that in Madrid ~25% of the population have been infected with SARS-CoV-2 and they have also suggested for vaccination to prevent a greater number of positive infected cases. In [25] Kannan *et al.* have mentioned about the repetition of COVID-19 wave with its intensity and about the importance of vaccination to control the situation. Mitra et al. [26] have proposed that different epidemic reduction strategies like isolation, quarantine, and lockdown can restrict of spreading of virus. During unlock phases in India, the Indians have resumed their normal activities, hence, various mutant strains of SARS-CoV-2 have been roll out across different states of India [27] and increases death particularly in the young population. It is identified that the second wave is more dangerous than the previous one and it has been difficult to adopt diagnostics strategies to control the outbreak. Researchers fear that, slow vaccination drive and easing restrictions, the appearance of new variants could spur a devastating third wave [28]. In India only 140 million doses of COVID-19 vaccine have been managed till date in India, i.e., 10% of total population [29]. The country is still struggling with a severe shortage in medical supplies.

However, the above discussed literature and threat of Covid-19 motivate the authors to analyse and predict the future direction of this pandemic. In this regard, the conventional SIR and regression models are adopted in this work to obtain the prediction more accurately and efficiently [30]. In view of daily new infected cases, India has become global hotspot of the pandemic in the period April to June 2021 due to second wave, but a dramatic decline in daily new infected cases has also been observed after few weeks. Therefore, this work contributes in the concerned domain regarding prediction for the developing country like India; where the high risk of third wave could come in the early future [31]. On the basis of

the authors' understanding, none have considered the prediction about third wave disease transmission trends in India as before, which establish the novelty of this proposed work. Our proposed work has been focused as follows:

- To analysis and predict the COVID-19 transmission movement a time variant discrete SIR algorithm has been utilized.
- The massive population and economically moderate country like India eventually proved that that the purpose of lockdown is important to manage the extensive effect of pandemic.
- In addition, COVID-19 vaccines reduce the risk of spreading disease and also fully vaccination; people can resume their normal activities [32, 33]. So, to build the immunity of the common people, the more vaccination processes should also be an effective measure for the current plan of action which must be taken by the Government of India. Our propose analysis also gives a prediction about the end of this COVID-19 pandemic.

Moreover, the reports the basic reproduction number (R_0) as less than one in both phase of lockdown (June to December 2020 and April to June 2021), which proves the effectiveness of lockdown. Additionally, in our suggested work the time series analysis has also been adopted for short period of time. It is also noticed that our proposed model provides near satisfactory results for the prediction of number of vaccination processes have been done in the month of June and July 2021. As per the official data of 25th June 2021, India has administered 18% and 3.9% vaccines for at least first dose and fully vaccinated respectively whereas, our model has provided results of 14.9% and 3.5% for both the cases (figure 7). Moreover, it has been noticed form the official global vaccination data (worldwide) on 9th June that 12.2% and 6.2% of global population have taken their first dose and fully vaccinated respectively whereas on 10th June 2021, the data has been shown as 20.3% and 9.2% respectively. Therefore, it is obvious justification for our result analysis where some data variation may be happened due to the availability of more vaccines in the country. Our work also analyses the trend of USA where the infected cases are decreasing in the month of August/September, 2021 whereas in case of India it is still rising up in the same time (figure 5). Our result analysis is also sustainable because from the official data about 50% of total population has been fully vaccinated in USA, whereas in India only 7% of total population has been fully vaccinated. The effect of lockdown and plan of actions by the administrations always meaningful for our experimental results, hence on the basis of our predictive models provide better decision making for this pandemic.

The following sections of the article are organised in below. In section 2, the information regarding COVID-19 for the period of January 2020 to June 2021 has been analysed in detail. For example, total infected cases, daily infected cases, total death, daily death, vaccination status etc. for India and USA have been depicted in this section. After the section 2, the proposed methodology for forecasting the lockdown phase due to the third wave of COVID-19 has been discussed in section three. The detail mathematical modelling of SIR algorithm has been discussed in this section. The section four represents the experimental results of the proposed model. In the same section the effect of lockdown on basic reproductive rate and analysis of COVID-19 vaccination have been discussed in detail. Moreover, the decisions taken by government agencies and various strategies taken by the different administrations, medical management agencies and the government organization in the trailing portion of the same section. Finally, the last section concludes and projects future plan of our proposed research.

2. Analysis of the informations.

In India, the information related to coronavirus like total infected cases, total deaths and recoveries, vaccination status etc. are reported by the different government health organizations. The database is used for the analysis of data

which are retrieved from open-domain at https://ourworldindata.org/covid- vaccinations?country=IND [26, 34]. This resource helps policymakers of a country, planning commission, government authorities, and researchers for understanding the rate of recent status for taking decision against this pandemic.

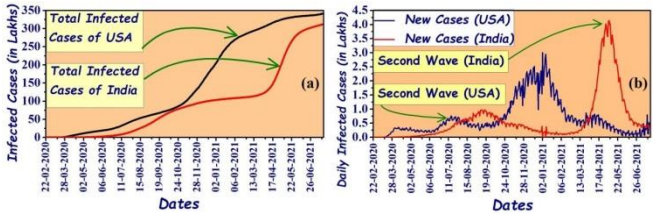

Figure 1. (a) Total COVID-19 cases up to July 2021 (b) New COVID-19 cases during the first and second wave of pandemic.

Two countries such as India and USA are marked as most coronavirus infected countries in the world. Although until now the USA has faced three waves of COVID-19, whereas currently India is in the end of second transmission [35]. Moreover, the second transmission of coronavirus has been began in India at the end of February 2021, whereas the second transmission for the USA has been started in middle of June, 2020 and it has reached to the peak during the last week of July 2020 as shown in the figure 1b. Additionally, in the starting of October 2020 the USA also has experienced a deadlier third transmission of coronavirus and it has reached to its peak level in the second week of January 2021 which is also depicted in the figure 1a. The figure 1b represents the day-to-day new cases of coronavirus during the first and second wave of this pandemic. The second wave of coronavirus has been continued for nearly forty- five days in the USA whereas in India, the second wave has been continued approximately for sixty days

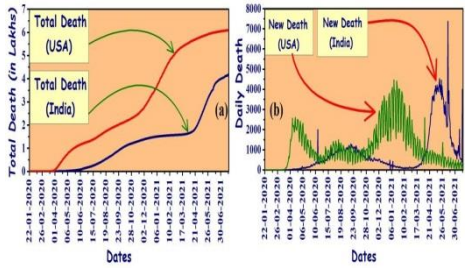

Figure 2. (a) Total COVID-19 death cases up to July 2021 (b) New COVID-19 death cases during the first and second wave of pandemic.

and maximum of 450000 infected cases reported in a day. Indian Council of Medical Research (ICMR) already explained the reasons that could perhaps lead to the third wave of this pandemic in India [17]. A group of researchers have also predicted that by the last week of August 2021 the third wave of COVID-19 is expected to hit India [36]. Therefore, after getting experienced from the second wave in India, our research objective is to provide new plan of action to planning commission and the government agencies for making appropriate arrangements to fight against this pandemic.

In the second wave of coronavirus transmission, the world has realized an extensive rise in the number of deaths [37]. In India the death rate in first and second waves of this pandemic has been compared and examined and it is noticed that the death rate has been expanded by approximately forty percent in the second wave, which is happened in India in the month of April - May 2021 [38, 39]. It has also been observed from the data that the maximum rate of mortality in India during second wave is among the people whose age is below 45 years. The figure 2b illustrates the total covid-19 death cases of India and USA during first and second wave of coronavirus pandemic. Similarly, the figure 2b represents that the overall COVID-19 mortality rate has jumped to 10.5 percent in the second wave from 7.2 percent in the first wave. In India the sharpest increase in mortality during the second wave has also remarkable in the month of June 2021.

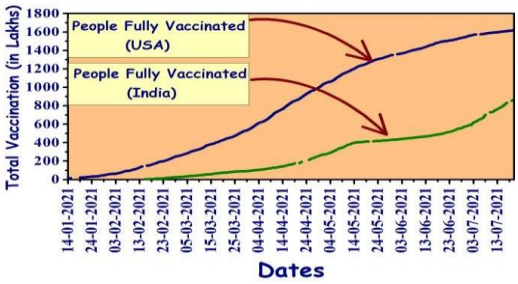

Figure 3. Fully vaccinated cases up to July 2021.

Moreover, herd immunity against the COVID-19 is considered to be high enough when a large percentage of the people are vaccinated and/or have been infected by corona virus and developed antibodies to fight against it. In figure 3, it has been shown that after six months India has started the largest vaccination drive of the world, and it has administered jabs to just over only 9.2 Cr. i.e., 6.8 percent of total population whereas in USA, 16.3 Cr. i.e., about 50 percent of total population [40, 41]. However, it is also important that a large amount of the populace is still endangered to coronavirus transmission in India, after having experienced of second wave against the disease.

3. COVID-19 SIR model with vaccination for pandemic

In the article [22], authors have discussed about the predictive solutions for taking decision for lockdown during the period of March 2020 to July 2021. But, officially after launching of COVID-19 vaccines in the month of December/January 2021, the predictive model related to taking decision of lockdown is needed to be improved. Hence, the novel model is important for the Indian government authorities to take
necessary decision related to future lockdown. Our predictive result analysis is also sufficient to measures about future wave of COVID-19.

Susceptible (S), Infected (I), and Removed (R) cases, the SIR model is compartmental model, commonly used for infectious disease pandemics that if λ is consider as density of susceptible birth, then

$N = S + I + R$ = constant, when $\square = 0(1)$

Where N = total population, S = total susceptible individuals, I = total infected individuals, R = total removed individuals.

- Susceptible individuals S(t): Individuals who are not infected till now, but there is a chance to become infected.
- Infected individuals I(t): Individuals who are already infected by the virus and it can be transmitted to susceptible individuals.
- Removed individuals R(t): Individuals who have recovered from the disease and are considered to be resistant, or have vaccinated and considered to be immune also or have expired. It is assumed that the recovered individuals have a permanent immunity so that they cannot be re- infected.

Here, □ = rate of infection, □ = average recovery and death rate, □ = lockdown of susceptible rate, □ = rate of infectious isolation, and □ = proportion of individuals vaccinated.

The rate of variation in susceptible populace with respect to time is expressed as

$$\frac{dS}{dt} = \lambda - \gamma(t)(1-\beta(t))(1-\theta(t))S(t)I(t) - \alpha(t)I(t) - \theta(t)I(t) - \alpha(t)S(t) - \delta(t)S(t) \quad (2)$$

The rate of variation in infected populace with respect to time is expressed as

$$\frac{dI}{dt} = \gamma(t)(1-\beta(t))(1-\theta(t))S(t)I(t) - \alpha(t)I(t) - \theta(t)I(t) \quad (3)$$

The rate of variation in removed populace with respect to time is represented as

$$\frac{dR}{dt} = \alpha(t)I(t) + \theta(t)I(t) + \alpha(t)S(t) + \delta(t)S(t) \quad (4)$$

Therefore, the total rate of variation is $\frac{dS}{dt} + \frac{dI}{dt} + \frac{dR}{dt} = 0$ (5)

The susceptible fraction can be expressed as $s(t) = \frac{S(t)}{N}$ (6)

The infected fraction can be expressed as $i(t) = \frac{I(t)}{N}$ (7)

The removed fraction can be expressed as $r(t) = \frac{R(t)}{N}$ (8)

and, $s(t) + i(t) + r(t) = 1$ (9)

It has been assumed that $0 \le$ □ ≤ 1 and $0 \le$ □ ≤ 1 where □ and □ are considered as lockdown of susceptible rate and isolation of infectious rate respectively. Therefore, the fraction of susceptible protected population and the fraction of un-isolated infectious population are calculated as *(1-* □*) S* and *(1-*□*) S*

respectively. The basic reproduction number which is denoted as R_0 has been represented in different forms in different stages of lockdown in different countries.

Applying time dependent discrete SIR model, equations (2), (3), and (4) are modified as given below.

$$S(t+1) - S(t) = -\frac{\gamma(t)S(t)I(t)}{N} - \delta(t)S(t)$$

$$I(t+1) - I(t) = \frac{\gamma(t)S(t)I(t)}{N} - \alpha(t)I(t)$$

$$R(t+1) - R(t) = \alpha(t)I(t) + \delta(t)S(t)$$

At early stage of the pandemic, the number of confirmed infected cases is very less and it can be assumed that most of the total population (N) is in susceptible stage $S(t)$. Therefore, equation (11) can be modified as

$$I(t+1) - I(t) = \gamma(t)I(t) - \alpha(t)I(t)$$

Daily recovery rate and transmission rate can also be represented as

$$I(t+1) - I(t) = \gamma(t)I(t) - \alpha(t)I(t) \quad (13)$$

$$\alpha(t) = \frac{R(t+1) - R(t)}{I(t)}$$

$$\gamma(t) = \frac{I(t+1) - I(t) + R(t+1) - R(t)}{I(t)}$$

Here, the finite impulse filter [22] has been applied to forecast the transmission and recovery rate and also to predict the amount of infected and recovered individuals in the equations (11) – (15).

To predict the infected and recovered individuals where the predicted and infected individuals at time t =

T are represented by

$$I'(T) = (1 + \gamma'(T-1) - \alpha'(T-1))I(T-1) \quad (16)$$

$$R'(T) = R(T-1) + \alpha'(T-1)I(T-1) + \delta'(T-1)S(T-1) \quad (17)$$

calculated by using Ridge regression method [22].

For large number of populations, the deterministic model for pandemic is considered as more appropriate. Therefore, when $I(t)$ and $R(t)$ are relatively trivial, the accuracy may not be desired and forecast the factors according to requirement. For more clarity of the working model the algorithm of the prediction method is mentioned herewith.

ALGORITHM: COVID-19 SIR model with vaccination for pandemic

Input: $I(t)$, $R(t)$, $0 \le t \le (T-1)$, regularization parameters γ_1 and γ_2, two filters to forecast window F

Output: $\begin{bmatrix} \{\gamma(t), \ \alpha(t), \ 0 \le t \le T-2\} \\ \{\gamma(t), \ \alpha(t), \ t \ge T-1\} \\ \{I'(t), \ R'(t), \ t \ge T\} \end{bmatrix}$

Step 1: Calculate $\alpha(t)$ and $\gamma(t)$ using (14) and (15) respectively when $0 \le t \le (T-2)$Step 2: Train the data using ridge regression method

Step 3: Calculate $\gamma'(T-1)$ and $\alpha'(T-1)$ using ridge regression method Step 4: Calculate $I'(T)$ and $R'(T)$ for the next day T using (16) and (17)

Step 5: If $T \le t \le T+F$ do

Calculate $\gamma'(t)$ and $\alpha'(t)$ using ridge regression method Estimate
$I'(t+1)$ and $R'(t+1)$using (18) and (19) respectively
End if
Step 6: End

4. Experimental Results and Discussion

To analysis and predict the trend of COVID-19 worldwide, the proposed work has been carried out based on the dataset collected from the project of the Global Change Data Lab, named "Our World in Data (https://ourworldindata.org)", which is established and maintained by a group of developers and researchers worldwide [34]. Numerous researchers have examined this for carrying their research on various directions of coronavirus disease. Day-to-day infected cases, daily recovered people, total infected, total active cases, total death, daily new death, people vaccinated - fully vaccinated, etc. have been utilised as basic variables for analysing and predicting the disease transmission trend and effect of lockdown on this transmission.

This section illustrates different characteristics of the proposed work for analysing the purpose of lockdown on transmission of coronavirus disease and discusses the contribution regarding originality and performance calculation as well. Few performances matrices have been explained in the following subsections.

4.1. Effect of lockdown on basic reproductive rate (R_0)

A tool, Scikit-learn, open-source software of Python 3 has been utilised to execute the ridge regression calculation for predictive data analysis purpose. As the reproduction rate (R0) can't be a negative, hence, it is considered as 0 when it is 0. The data before 5th March, 2020 are not significant and sometimes not available, as a result it is considered as noise in the analysis. Therefore, for analysis, the data after 5th March, 2020 has been considered here. In any pandemic model, few questions like total infected people, rate of death, lockdown continuation days, vaccination status, pandemic end date and future trend always appear.

However, it the basic reproduction number (R_0) is found more than one then the disease is expected to increase in exponential form and a definite percentage of the entire population is considered to be infected ultimately. R_0 can be used as a threshold, even if calculated with different methods: if $R_0 < 1$, the epidemic will die out; and if $R_0 > 1$, the epidemic will expand [42, 43]. As per basic comparison in figure 4, it has been observed that in the strict lockdown period in India (Phase 1 and Phase 4) from 24th March – 31st May, the basic reproductive rate (R_0) value lies between 2.09 to 1.25. Moreover, in the several unlock phases (unlock-1.0 to unlock-6.0 from 1st June to 30th November) the values of basic reproductive rates (R_0) have been reduced to 0.9 from 1.2 owing to different COVID-19 curtailment strategies such as (i) case-isolation, (ii) quarantine, (iii) maintain social distancing, (iv) wearing a face mask in public etc. Therefore, it has been noticed that the decision of strict or partial lockdown is obviously an effective measure taken by to the different administrations, medical management agencies and the government organization. As conclusion, infected populace can be reduced up to a significant scale if the lockdown is well managed and is continued for extended period [44].

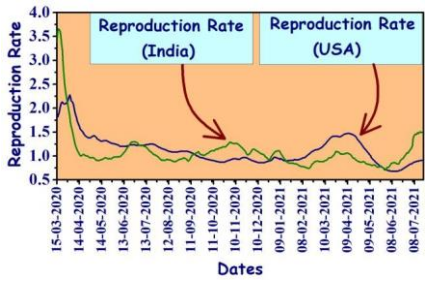

Figure 4. Reproduction rate of COVID-19 during the first and second wave coronavirus pandemic

Similarly, in the United States, the value of basic reproductive rate (R_0) has been reported as 2.41 ($R_0 > 1$) and immediately government has announced an order for all the citizens to stay home from 9 p.m. to 5
a.m. with exemption of limited unavoidable circumstances. The lockdown process in USA has been continued up to 31st May 2020. After that, the average value of R_0 has decreased to less than 1 but still the second wave for the USA has been started in the middle of June, 2020 and it has been reached to peak level during the last week of July 2020 [45]. But, in the second wave of India the virus has muted as novel "Indian variant" and become more contagious and more deadly. But this disaster is also man-made and reflects trends which have already been pointed out during the first wave [46]. Therefore, from February 2021, the value of basic reproductive rate (R_0) has increased to more than 1. So, again the nationwide (India) lockdown is announced in the period of 14 April to 5 May, 2021. But, in the unlock period June to July 2021, again the R0 value has increased from 0.68 to 0.9. By comparing two most affected countries, USA and India, it is concluded that in India, population density has major impact on COVID-19 infection and mortality rate [47].

The figure-5 and figure 6 shows the comparisons between predicted daily new cases and actual daily- infected cases in India and USA. It is clearly realized from the figure-5 that has able to forecast future trend of the COVID-19 up to December 2021 using our proposed predictive model. It has been lucidly explained that the USA is comparatively safe country than India, as the curve of the graph of USA is downward in the period of August to September 2021, whereas the curve of the India is upward in the same time. It may happen due to unlock phase, which has been started in the month of July and the value of reproductive rate (R0) is again increased to more than 1 (figure 5).

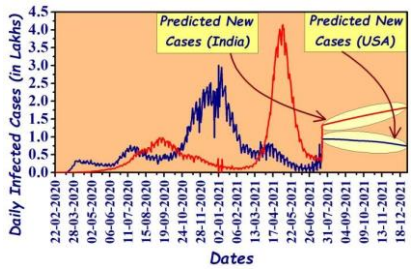

Figure 5. Predicted COVID-19 new cases in USA and India after the month of July 2021

The data have been analysed for the period of 14/01/2021 to 18/07/21 and 13/02/21 to 18/07/21 for USA and India respectively. Different countries have started administration of COVID-19 vaccines since

December 2020 with priority given to different healthcare and frontline workers. It consists of 186 and 156 instances for USA and India respectively and three attributes. These attributes carry information about day wise new cases, daily total cases and people fully vaccinated which are considered as the primary parameters for analysis.

The robustness of the proposed model lies on basis of all the facets is Statistical ANOVA measure which is depicted in table 1. If the value of P greater than 0.05, then there is a possibility that the null hypothesis is true which is presented in table 2. The table 3 elucidates Mean Absolute Error (MAE), Mean Absolute Percentage Error (MAPE), and Root Mean Squared Error (RMSE) for our predictor model.

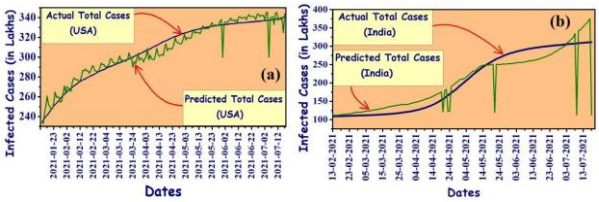

Figure 6. Actual total cases vs predicted total cases Table 1. Measure of statistical ANOVA

	Df	SS	MS	F	Significance F
Regression	2	1.44E+15	7.18E+14	1422.255	0
Residual	183	9.24E+13	5.05E+11		
Total	185	1.53E+15			

Table 2. Significance of p-value for validation of proposed model to predict fully vaccinated people and actual new case

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	30167240.15	204862.9	147.2558	5E-192	29763043.22	30571437.07
People fully vaccinated (USA)	0.02848	0.00147	20.10488	3.31E-48	0.02569	0.03128
Actual new case (USA)	-28.56672	1.68785	-16.9249	2.75E-39	-31.8969	-25.2366

Table 3. Correlation coefficients of attributes

Score (R^2)	Mean Absolute Error (MAE)	Mean Absolute Percentage Error (MAPE)	Root Mean Squared Error (RMSE)
0.93	0.01714	1.71389	704705

4.2. Analysis of COVID-19 vaccination data

In population viewpoint, India is the second-highest country after the China in worldwide that is 17.5% of total world population [48]. Moreover, in this pandemic, worldwide India positions second only after USA in absolute numbers of cases. Till 31st of July 2021, it has been reported total 400,000 deaths owing to COVID-19 in India, which is the highest in number after the United States and Brazil in the world [49]. In this circumstance, many researchers agreed that a quick vaccination is only way to defeat COVID-19 pandemic in India [50].

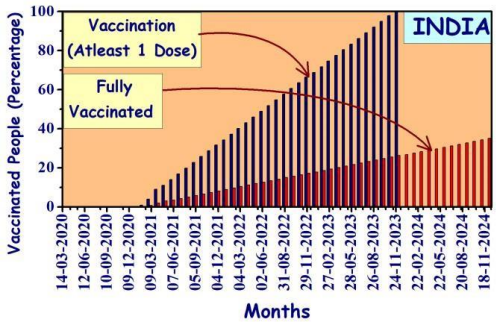

Figure 7. Predicted COVID-19 vaccination statistics in India up to December 2024

However, officially on 16th January 2021 the COVID-19 vaccination drive has been launched in India, with two approved vaccines namely Covishield and Covaxin [51]. According to the data on 7th June 2021, India has managed only 221 million doses of vaccine, among this only 45.1 million have been fully vaccinated (which is ~3% of the total population) [34]. In this research, to analysis the vaccination status (as shown in figure 7) the data have been taken for the period of 17th January and 25th May 2021. Based on these data the predicted data trend has been calculated for the months of June and July 2021. For example, from the actual data on 25th June 2021, India has administered 18% and 3.9% for vaccinations at least first dose and fully vaccinated respectively whereas, our model has calculated 14.9% and 3.5% for both the cases. Similarly on 25th July 2021, the actual data has shown 25% and 6.8% for vaccinations at least first dose and fully vaccinated respectively though our model has predicted the result about 17% and 4.3% respectively for those cases. We meticulously follow the predicted output data trends which have nearly similar with the month of October 2021. As per our prediction model, it has been concluded that India might be administered the first dose of vaccine to the total population in the month of December 2023 as shown in figure 7 and also important note that the supplied vaccines must be available in the market. If the availability of the vaccines is increased it may be completed before the stipulated time.

4.3. Suggested strategies for the Administrations

The aim of the article is to develop a predictive data analysis model to decide the purpose of lockdown, which still continues during August, September, and October 2021. Figure 1b and figure 2b depict that, in India and USA the number of new active cases and death cases during the first and second wave coronavirus pandemic. It is also observed from the data set of two most affected countries USA and India that there is an impact of population density on COVID-19 infection and mortality rate in India. According to predicted Covid-19 new cases after July 2021 the graph is rising up for India because the another wave of the coronavirus pandemic might be come. For India, the prediction of vaccination

statistics up to December 2024 (shown in figure-7) have been calculated by time series analysis where the value of smoothing factor lies between 0.7 and 0.9. However, after analysing the COVID-19 data, the authors have suggested few suitable strategies of proposed prediction model analysis for different administrations, medical management agencies and the government organization to fight against COVID-19. The suggested strategies are lucidly explained in the following subsections.

- **Strict lockdown**

In the result of our data analyis as shown in the figure 3 to figure 6, the number of newly infected people have rose increased exponentially during the period of lockdown, but at the same period the value of reproduction number (R_0) has lesser than 1. But Indian goverment has announced to re-open few offices, organizations and institutions in different unlock phases (1st June and 30th November 2020) by considering economic benefits of the country and the values of basic reproductive rates (R0) has been reduced from 1.2 to 0.9. But from February 2021, the basic reproductive rate (R0) has started increasing and reached more than 1 due to the novel "Indian variant" and also dramatic rise in social mixing [52]. So, from 14th April 2021, again the nationwide lockdown has been imposed and extended till 5 May 2021. Hence, it is concluded that the decision of strict lockdown taken by government is obviously necessary and successful.

4.4 Partial lockdown

Always strict lockdown is not suggested. As India has a huge population and Indian Economy is considered the Middle Level Economy, keeping these in mind, we have to fight against the third wave of COVID-19 in such a way that we are able to resist the collapse of Gross Domestic Product (GDP) or economy due to strict lockdown. We should think of re-opening of some industries, business centers and institutions for which there is not a heavy fall of economy. Besides, we should also think of some measures for no spread of corona virus. To make this happen, first divide the whole population into some clusters according to the density of the population of India. Further more, in a cluster if all the business hubs and offices are opened, and simultaniously make the inhabitants of those clusters confined inside their house, them it meight be possible to resist the attack of the third wave of COVID-19 with considering economy. This can be executed, by circulating contacts and informations about daily need stores, etc. to every households in a cluster and the poor classes of every cluster have to be identified and they have to be engaged in order delivery. At this, they can be able to have some daily earnings in this pandemic situation, traders or businessmen can also be able to earn by selling their products and the buyers or consumers don't have to go to market for purchasing goods, hence the gatherings in the market (which are crucial for spreading infection) can be controlled. The process of execution is expected to be difficult enough but it can be fisibile for government administration alone or government administration and Non-Government Organization (NGO) work together. Then it is possible to resist the third wave of COVID-19 keeping economy in mind.

4.5 Herd immunity

The administrations have been decided different strategies to build the population become resistant to the disease, consequently the entire population becomes safe from the disease [53]. If the total population is immuned, then the administration can take back the decision of lockdown.

Researcher suggested that resistant systems of more than ninty percent of population who have recuperated from coronavirus infection [54]. As per the data 31st July 2021, about 3.09Crore population have recovered from the COVID-19 disease, and aproximately 27% and 7.6% of total population have been vaccinated at least first dose and fully vaccinated respectively. Since a large portion of the population i.e., nearly 80% of communities in India still have not developed immunity. Therefore, the chances of lockdown might happen in the period 2021 - 23 until the maximum number of the population is fully vaccinated or the R_0 is greater than one.

5. Conclusion

In this paper, the purpose of lockdown has been discussed on the basis of the value of reproduction number. India is the second most populous country followed by China. Due to the second transmission of coronavirus disease in India, the mortality rate increased about forty percent. It has been noticed that only the strict lockdown period the value of reproduction number lesser than 1, but otherwise in the unlock period the value of reproduction number rose over 1. As the India is considered the Middle Level Economy and proverty is still a major challenge in India. In May 2021, a study suggested that about twenty three crore people in India are now earning below rupee 375 per day. However, strict lockdown is not solution to overcome form the COVID-19 pandemic situation. As, administration will not able to stop people to stay them at their own residence. Various studies suggested that vaccinated people do not get infected about seventy eight percent less than unvaccinated people. Moreover, researchrs also suggested that vaccines still offer reduced protetion againt Delta variant of COVID-19. But in August 2021 in India, still only about 33% and 9% of the total population are vaccinated at lest one dose and full dose respectively. It is also likely impossible for India to complete their vaccination drive by December 2021. Therefore, predictions based on data is also challenging in that current situation; because of the following important factors include a) sharp changes in the short duration due to frequent availability of vaccine, b) mutations in the virus, c) no proper implementation of lockdown, d) negligence of people about COVID protocol. But our proposed model is not only helpful, but also more adaptive to handle in different variable situation for near future.

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A Study on Sentiment Analysis using Text Summarization

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Abstract
People's sentiments that are expressed on the internet have high impact on the readers. Thus the unstructured fashion of data from the social networking platform is required to be analysed for which sentiment analysis plays an important role. Sentiment analysis categorizes the expression of the texts into various sentiment polarities such as positive, neutral, negative or happy, angry, disgust, fear, and many more. The aim of this paper is to analyze the polarities ('happy', 'sad', 'disgust', 'surprise', 'fear', 'angry') of the sentiment of Bangla texts using text summarization approach. The handcrafted features and rule-based algorithm shows encouraging outcome of 98.33% on the Bangla dataset.

Keywords
Sentiment analysis, Social networking platform, summarization, sentiment polarity, rule- based algorithm

INTRODUCTION

Sentiment analysis (SA) also referred as opinion mining is a domain of research where people's sentiments or opinions for a particular subject are analysed. For the past few years, the affluence of the social networking sites drives the evolution of sentiment analysis. The expansion of information in social media platform makes sentiment analysis much more decisive. SA deals with opinions and human outlooks based on emotions and frame of mind about a particular subject or an event. The aim of this paper is to analyze six different polarities (happy, sad, disgust, surprise, fear, angry) of the sentiment for Bangla texts
using text summarization approach. Sentiment analysis have several real world applications such as spam emails filteration, analyzing unsuitable tweets, classifying fake comments or reviews, analyzing customer support and feedbacks based on a product and many more.
Sentiment analysis can be performed by two algorithms: 1) machine learning algorithm and 2) corpus-based or dictionary-based algorithm. In the present experiment, we have used summarization approach to learn supervised learning algorithm (rule- based classifier) to categorize the Bangla blog texts into their respective sentiment polarities. Bangla blog texts were summarized depending on scoring (using PageRank algorithm) the weighted terms in order to extract the features and feed the rule-base algorithm for categorizing sentiment polarities. Various works have been carried out in English followed by other non-Indic languages. However, very few works are available in the literature for Bangla as well as for Indic languages. The handcrafted features and rule-based algorithm shows encouraging outcome on the considered dataset.

[1] Contributions:

The aim of this paper is to provide a new insight toward this domain. In summary, the contributions of the paper are:

1. Development of an algorithm based on summarization method for categorizing sentiment polarity of Bangla text data.
2. The system is capable of determining six different sentiment polarities (happy, sad, disgust, surprise, fear, angry) of Bangla blog texts.
3. Text summarization is used to extract the features and feed the supervised learning model for categorizing sentiments.

The paper organistaion shows: Section II presents a brief literature study. In Section III, proposed methodology is discussed followed by results and analysis in Section IV. Lastly, Section V concludes the paper with some future insights in this domain.

LITERATURE STUDY

Lot of works have been carried out in sentimental analysis field in different languages on various topics. But there are limited works determining the sentiment polarity of Bangla tweet data using text summarization and rule-based algorithm. However, in this section, we have provided a brief discussion on the existing works on sentiment analysis in various languages.

Hussein [1] presented a survey on challenges faced while implementing various techniques used in sentiment analysis tasks. Zhang et al. [2] provides an extensive survey on deep learning techniques and their applications in the task of sentiment analysis. Mäntylä et al. [3] presented an automatic system for reviewing literature where they utilized text

mining and qualitative coding techniques, and analysed 6,996 papers from Scopus. They have presented the top-20 cited papers from Google Scholar and Scopus and the categorization of research topics.

Wang et al. [4] identified positive and negative sentiments of the sentences from a peer review articles commented by a reviewer during paper submission. They proposed a multiple occurrence based learning network with abstract based memory implementation to perform the job. They tested their system on two evaluation datasets developed from the ICLR open reviews and the results show the efficacy of their system.

Dong et al. [5] used sentiment embedding on external dataset and fed into the model by utilizing a dedicated memory-based component. They observed the effectiveness of their system on different datasets in seven languages. Gohil et al. [6] provided a analysing on different resources available for extracting sentiments from Twitter health care research by studying existing works in this domain. Also, they analysed the methodology of the model utilized to
solve health care related queries, production, and accuracy being obtained.

Raghuwanshi and Pawar [7] evaluate two classification algorithms: linear and probabilistic for categorizing polarity of sentiments. They obtained the data from twitter.com. They also presented a comparative study of Naïve Bayes (NB), Support Vector Machines (SVM) and Logistic regression (LR) and their methodology on the same dataset.

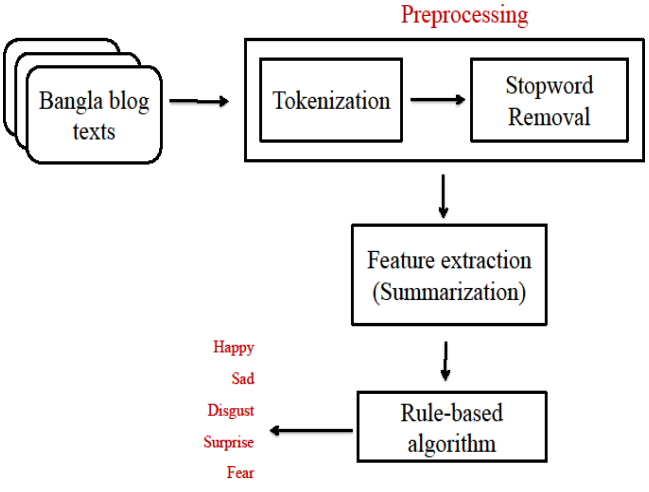
Yousif [8] presented an extensive survey on sentiment analysis of scientific citations. They have discussed the procedure, the proposed approaches and the difficulties faced by the researchers while working in this area. Zhou and Ye [9] also provided a review on high qualified scientific literature and discussed about the future work in this domain depending on the reviewed articles. From five online bibliographic databases, 41 relevant articles were considered. Their result shows that most studies focuses on higher education and consider smaller datasets.

Ali et al. [10] developed "BanglaSenti", a dictionary- based dataset consists of 61,582 Bangla terms with positive, negative and neutral polarity. They have not only developed the corpus, but also performed model simulation in order to realize the practicability of this dataset. Bhowmik et al. [11] also worked with dictionary-based approach along with rule-based model to categorizes the sentiment polarities of texts.

From the literature study, it can be claimed that sentiment analysis have not been extensively studied on Bangla texts being it tweet texts, blog comments or product reviews. Thus, Bangla being the 6th most spoken language in the world, there is a pressing need for the development of the system that can work for analyzing sentiment polarities of Bangla texts.

2. PROPOSED METHODOLOGY

The overall methodology proposed in this paper is illustrated through the following Figure 1. An algorithm based on summarization method is proposed for categorizing Bangla blog texts into six different sentiment polarities (happy, sad, disgust, surprise, fear, angry). Bangla blog texts were summarized depending on scoring (using PageRank algorithm) the weighted terms in order to extract the features and feed the rule- base algorithm for categorizing sentiment polarities.



1011784898894138_1012271388845489	দুরাশা৩ ৩৩ বাংলাদেশ এগিয়ে আছে	sad
1011784898894138_1011943885544906	জেই দেশে বেশ্যা বেশি পরজেটক তত বেশি কিবলেন দেশি	disgust
1011784898894138_1012544418818186	মায়ানমারের প্রবাশি হিসাবে বাংলা টিচি চ্যানেল চাই	
1011760625563232_1012451992160762	যে লোক সংসদে দাড়িয়ে শুদ্ধ বাংলা বলতে পারেনা,বুড়া কালে বিয়ে, রেলর মতই মন্ত্রী থাকে অসুস্থ, তার দাড়া যাই হউক উন্নতি হতে পারে না। কারণ বেসরকারি সংগঠন (যানবাহন),এই রেল পথ পক্ষে না।	disgust
1011760625563232_1011762992229662	জাতির ক্ষোভটা ভালো করে তুলে ধরেন।এখনকার রেলমন্ত্রীও কথার বুলি আউড়িয়ে গেছেন।চেয়ারে বসে বসে তিনি রেলখাতের উন্নয়ন করতে চাচ্ছেন।উনার চাইতে ওবায়দুল কাদের হাজার গুণ ভাল ছিলেন।	angry
1011760625563232_1011860778886550	যে দেশে এ টি এম বুথের চুরির টাকার ভাগবাটোয়ারা হয় সেখানে টাকা যতই খরচ যেক,উন্নয়ন হবে না, হবে চোরেদের পেট ভারি।	angry
1011760625563232_1011818958890732	দিনাজপুর থেকে ঢাকা যেতে অনেক সময় লাগে।এছাড়া ট্রেনে টোকাই ও চাঁন্দা হকারের উতপাত খুব।মাননীয় মন্ত্রী যদি একটু দেখতেন?তবে রংপুর এক্সপ্রেস অনেক ভাল।	sad
1011760625563232_1012423895496905	রেল কে আধুনিক,যুগোপযোগী, লাভজনক করতে হলে শুধুমাত্র আমি আবারো বলছি শুধুমাত্র রেলের কর্মকর্তা কর্মচারীদের সৎ হতে হবে। ৫০ টাকা ভাড়ার জায়গায় ১০ বড়জোর ২০ টাকা দিয়েদিলেই আর কে আছে দেখার? রেল বিভাগের যে পরিমান জমি বেদখল হয়ে আছে তা উদ্ধার করতে পারলেই ৮০ ভাগ উন্নতি করা সম্ভব। সুরঞ্জিৎ বাবু রেল কে দূর্নীতি মুক্ত করতে যেয়ে শেষে নিজেই কুচক্রদের শিকার হয়েছেন।	sad
1011760625563232_1011775362228425	বাংলাদেশের বাজেটের আকার অনুযায়ী ট্রেনের বগির দাম কি এতই বেশী? যে কখনো কখনো আন্তনগর ট্রেনে পাওয়ারকারসহ ৩টি বগি নিয়ে চলতে হয়।	surpise
1011760625563232_1012038925535402	যে সমাজের প্রতিটা স্তরেই দুর্নীতির কালো থাবা বিরাজ করে, সেখানে কাড়িকাড়ি টাকা ঢেলে যাত্রী সেবার মান বাড়ানোর কথা চিন্তা করা আমাদের বোকামির নামান্তর।	disgust
1011760625563232_1011766882229273	রাজশাহী থেকে আব্দুলপুর মাঝখানে নন্দনগাছী রেল ষ্টেশণ প্রায় বার বছর থেকে বন্ধ নাই কোন ষ্টেশন মাস্টার সাধারন জনগনের যাতায়াত খুব অসুবিধা তাই জনগনের মাঝে খবর সৃষ্টি হচ্ছে কিন্তু মাননীয় রেল মন্ত্রীর সদয় দৃষ্টি দিয়ে নন্দনগাছী রেল ষ্টেশন পুনরাই চালু করার জন্য বিষেশ	angry

Figure 1: The illustration of the proposed methodology.

2.1 Dataset

Data is the main building block in an experiment. Data in terms of the quality and quantity plays an important role as the end result of any experiment. However, data extraction in Bangla is quite a challenging job as there is unavialbility of enough data in Bangla language on the internet since languages compared to English language are used in less than 0.1% of internet as stated in [19]. Another challenge that is to be faced while dealing with Bangla texts is that compare to English, Bangla tokens have much more morphologically complex variants.

In this experiment, we have considered Bangla blog texts [12]. The downloaded file (in .xls file) contains 33,362 blog texts in Bangla with sentiments tagged to it as 'happy', 'sad', 'disgust', 'surprise', 'fear' and 'angry'. The data file contains three fields: 'Id', 'Text', and 'Sentiment'. However, we have only considered the 'Text' and 'Sentiment' field for the proposed work. The 'Text' field contains the actual comments by various users from different countries and the 'Sentiment' field contains various sentiments associated with the comments. The sample blog texts from the dataset is provided in Figure 2 where we can get a glimpse of different sentiment polarities associated with each Bangla blog text.
Figure 2: The sample Bangla blog texts from the dataset used in the experiment.

The total number of blog texts asoociated with six different sentiment polarities ('happy', 'sad', 'disgust', 'surprise', 'fear' and 'angry') present in the dataset is depicted through Figure 3.

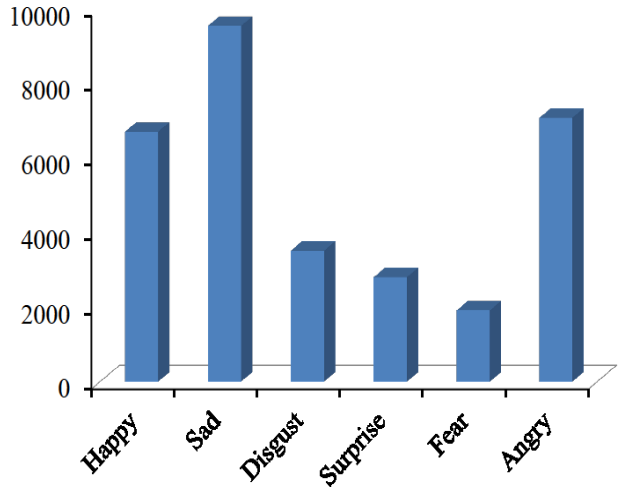


Figure 3: The count of different sentiment polarity comments.

2.2 Pre-processing

The Bangla blog texts considered for the experiment are formed either in sentences or paragraphs. The proposed algorithm implemented in the present
experiment operates on tokens hence pre-processing the data is an important move. Normally, data pre- processing includes tokenization, stopword removal, lemmatization and stemming. However, here we have only used tokenization and stopword removal as for Bangla text there is no standard lemmatizer or stemmer available.

The first step to be performed for pre-processing the
2.3 Summarization
After pre-processing the data, features were extracted based on proposed term weighting scheme referred as 'Term Weightage (TW)' using the below Equation 1. 'Term Weightage' is computed by counting the tokens associated with the contents of each sentiment polarity of each comment.
comments is to perform tokenization that is, splitting the sentences into individual 'tokens' followed by the removal of stopword. There are two types of

$$TW = \frac{O(wi)+n\_senpol}{\sum O(wi)}$$

(1)
tokenizers: word tokenizer and sentence tokenizer. Word tokenizer tokenizes the sentence into wordsStopword refers to those tokens that are not informative and relevant to specific domains. Thus, these tokens were removed from the lexical stock to get rid of erroneous results. Then list of stopwords followed here is provided in [12]. Along with the words in the list we have also removed English equivalent words, English and Bangla numerals. The length of the comments was determined and extremely short comments were removed from the dataset to get the final list that will be used for further processing.
(wi) represents the presence of token wi in a
particular comment. n_senpol determines the presence of wi in a comment belongs to a particular sentiment polarity. $\sum(wi)$ represents the total occurrences of all the tokens in a comment. After assigning weights to
each token, scoring is performed based on 'PageRank algorithm' [17] and the words with maximum score is considered to be the important token that needs to be included in the final comment summary and others are discarded. The PageRank algorithm is measured using the below Equation 2 where n represents the total number of tokens in the final corpus.

Some examples of stopwords used in the present experiment to remove the irrelevant terms from the

$$PageRank = \sum^{n} PageRank(i)$$

(2) corpus are provided in Figure 4.

ইহা	এটা	ওকে
উচিত	এটাই	ওখানে
উত্তর	এটি	ওদের
উনি	এত	ওর
উপর	এতটাই	ওরা
উপরে	এতে	কখনও
এঁদের	এদের	কত
এঁরা	এব	কবে
এই	এবং	কমনে
একই	এবার	কয়েক
একটি	এমন	কয়েকটি
একবার	এমনকী	করছে
একে	এমনি	করছেন
এক্	এর	করতে
এখন	এরা	করবে
এখনও	এল	করবেন
এখানে	এস	করলে
এখানেই	এসে	করলেন

Figure 4: The sample of stopwords list used in the experiment.

RESULTS ANALYSIS

In the present experiment, rule-based algorithm (PART) was used for classification purpose from WEKA [15]. Rule-based classification algorithm evaluates the system's performance depending on "If- Then" knowledge to determine the appropriateness of the comments to their respective sentiment polarities. The number of iterations in PART is

involved in developing a partial decision tree and the worthy leaf was considered as a rule.
The confidence factor and the number of folds for reducing error pruning were set to 0.50 and 5 respectively. One fold was used for pruning and four fold for generating rules. Number of occurrences per rule was 5. It was observed that while expanding number of occurrences per rule, performance gets shrinks. In the present experiment, 5-fold cross- validations is carried out and obtained an accuracy of 98.33%. In the present experiment, the performance of the system is measured in terms of accuracy which determines how efficiently a Bangla blog text can be
precisely categorized into its respective sentiment polarities. It is normally computed using Equation 2.
The sentiment polarity-wise accuracy obtained on the final corpus developed after scoring is provided in Figure 5. It can be observed from the figure that the system mostly fails to categorize texts that belongs to 'surprise' polarity because of the presence of ambiguous terms in it which might belongs to the blog texts of 'happy' polarity. We can see the performance reduction in both 'surprise' and 'happy' scenarios.

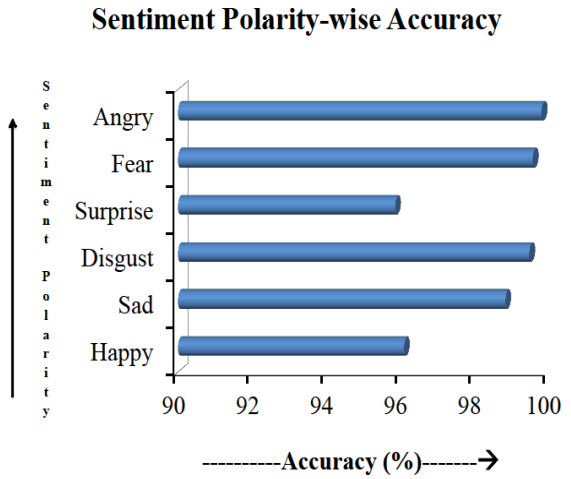


Figure 5: The sentiment polarity-wise accuracy.

We have compared the performance of PART (a rule-based supervised learning algorithm) with some other commonly used supervised learning algorithms such as Naïve Bayes Multinomial (NBM) and Support Vector Machine (SVM), and Multilayer Perceptron (MLP) because of their use in various NLP tasks [13, 14, 16]. The accuracy obtained for all the learning algorithms considered here is illustrated through Table 1.

Table 1. Comparison among different classifiers.

Classifiers	Accuracy (%)
PART	98.33
NBM	97.25
SVM	93.49
MLP	96.55

The Friedman statistical significance test [18] validates that the rule-based classifier (PART) performed well compared to other supervised learning algorithms. In Table 2, the mean ranks for all the classification algorithms are provided. This test have been used as it does not perform based on any assumption about the algorithm being used in the present experiment. From Table 2, it can be seen that PART obtained a highest rank 1.00 and SVM obtained a lowest rank 4.00 (rank is determined in ascending order). The mean ranks are provided in Table 2. The detailed statistical analysis of the Friedman rank sum test (Chi-Square) is illustrated in Table 3 where N, df and Asymp. Sig. represents the dataset, the degree of freedom and the significance level respectively.

Table 2. Mean Ranks for classifiers.

Algorithm	Mean Rank
PART	1.00
NBM	2.40
SVM	4.00
MLP	2.60

Table 3. Statistical analysis of Friedman test.

N	4
Chi-Square	23.112
df	4
Asymp. Sig.	0.05

CONCLUSIONS

The paper proposed a feature extraction scheme based on text summarization to categorize the Bangla blog texts into their respective sentiment polarities and obtained a maximum accuracy of 98.33%. In the present work, handcrafted features and rule-based algorithm have been used for sentiment analysis of Bangla texts. This study will be useful for various researchers across different domains for understanding
and gaining knowledge so that advanced researches can be carried out in sentiment analysis problem.

The study will also pave the way for researches to a great extent by recognizing the limitations and challenges toward comprehensive methods. In future this study can be expanded in terms of dataset as well as similarity polarities. Also we can implement the experiment for other Indic and non-Indic languages as well. Also, we can explore the study for multiple languages as well.

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Various Security Issues and Its Solutions in the Domain of Fog Computing

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Abstract
Fintech describes the technologies that seek to enhance and automate the delivery of financial services in the finance industry. At its core, fintech is used to help the financial sector better manage its financial procedures and operations by leveraging the specialized algorithms and software used in smartphones and computers. With the constant rise in technological innovations every year, the fintech industry has become the fastest-growing industry in the world. During the coronavirus in 2020, the digital transformation went to new heights as people shifted towards easier options that meet their financial needs. Fintech apps have helped improve customers' access to financial services at their comfort, but their demand is not yet over and continues to increase, further welcoming new technology trends that help to shape the industry. With many people moving towards digital solutions to manage their financial needs, stiff competition among financial institutions is expected to increase. Furthermore, banks and other financial institutions are adopting new ways to improve their banking experience. As a result, they have had to jump on the latest fintech trend to help them sustain a competitive advantage. The paper addresses major fintech trends, including Artificial Intelligence, blockchain, and partnerships, their benefits, and their impact on the finance industry.

Keywords
Fintech, Artificial Intelligence, Blockchain, Biometrics, Crypto market, Voice Banking

INTRODUCTION

Money has always been people's major priority, and since it is an important medium of exchange, individuals always have been skeptical about trusting others (banks) to provide safety for their money. Currently, almost two billion people worldwide do not have access to a bank account (Thinks Mobility 2021). However, financial services in 2020 were characterized by a sudden acceleration in "digital engagement" and digitization influenced by the effects of the coronavirus pandemic (Rowe 2021). Exchanges halted their trading floors and relied on remote trading to meet government movement restrictions and work from home measures. Personal trading apps recorded high transaction volumes, mobile banking transactions increased, and call center employees kept clients' support active by working from their homes, as directed by various governments worldwide. It was clear that financial institutions were required to modernize their architecture and systems to satisfy the rising consumer demands and increase data volume. Even when the financial sector was able to withstand the "digital tsunami" and continue with its operations, it became apparent that the "winds of change" were not temporary (Rowe 2021). Financial institutions have started thinking strategically about their technological situation and inquiring whether the tools they used previously are the most effective ones to implement going forward. Majority of the companies in the banking and finance industry have already spent most of their times digitizing core services and products to future proof their firms by improving their digital presence. This paper will analyze the technological trends that are likely to dominate the fintech industry as well as their impacts.

ARTIFICIAL INTELLIGENCE

In 2016, "AlphaGo," a machine, defeated Lee Sedol, the 18-time (eighteen-time) global champion at the game of Go. Since then, artificial intelligence (AI) technologies have progressed more, and their transformative nature has been witnessed across various industries (Biswas et al 2021.). Artificial intelligence is defined as an intelligent system developed to use and assess data and involve the performance of specific tasks minus the need for programming (Mhlanga 2020). AI-powered machines play a key role in targeted marketing, designing clothing lines, and surpassing experienced physicians in cancer detection. McKinsey estimates that AI technologies have the potential of delivering up to $1 trillion in extra value every year (Biswas et al.2021). However, many banking institutions have found it difficult to scale AI technologies across their operations because of fragmented data sets, unclear strategies for AI, outdated operating models, and investment-starved technology cores. To compete successfully and prosper following the coronavirus pandemic, incumbent banks now need to adopt AI technologies as the basis for unique customer experiences and new value propositions. The technologies can result in higher automation in the banking system, improving human decision-making capabilities in terms of accuracy and speed. Figure 1 displays some of the ways banking institutions are using AI to improve their operations.

Artificial intelligence technologies can aid to increase revenues through improved personalization of customer services. Combining relevant information such as customer's financial status, consumption preferences, behavior patterns, and financial status, AI can help realize the accurate position of client's needs, develop customer portraits, and predict customer needs (Li et al. 2021). AI will help decrease costs through competencies generated by automation, decrease error rates, and uncover new unrealized opportunities. More broadly, disruptive artificial intelligence technologies can significantly enhance the bank's ability to attain important outcomes: unique omnichannel experiences, at-scale personalization, rapid innovation cycles, and higher profits (Biswas et al 2021.). Financial institutions that fail to implement AI technology to their core operations and strategy will risk losing their competitive advantage and lose customers to the competition.

According to a report by Gartner, in 2019, 40% of major companies were expected to adopt AI technologies by 2020, and more than half of the companies that had implemented the AI solutions would double them by 2020 (Gartner 2021). While the coronavirus pandemic impacted these estimations, it is clear that Artificial Intelligence is now an important "player" in the finance industry. Already, AI is being used by some companies in the finance industry, and the technology has transformed the industry in the following ways:

1.1 Personalized banking

Many people believe that the banking industry was falling behind other industries when it came to customer service and satisfaction. The days of "face-to-face transactions" are long gone, as customers are relying on digital platforms for banks on customer support, and the banking industry is finally catching up. Chatbots and live chat technologies have become the primary contact point for clients seeking customer support (NEC 2021). Advanced chatbots integrated with "deep learning" abilities have enabled them to learn and improve customer service through customer conversations. One bank in Singapore, OCBC, partnered with Google to launch the first-ever AI-powered voice banking could converse with customers on a number of banking services, including calculating mortgage loans, foreign exchange rates, and unit trust prices (Nikolova 2018). Furthermore, many banks have been able to provide personalized financial guidance through mobile apps. These AI-powered applications can help manage expenses, spending behavior and income, and financial strategies and propositions. Mobile banking applications can also remind customers to conveniently pay bills, complete transactions, and interrelate with their respective financial institutions.

1.2 Fraud prevention

Digital transactions have increased significantly in recent years, necessitating appropriate fraud detection tools to safeguard sensitive financial data. According to a report by IBM 2021, 72% of influential business leaders believe that fraud has been a major concern for the 12 months. Artificial intelligence can be used to examine a huge number of transactions to uncover fraud trends that can be used to detect fraud in real-time. When fraud is detected, AI models are then used to flag or reject transactions for further investigation. Improved fraud detection and prevention offers an opportunity for financial service institutions providing virtual payment options and credits cards to use Artificial Intelligence-powered algorithms to detect stolen cards activities (Lappetito 2021).

1.3 Reliable risk management

AI plays an important role in managing risk efficiently. Its algorithms can be used in risk assessments to examine a case history and determine any probable issues. This involves adopting "machine learning" to develop models that allow financial professionals to follow certain tendencies and notice potential risks (NEC 2021). Risk assessment in accounting is a complex issue that, even with experts, manual errors are still prone to happen. Strict protocols usually govern financial institutions, and guaranteeing compliance when dealing with securities, debt, and insurance can be difficult. In such instances, AI can be employed to improve risk assessments by introducing "systemized" models that decrease manual error (Figure 1).

Fig 1: Banks using AI to improve operations (Biswas et al.)

BLOCKCHAIN

Blockchain is a concept that has garnered significant attraction in "financial technology" (fintech 2021). This concept combines various computer technologies, including point-to-point transmission, distributed data storage, encryption algorithms, and consensus mechanisms (Guo and Liang 2016). Blockchain technology has also been described as a "disruptive innovation" that resulted from the advancement in the internet. However, since blockchain has been a breakthrough in information transmission and data storage, it is expected to transform the current economy and finance operating models, resulting in new technological innovations in the fintech industry (Guo and Liang 2016). Blockchain attracts attention, since it is a core technology for cryptocurrencies such as bitcoin and is perceived as the new basis for transactions in the world. It is an uninterrupted account database that is distributed and unchangeable (Chang et al. 2020). The most important advantage of blockchain is a "decentralized system" with a long security chain that cannot

be altered or broken. Therefore, the blockchain provides the following benefits: removing third parties who facilitate transactions, reducing trading costs, and decreasing transaction time. Given the promise of such technology, many financial institutions are investing in blockchain solutions because they have a huge opportunity to disintermediate key services that financial institutions provide, including facilitating payments and loans and credit.

1.4 Facilitating payments

Blockchain technology guarantees to facilitate fast and low-cost global payment process services through its secure distributed ledgers that eliminate intermediaries (Faden 2021). Sending a global payment through normal banking methods is often a sophisticated and expensive process involving many third parties. For instance, if Firm 1 in France wants to pay Firm 2 in the United States, Firm 1 asks its France bank to send an overseas payment. The France bank allies with a correspondent bank in the USA to facilitate the payment, and then the money is transferred to Firm 2's bank account. Every step in this process necessitates time and more money to be completed, establishing a frustrating and overpriced bottleneck. Blockchain solves this problem by restructuring the process of sending money and storing each transaction in a safe "distributed ledger". When a transaction is logged, the recipient immediately gets access to the money without delays and fines. In addition, once payment is made, it cannot be altered in the distributed ledger or reversed, fostering a sense of security and accountability. The best examples of blockchain technologies are cryptocurrencies such as ether and bitcoin, developed on public blockchains where anybody can send and receive money. These public blockchains eliminate the need for third parties such as banks to verify transactions and provide the customer with cheap and fast borderless payments (CB Insights 2021). For instance, Bitpesa is a company in East Africa that uses blockchain technology to facilitate payments in Uganda, Nigeria, and Kenya, eliminating more than 90% of transfer fees in East Africa.

1.5 Loans and credits

Blockchain technology plays an important role in assessing credit risk in customers (borrowers) (Kumar 2021). When customers fill out an application for a loan at a bank, the bank has to assess the risk that the customer would not payback. They accomplish this by assessing factors such as the "credit score, homeownership status, and debt-to-income ratio" (Kumar 2021). Based on this information, lending institutions risk a default into interest and fees collected on loans. This system is harsh to customers, as it can have "material error" in people's credit scores affect their ability to apply for loans. Therefore, blockchain technology could provide a cheap and efficient way of making personal loans easy to access. Through a decentralized ledger, banks could easily provide and approve loans depending on a global score. One company that uses blockchain technology to provide loans and credit is SALT Lending. It provides a platform where its users can request a loan by using cryptocurrency or a digital asset as collateral (Frankfield). Loans are approved depending on the collateral's value and not the customer's credit score. As seen in Figure 2, the Bloom protocol based on blockchain technology issues a credit card and loans depending on a track record of "successful identity attestation" without the need for third parties (CB Insights 2021).

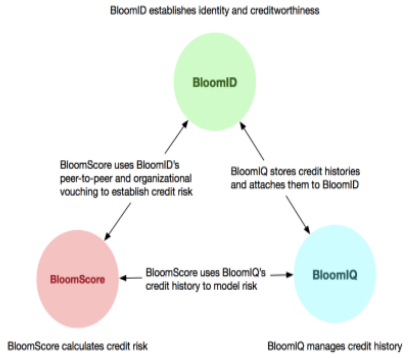

Fig 2: Bloom Protocol (CB Insights)

BANK AND FINTECH COLLABORATION IS BECOMING MAINSTREAM

The relationship between banks and fintech has evolved for several years, with the recent focus being on partnerships and collaboration (Fintech Talents 2021). Although partnerships between banks and fintech have not been easy, many have learned from previous experiences and positioned themselves to collaborate and partner. During the coronavirus pandemic, almost every industry had to pivot in different ways so as to adapt to the challenges brought by the pandemic. Financial institutions were most affected by people shopping, banking, and working from home because of social distancing. The global pandemic had increased the shift to digital payment and commerce, in some cases substituting the merchant and the retail experience altogether. This is because fintech businesses had to function and work in different stages of lockdown while meeting customers' financial needs. As a result, banks and fintech needed pivots (partnerships) to survive the tough economic situations during the coronavirus pandemic. A bank-fintech partnership is an arrangement whereby a fintech company provides loan servicing, administration, or other services to enable the bank to provide tech-enabled banking services and products (Holzel and Stern 2021).

Multiple global developments have created a clear need for forming partnerships (van der Kroft 2021). Fintech companies corporated with banks mainly because of the following reasons: (1) banks have a stable and well-defined customer base; (2) forming a partnership with a bank is a sign of credibility; (3) banks usually have bigger investment budgets that could be used in developing fintech services, and (4) banks tend to possess a lot of knowledge in areas such as regulatory and legal compliance that fintech companies can benefit from. On the other hand, the key driver for banks to partner with fintech companies are that customers are used to

seamless digital experience and expect their banks to provide digital services. In addition, because of the emergence of one-stop shops, fintech firms have shifted from being single service providers to offer a broad range of services. The benefits that have emerged from the partnerships between banks and Fintech include:

i. ***Building up a brand reputation:*** If either the bank or the Fintech Company has an excellent reputation, it is likely that the reputation can be passed down to the other partner when the two companies come together (Raspa 2021). For instance, if a bank is known to have excellent customer satisfaction, it is likely that these reputation would be passed down to its Fintech partner.

ii. ***Offering more features to clients:*** The partnership formed between a bank and a fintech company enables the bank to provide to its customers' important functions and features such as mobile check deposits and money management tools, which it could not provide,

iii. ***Increased ease-of-use:*** When a bank partners with a fintech firm, it benefits from the firm's technological prowess and starts providing consumers with programs that are easy to use.

iv. ***Broadened consumer base:*** Through a partnership, both a fintech company and the bank can access each other's existing user base, enabling them to expand their market shares to reach new customers.

v. ***Reduce costs:*** Banks will spend less when working with fintech companies and leveraging their technological capacities, unlike finding ways to enhance their services on their own.

vi. ***Ability to scale quickly:*** Partnerships formed between banks and fintech firms can easily be scaled depending on the consumer requirements. If the partnership is successful, the two companies can find more ways to add more features or services while improving their relationship.

GOOGLE CLOUD FOR FINANCIAL SERVICES

Like any sector, financial institutions face several challenges like managing risk, providing great customer experiences, and striving for profitability and growth (Shaukat 2021). However, they also struggle with changing market forces and regulations. As a result, a number of financial institutions have turned to the cloud for their services. Historically, financial institutions were reluctant to turn to the cloud because of compliance and security concerns. However, the coronavirus pandemic and changing consumer expectations forced the financial industry to rethink its business models. Currently, many financial services companies that were shy to move to "the cloud" have become "cloud champions" after realizing the prospects of cloud computing in terms of security and compliance, and scalability. Financial institutions worldwide are now choosing "Google Cloud Platform 2021" to manage their business operations, guaranteeing resilience and success in the post-pandemic world (Lehman 2021). The following are some of the ways Google cloud is transforming the financial sector.

1.6 Faster insights

Financial institutions handle and store a huge amount of data, including user data and other unstructured data collected from the internet (Lehman 2021). The major impact of the Google cloud platform in the financial industry is when companies can access the correct information whenever they need it and act intelligently on the information. Google cloud helps financial institutions safely retrieve and store their data that was previously scattered across various systems. This helps financial companies enhance their overall user experience and, at times, create new products quickly. Financial companies are looking for ways to decrease expenses and grow their revenue, and data could be a key ingredient to achieving this goal. As daily transactions keep rising, so does the volume of data. To implement new user experience innovations, financial institutions are required to store user data effectively. For instance, AXA Switzerland uses real-time Google Analytics to better insight into customer preferences to tailor their needs effectively.

1.7 Compliance and regulatory needs

Financial services focus on compliance and security, regulations, and risk and fraud detection since they are highly regulated. Google Cloud offers a secure foundation that financial institutions can verify as well as an independent control. The technology decreases data loss and security risks since it is developed on a complex zero-trust architecture (Google Cloud 2021). Furthermore, within the Google Cloud platform, more than 750 full-time security professionals work on the platform applying various security practices, ranging from audit trails to physical data access. These security features are needed to meet the best compliance and practice certificates audits that are important in the financial service, making "Google Cloud 2021" a secure platform.

1.8 Customer support services

In the financial sector, downtime can result in millions of dollars in losses, even if the downtime lasts for a minute. Google Cloud provides "Mission Critical Services," a unique consultative service for premium support customers who handle peak traffic loads. This service is a consultative offering that helps financial institutions solve any issue with their traffic as soon as possible to avoid any losses (Condon 2021).

ROBOTIC PROCESS AUTOMATION (RPA)

Robotic process automation (RPA) is used in the financial sector to automate the manual business functions in financial institutions to remain competitive in today's dynamic business environment. Retiwalla 2021 defines RPA in banking institutions as using Artificial Intelligence and robots to replace manual human functions in banking. The rise of cryptocurrency, digital banking solutions, and mobile payments forced major bank institutions to adopt new technologies so as to provide a better customer experience and sustain their competitive advantage. The financial sector

jobs involve analyzing huge amounts of data, handling repetitive tasks, and ensuring compliance, making RPA and financial institutions a perfect match. Automation in financial institutions is when a company uses software to decrease or eradicate manual functions in financial-related processes such as payroll, journal entries, accounts reconciliation, and expense management.

A good example where RPA can be effective in finance and accounting is when filling property tax returns. Property tax returns involve hundreds or thousands of forms that would make them difficult to complete. However, through automation, filing for property tax returns would be much easier since the software is able to retrieve and fill relevant data. As a result, the bank is able to save time and costs by automating the process of filing returns. With several repetitive and mundane tasks solved through automation, RPA has a profound impact on the financial sector in allocating scarce resources efficiently, decreasing costs, improving customer experience, and transforming some banking processes (International Banker 2021). Some of the banking processes that RPA would transform in the financial sector include:

1.9 Mortgage lending

Currently, mortgage lending is a time-consuming one requiring the need for automation (Kaur 2021). Loan borrowers must send several documents electronically to the bank offices, which the lending department then verifies. The verification process involved several repetitive functions, such as assessing and confirming data accuracy from identity to assets. Through capabilities such as screen scraping rules application and optical character recognition, RPA is able to perform the review and verification process effectively. In addition, the RPA can alert borrowers on the state of their application process without the need to visit the bank offices frequently. RPA will enable the bank's lending team to focus on handling exceptions, especially when documents are forged or of poor quality. Human intervention is then used to provide the quality assurance needed to approve the whole process

1.10Efficient allocation of resources

RPA and automation will change the financial industry by liberating the staff from complex and repetitive tasks so as to focus more on value-added tasks (Kosmopoulos 2021). Robotic process automation is a proven solution to help the financial industry perform repetitive tasks quickly and with higher performance output by decreasing human error. With more employees free from mundane tasks, the management could allocate more resources to other tasks that require employees to provide analytical insight to drive key business objectives.

1.11*Automatic report generation*

The standard requirement for any bank when there is a form of any suspicious or fraudulent activities is to generate compliance reports, also known as suspicious activity reports, that have to be analyzed by the compliance officers (Kaur 2021). These reports are read and filled manually, and in the case of severe fraudulent activities, they can be extremely cumbersome and time-consuming to fill. However, when this process is automated, the entire process can be completed at ease, saving time and money.

1.12Faster customer onboarding

One of RPA's main objectives across the financial industry is enhancing customer experience. Customer onboarding has always been a major challenge for companies in the financial sector. This has been attributed to compliance issues, inadequate resources, manual effort, and secure onboarding demanding significant time. For instance, in a recent study carried out by Deloitte, onboarding new customers in the banking industry takes between 20 to 90 days, causing $25,000 in losses because of delays (Deloitte 2021). Financial institutions can automate their functions with robots to address the loss of revenue and improve the client onboarding cycle. Common onboarding processes that RPA can automate include customer information verification, background checks, and contract management.

2. Biometric identification

The introduction of "biometric" identification has affected many businesses, including financial and banking services. The insurance, financial services, and banking world are built on complex state and federal laws and risk management. With security threats always evolving in this field, the use of biometrics is on the rise in the financial industry. It is estimated that the biometric market in the financial industry in the United States alone is at $999.3 million (Global Industry Analysis 2021). The coronavirus pandemic changed the normal daily lives of many people more than they could have imagined. Suddenly, customers could not be able to visit their bank branches, and some could not speak to representatives or open banks. The financial industry needed a "security solution" that could be deployed fast and remotely – authenticating people's identities from their homes so that they could proceed with their banking activities without risking their health from the coronavirus. Flexible facial recognition software that had the ability to function on a customer's device found its way to the financial industry (Huang 2021). Using highly tested Artificial Intelligence algorithms, facial recognition software has been demonstrated to be safer than passwords and cards that can be stolen or lost. Some forms of identification like passwords are easy to counterfeit, leading to the increase in identity theft experienced today.

2.1 Benefits of biometric identification

Biometric banking is all about establishing the balance between security and convenience. For banking at home, whether it is through the bank's website or phone, security questions and passwords are being replaced by biometric solutions such as "voice verification" (Grant 2021). Mobile banking tends to feel like an examination, especially when a customer is asked security questions that they have forgotten. Voice verification easily bypasses this problem and offers total guarantee to the bank representative that the person on

the phone is precisely who he claims to be. Voice recognition allows the customer to make a quick call without any hindrance or delay from security questions. Unlike passwords that can be stolen and documents that can be counterfeited, a person's voice is unique and cannot be altered. Voice verification technologies are becoming sophisticated and thus a great tool to use in security-conscious sectors such as finance.

Today's voice technologies are able to determine spoken words, tone, and cadence in a voice. When a customer calls the bank, voice biometric authentication can be deployed quickly rather than the customer having to answer many questions such as "What is your account number? When was your last deposit?" Since every person has distinct characteristics and behaviors associated with their speech, their voice can function as an audio fingerprint (Boukadakis 2020). Financial institutions can deploy an audio fingerprint to prove beyond any reasonable doubt that the person on the phone is who they say to be. By eradicating unnecessary interrogation, bank representatives can immediately provide assistance as they begin the call on a good note. For cashless transactions, "biometric technologies" imply replacing the customary PIN code with facial recognition technology (Grant 2021). One of the major concerns facing customers today is the thought that someone who knows their PIN code might steal their debit card and withdraw a significant amount of money from their account. New biometric technologies have introduced facial recognition technologies that require an iris scan before one completes a transaction.

2.2 The future of biometric identification

The risks of entering physical banks are still high for both employees and customers because of the ongoing coronavirus pandemic. While the health risks of entering financial institutions will end in the coming future, a new trend of "branchless banking" is taking hold. Clients have now developed a preference to manage their banking activities through websites and apps to decrease the rates of visiting physical banks (Phaneuf 2021). Therefore, the need for remote and secure authentication is definitely here to stay. In addition, legacy security processes that are often expensive have added more reasons for banking institutions to embrace biometric technologies. Some major banking institutions have reported spending about $500 million per year on customer due diligence and KYC processes, a figure that is expected to decrease as facial recognition technologies are expected to replace inefficient identification processes. (Thompson Reuters 2016). Consumers are eagerly waiting for the future where brokerage and opening a bank account do not require cumbersome identity checks and passwords that require special characters and alphabets. Financial institutions quickly adopt new and affordable security solutions, satisfy government legislation and satisfy customer needs (Huang 2021). Facial and voice recognition are entering the financial industry expected to check all these boxes.

OPEN BANKING

Open banking is a trend whereby customers allow third-party providers to access their financial information in the financial institutions to inform new services and products using technology known as "Application Programming Interfaces" (APIs), (Chuard 2021). Open banking has established an exciting scheme whereby all banking information from companies and customers is readily available for access to financial providers and potential lenders. The basic assumption of Open Banking is that information and data held by financial institutions such as banks belong to the client and not the institution. If a client wants to use his information and data to gain better financial services and products, it is within their rights to use their data as per their wish (Ndinga2021). Information such as credit scores, financial transactions, bank statements, and income are made available through APIs that bypass customary financial networks. For consumers and financial providers, open banking provides many benefits, including request to pay, faster payments, fast-tracking mortgages, savings, and new opportunities for merchants.

2.3 Request to pay

One of the major applications of open banking is the request to pay (RTP) function that allows customers to request payment from their bank accounts (Peplow 2021). Even though customers can make a real-time payment using mobile banking, "Request to Pay" is revolutionizing regular payments and invoicing, which is advantageous to self-employed business owners and merchants debtors get a notification of the amount they owe, whereas payees can tract their invoices and bills on the same device, providing them an efficient and straightforward way of reconciling their accounts.

2.4 *Faster payments*

The future of open banking lies in the ability to process and make payments faster (Tutors Lodge 2021). When a customer's financial information is readily available, it becomes easy for lenders and finance providers to process car finance or personal loans. This is because customers can not obscure their financial position or income since it is readily available from the bank. However, the only thing preventing this mode of payment from going mainstream is some clients' reluctance to share their financial information openly.

2.5 Fast-tracking mortgages

The use of "open banking" is an exciting prospect for home loans and mortgages (Tutors Lodge 2021). When a customer applies for a mortgage loan, they go through a cumbersome process as they are supposed to provide their bank statement and financial documents, making it a long and time-consuming process. Through open banking, lenders and financial providers will be able to access customer information at easer to determine whether they qualify for a loan or not.

2.6 Savings and new opportunities for merchants

Accelerating the adoption of open banking are the cost savings benefits it has for merchants. Open banking eradicates the risk of mishandling money, and the low

transaction costs from online purchases have made open banking attractive to business owners. The coronavirus pandemic saw most people shift towards online shopping for retail purchases. As more customers prefer to shop online, open banking could make non-banking companies become major financial-service players. With digital adoption expanding, many e-commerce companies would accumulate a significant lead in client attention. This would open the possibility that e-commerce giants would be the first companies to provide new financial services and products to their customer base, similar to what Google is doing with its "Plex product" (Asif et al.2021)

PERSONALIZATION

Financial institutions have been targeting customers and tailoring services to them for years before the age of mass marketing (Brodski et al.2021). The banking business was highly personal as loans were processed through handshakes, and tellers knew almost every customer who came in. Today, advancements in technology have enabled credit unions and banks to recognize their customers' interests and preferences. Until recently, these capabilities have been important to help banks differentiate their services, gain a competitive advantage and build customer engagement. However, this advantage is now being eroded as financial institutions are being leapfrogged by technological companies and retailers that put personalization at the core of their business strategies to attain significant performance gains. Similar to how these technology companies have been able to craft recommendations, financial institutions will be able to employ analytics and data to anticipate customers' needs as well as establish relationships.

Personalizing in financial industries such as banking is about delivering a product or a service to customers based on their historical data and personal experiences (Marketing Evolution 2021). Personalized banking is a journey with the client in focus. Getting closer to clients means meeting them, understanding their goals, and offering advice. As financial institutions are entering the post-pandemic world, they are likely to face a dynamic consumer landscape. Consumer expectations have changed, and achieving personalization will become a major challenge for financial institutions in the coming years. Therefore, to stay competitive in the financial sector, firms need to personalize their services towards meeting the needs of the consumers. The needs of consumers do not mean selling a service to the consumer but providing one before the consumers know they need it.

Personalization can help in fraud detection, especially when customers are not aware (NCR 2021). For instance, if a customer withdraws the maximum amount from the ATM two days consecutively or transacts in a different location than they have never transacted before, a bank can assess their customer behavior and send an SMS notification in real-time to validate the transactions. As a result, a customer will feel like the bank knows them and protects their money through personalization. Aside from fraud detection, great personalization has the following benefits, according to Rausch 2021:

i. It aids to foster coherence across service and product groups (credit cards/savings accounts, personal/housing loans, etc.), offering a consistent experience.
ii. It allows progressive profiling of clients to enable targeted offerings.
iii. It improves the brand appeal
iv. It helps identify new solutions that drive incremental growth

SUMMARY AND CONCLUSION

The aim of this research paper was to determine the Fintech trends currently shaping the finance industry and their impact. Fintech describes the technologies that seek to enhance and automate the delivery of financial services in the finance industry. At its core, Fintech is used to help the financial sector better manage its financial processes and operations by leveraging the specialized algorithms and software used in smartphones and computers. Fintech mobile applications have helped improve customers' access to financial services at their comfort, but their demand is not yet over and continues to increase further, welcoming new technology trends that help to reshape the industry.

Since 2020, financial services were subject to an abrupt acceleration in digital engagement and digitization influenced. The post coronavirus pandemic has required the financial industry to accelerate the adoption of various technologies and trends that will either improve their customer experience (less cost, less transaction time, more diversified investments) or sustain their competitive advantage more volume of transactions, better reactivity, and higher economy of scope).

With many people moving towards digital money to manage their financial needs, stiff competition among financial institutions is expected to increase to be very high. Innovation in digital solutions and investor satisfaction are of a paramount challenge in the financial sector landscape. The trends discussed in the paper include Artificial Intelligence (AI), Blockchain, Bank and Fintech Collaboration, Robotic Process Automation, Open banking, Biometric Identification, and Personalization. These trends were assessed in detail, with several examples related to them being provided and their impacts were discussed. It is evident that in the future, we will have a higher and a less risker digital solutions among the crypto communities. Fintech companies are playing a key role in improving customer experience through automating more and more financial services. Investors are more and more digital money literate and their risk aversion to the new digital services would decrease.

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A Short Survey on Smartphone Based Activity Recognition

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Abstract
Smartphones are very useful devices that are used widely. It comes with many sensors and with a big battery. Thus, operating and accessing the internet can easily be done by a human. Human involves many activities with the smartphone and its powerful sensors like GPS for location-related information. Thus, Human deeds are 70% dependent on smartphones. Researchers and scientists do lots of research on it. They publish many articles, blogs, surveys, and much more to this world for growing and learning purposes. They try to implement a large community to find solutions to unsolved cases. Smartphones are easily portable, accessible, and hardy devices. Smartphones come with many sensors, which give data of the user stored in a cloud server. There are 3.8 billion smartphone users. So, Server stores a huge amount of data. There are 7 million data servers all over the world. By collecting and processing a large amount of data, researchers use ML and DL techniques. Some of the data are used to recognize driver's behavior; some are used for human activities, some are used for what humankind is like to do, etc. Data are divided accordingly. Artificial intelligence and machine learning come into the picture when large data are processed and generate the approximately same output. Some algorithms and techniques detect human activities with various behavioral traits, human age, gender, movement style, etc. Many problems are there to collect the data, i.e., environmental problems, noise, etc. Many old-aged people can get help by using an eHealth application that works on smartphone sensors and gives appropriate suggestions. Many people have secret diseases that can also be solved. This can be very useful in healthcare applications where robotics and AI can monitor and analyze the problem. This is a short smartphone sensor survey based on human activity that can be monitored and recognized through different sensors and ML and DL techniques. In Human activity monitoring and recognition, in short, HAMR, researchers do analytical tasks, i.e., quantitative analysis of human action and reactions. Accordingly, Machine learning and Deep learning processes can detect motion using smartphone sensors. Elder, disabled people with special needs can get help from the eHealth application developed and updated yearly. Moreover, many experiments with a publicly convenient database of human activity with smartphones help develop more and serve secure lives.

Keywords
Human activity, Machine learning, Deep learning, Healthcare, Smartphone Sensor

INTRODUCTION

Near about 1979, the hand-help mobile phones come from the very beginning. Since then, many technologies have come, and the demand for mobile phones has also increased. In 2023, nearly 4.5 billion people will adopt mobile phones [1]. Mobile phones are now developed with very powerful technology and are called SMARTPHONEs. This shows the growth rate of mobile phone adoption.

The world's greatest democratic country, India, has many users who use smartphones, i.e., it will reach approximately over 760 million in 2021. Sensors in smartphones, wearable devices are used in many cases, such as human activity recognition, health monitoring, detecting emotion, behavior, and security [2] [3]. In this multitasking environment, different types of sensors are co-related to collect the data. This helps in traffic monitoring infrastructure, detecting human health status, etc. There is much more capability than the past infrastructure; now, a huge amount of data can be supported and processed using a huge data directory. However, lots of errors are also there. Therefore, data mining and machine learning methods are implemented in the back end [4].

By considering human health and behavioral status, health organization plays an excellent role by collecting clinical facts of the healthcare system; this covers the gap between the various clinical visits into the relation of smartphone sensors with the human body. Many sensors are attached to a smartphone, but Camera sensors play a great role in informing which type of environment the user is in [5]. Moreover, HD images, videos are gathered for analysis. Thus, it helps to monitor and recognize properly the human body. On the other hand, many wearable and atmosphere sensors have disadvantages like noise, network issues, etc. To overcome this kind of situation, a smartphone with a range of 7-15k comes with very powerful sensors with good computing power [6].

Section 2 narrates a brief overview of smartphone sensors; Section 3 discusses some human behavior detection techniques used in existing literature. Finally, related works

over-analyzing human deeds are described in section 4, And the conclusion is presented in section 5.

2. SMARTPHONE SENSORS

There are tiny sensors used in smartphones. Smartphone with a higher price comes with very powerful sensors; not only that, but the smartphone with a lower price also comes with sufficient important sensors that work fine and are trustworthy. These are used for analyzing human behavior, indicating human activities with health monitoring, etc. [7]. Some of the names of the sensors are given below, with some descriptions. Types of sensors: motion sensor, gyroscope sensor, environment sensor, position sensor, proximity sensor, ambient light sensor, accelerometer sensor, compass sensor, barometer sensor.

Motion sensors- the movement like smartphone rotation, tilt, etc., helps identify the motion direction through an accelerometer. It also helps to identify earthquakes or medical devices.

Environmental Sensors– is useful to detect environmental parameters like humidity, heat, or temperature.

Ambient Light sensor– the auto-brightness mode feature can be enabled using this sensor. The brightness of the display changes accordingly. This is a 2-3 mm size sensor inbuilt in our smartphones.

Proximity Sensor– Proximity sensors are placed at the top of the screen. This emits an electromagnetic field and looks for changes in the return signal. Machine vibration can also be measured by it. It is also used to save battery life and safes accidental screen touches.

Accelerometer Sensor– Horizontal and landscape are the modes of orientation. To check mobile phones orientation, it is used.

Gyroscope Sensor– 360-degree images, videos can be processed using this sensor. Every point angle and direction of the axis is measured in the best precise manner. Helps to adjust contents of phone accordingly to user.

Barometer Sensor – For height-related data, this sensor is useful. It also helps with GPS. Compass Sensor– Electrical compass is linked with this sensor, which helps detect the direction.

Pedometer Sensor– By counting the number of steps the user has walked. It shows the step count, helps in health care application.

IR Blaster– To control electrical devices like TV, AC, SET TOP BOX, this sensor helps a lot.

2.1. Sensor Selection and Location

Analysis based on some accurate results, Smartphone sensors in human activity detection play an important role rather than using ambient or wearable sensors. So, pick the right one, and installing the sensors is the most important concern. Motion sensors such as gyroscopes, accelerometers, etc., position sensors, i.e., magnetometers and environmental sensors (thermometers and barometers), are the three kinds of the sensor. Various complex activities can be considered with simple activity measurements. Thus, it helps to determine whether a person's activity is like a rush or not. Many differences come when the phone is in hand or phone in car desk. The sensor's signals differ by changing the position. Researchers find a distinct range of values of human activities. Through this, lots of ML and DL (specially,.

2.2. Comparison Among State of the Art

Table 1 analyses state of the art in terms of their benefits and shortcomings (if any).

Table 1. Analysis of state-of-the-art models

Ref.	Objective	Benefit	Drawback
[13]	Classification of daily activities using smartphone	Fixed point representation based Multiclass Support Vector Machine's performance was up to the mark	Less adaptability to the smartphone setting and user in different positions to support online learning
[14]	To track activity and assess the behavioral change using smartphone	Improved health and combatting different harmful diseases and conditions due to inactivity	No iPhone support and no integration with social media to consider positive social influence
[15]	Pedestrian activity detection by smartphone in indoor environment	CNN's 98% accuracy in activity classification	Small dataset and no consideration of energy consumption factor
[16]	post-process method locating and correcting the errors in classified activity sequence	Improved recognition accuracy in the premise of introducing a small amount of overhead	Time complexity during activity switching
[17]	Automated detection of workers activities using embedded gyroscope & accelerometer	The k-nearest neighbor performed best among different ML classifiers in user dependent & independent ways	No attempt towards productivity measurement & improvement

3. HUMAN BEHAVIOR DETECTION

All over the world, researchers have been tried to monitor human behavior using sensors, i.e., provided inside the car or inbuilt smartphone sensors. These data are collected and analyzed by ML or DL techniques to predict human behavior. Some basic kinds of behavior are rush, normal, challenging behavior, etc.

IOS, Android-based healthcare applications are developed at a higher rate than others. Using the sensors mentioned above, these applications run smoothly, without any fault. 99.9% high availability is there to data sent to servers [8]. Data can be analyzed and recognize which formation user is doing its work. It can be a rush behavior in a pleasant situation. Data are correlated to make new patterns. For example, a sudden break, speed breaker, sudden acceleration, etc. Some generic data also be found in the case of highly qualified people. Their style may be very important when sensing their behavior.

Various ratings are given to doctors and employers to inform them to improve their performance. Based on this rating or feedback-related application, Cameras, GPS, accelerometer sensors are widely used. It helps drivers to better their driving experience and to monitor health. Human behavior can be categorized into normal, aggressive, and very aggressive manners. This categorization can be done by collecting the data from different sensors like accelerometers, gyroscopes, magnetometers, GPS, video. The Dynamic Time Warping (DTW) algorithm helps to categorize it. Audible responses come when human behavior is aggressive in an aggressive situation.

Humans are in dangerous situations when they drink alcohol. Sudden changes of behavior are collected as special cases. Health care applications are developed accordingly. Pattern recognition is used to determine human behavior when driving depending on the skill set, i.e., a skill level. This skill level can be defined as weak, medium, or strong. Researchers do some analysis on it and predict some lines over it. Over or below the line clearly shows that humans are drunk or in a special situation. Then, many learning algorithms are applied to it [9].

When sensing, some fault can occur due to noise, environment changes, etc. Researchers, although deposited some equations and based on it, cancellation of this kind of fault is made easily. Crowd Situation - People are gathered in some occasional events and some different data sets can be served different from their habit-related data. Environmental Factor- rain, wind, and earthquake are certain factors when the data set changes. Depending on the threshold value, machine learning algorithms are implemented.

4. RELATED WORK OVER ANALYZING HUMAN DEEDS

Human moves are captured and sensed using various ambient and wearable sensors. In HAMR, the smartphone sensor plays a very important role in getting images of the surrounding environment. However, some privacy concerns are there. Also, wearable sensors and ambient sensors have some disadvantages. Therefore, a solution like a smartphone with high-computing sensors is mostly used to overcome issues.

4.1. Categorization of activities

The regular behavioral activities of humans have been classified into three parts accordingly to the duration and complicacy, such as complex activities, basic works, and short events [10]. Out of 100, 45 researchers focused on basic activities and concise events. The system can identify such kinds of activities. Some activity can't identify by the system or has less predictable accuracy. Thus, this kind of activity is labeled "unknown activity". The architecture of the traditional HAMR is provided in Fig. 1.

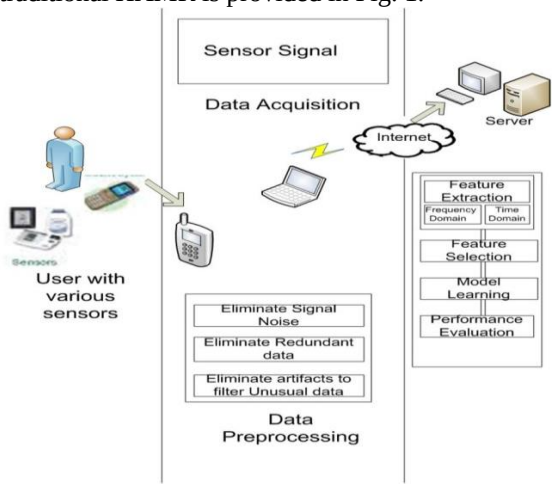

Fig. 1 Construction of conventional HAMR

In Fig. 1, the conventional HAMR is mentioned. In the first level, Human behavior is perceived and the subject (data) preliminary process for the data acquisition. Afterward, the data is accomplished with the acquisition; peculiarity extraction is accomplished depending on the field of time and frequency. Afterward, with the use of the classifier, deed acceptance is performed. After the deed acceptance, all information is available and applied by most health care exercises. In the vogue of the cellular device, Investigators use the power or ability of the cellular device to verify sensor data. Smartphones are used intensively with several sensors, such as temperature, accelerometers, microphones, cameras, light sensors, gyroscopes, magnetometer, GPS receivers, and digital compasses. Thanks to the advanced computing power and small size of smartphones, they can turn in extremely strong sensing gadgets that monitor health and make people healthy.

The social activity process of recognizing is focused on the instance that body movements are produced to sensors strange signal patterns which can assist in recognizing with different ML algorithms. The arrangement in classes was one of the most- acquired procedures such as Naive Bayesian, k-Nearest Neighbors, Decision Tree, Multi-layer Perceptron, Logistic Regression, Support Vector Machines, Extreme Learning Machine, an ensemble for learning algorithm of the Random Forest, Artificial Neural Networks and deep learning are the approaches of various deep LSTM. Conduct the earlier mentioned distribution; researchers have submitted several procedures with several verified and effective results. Therefore, several people can conclude this into three trends as shown in Fig. 2.

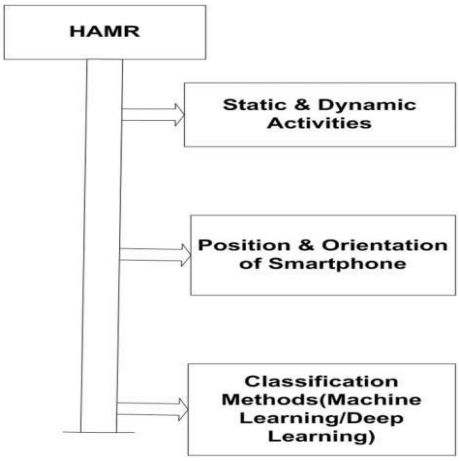

Fig. 2 Three directional tendency

4.2. Humanism and Behaviorism

Behaviorism strengthens the gravity of noticeable actions and the study based on the methods and principles of science and believes that human action and reaction are impersonated by the environment [11]. Behaviorism is the scientist studying the human and animal mind and using objective methods. Behaviorism is mainly concentrated on behavior. At the same time, Humanism's impact on human needs solves human problems intellectually. It is related to the inner self, human feelings [12]. Common theories are applied to both animals and humans (as in Behaviorism).

4.3. Detect Human Motion using a wearable device

Wearable motion sensors are also used to get motion data. For example, human wear this device, and then walking, standing, running, motions are senses using this device [10]. Using Bluetooth and battery, this device works.

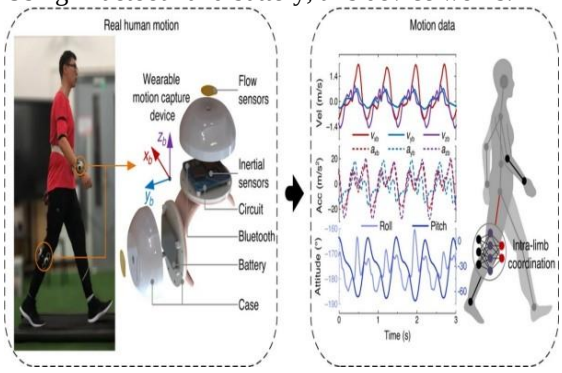

Fig. 3. A wearable device able to detect human motion

The left side of Fig. 3 shows that a person is wearing the motion-detecting device and is now walking normally. Device inbuilt components are shown here. The tri-axis flow sensor with tri-axis inertial sensor body motions can be drawn in an analog signal shown on the figure's right side. Movement data includes the three-dimension speed of movement, pointer acceleration, and behavior angles that can be quantified by this machine. This speed of movement and pointer acceleration is measured via an integrated approach using the little sensor, which helps avoid accumulative errors. This pointer acceleration is correctly determined by taken as part of a whole with the speed of movement and acceleration detected from the flow sensor relating to quantities observed by the sensors. Therefore, these drift and instability problems can be overcome. A neural network model is produced to characterize the natural intra-limb involvement for the human lower limb and is used to determine the thigh motion from the shank motion with human walking and running.

Smart sensors are classified into Type, Component, Technology, Application, and Geography. Type means Humidity, Flow, Position, Pressure, Temperature. Technology means CMOS, Optical Spectroscopy, MEMS, Component means Digital-to-Analog Converter, Amplifier, Analog-to-Digital Converter, Application means Aerospace and Defense, Automotive and Transportation, Healthcare, Industrial Automation. The demand for the highly powerful sensor is high. Smartphone with smart sensor performance is unbelievable. Over the past few years, the sensor's Adoption has been going high.

With the up-gradation of the conventional sensor, they automatically collect environmental data or information with very little fault rate. Furthermore, the speedily growing state of being utilized and infiltration of the internet of things (IoT), detailed with the developing largely automatic equipment in the vehicles and the highly intelligent wearable systems for health monitoring and detection, is in desire that the smartphone market grows regarding new forecast span.

5. CONCLUSION

How a person's life has widely changed with the rapid growth of smartphones. Compact smartphone sensors provide a feasible way to gather and explore new data that can be intensively used in health applications. To observe and check the progress or human behavioral quality over some time using a smartphone. That is enlarged as a modern trend because of developing or changing in fewer cost margins and lots of survey figure out that the public already owns it. The existing analysis is achieved based on the three distinct parameters: human deeds, place and position of the cellular device, and grouping method. Following our research, we found that with the large set of data and ML and DL techniques, much more accurate and efficient results can be achieved using smartphone sensors. Some plus points of smartphone sensors are, wide availability, enough bandwidth to transmit slowly varying biometric signals, low cost, and ease to use.

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Introduction of Blended Learning in Indian Colleges

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Abstract
Blended learning is generally applied to the practice of using both online and in-person learning experiences when teaching students. Also called hybrid learning and mixed-mode learning, blended-learning experiences may vary widely in design and execution from schools to universities. The deadly spread of COVID-19 has brought a major change in the education system of our country. Keeping in mind the current situation, the University Grants Commission (UGC) is drafting a concept note on a "blended mode of teaching and learning" in varsities and colleges. University Grants Commission, UGC has released a public notice on the implementation of Blended Mode of Teaching and Learning in universities. UGC decided that the Higher Education Institutes will be allowed to teach 40% of course online through SWAYAM and 60% through offline mode. So, in this paper we will discuss the possibility of this blended learning in Indian colleges, we will also discuss the future of this technology and at the end we will also discuss the advantages and disadvantages on this initiative taken by university grant commission (UGC).

Keywords
Blended learning, Online-education, Blended learning in India, teaching – learning system, LMS (learning management system), MEC , MOOC'S, RCT

1. INTRODUCTION

Blended learning is not doing online worksheets, reading digital materials any technology-related activity unless it allows student some control over the pace and content of the instruction. Bates (2015) suggested that blended learning has wide variety of designs: 1)Technology used as classroom aids (e.g. PowerPoint slides, clickers); 2) Using learning management system to support classroom teaching (e.g. for storing learning materials or for online discussions); 3) Using lecture capture for flipped classrooms; 4) short periods on campus for hands-on experience or training followed by concentrated time studying online; 5) Hybrid or flexible learning requiring the redesign of teaching to enable students to do majority of their learning online, coming to campus only for specific in-person sessions (e.g. laboratories).Though we have spent more than 70 years of independent life in India, the drastic reformation of education system have not been done yet in comparison to other countries. After emergence of educational technology in field of education PLATO (Programmed Logic for Automatic Teaching Operations) was first introduced in 1960s by University of Illinois. Later e-learning and then hybrid learning techniques were introduced. Later the hybrid learning was renamed as Blended learning in the year 2006 by Bonk and Graham in their book 'Textbook of Blended Learning'. Many previous studies prove that blended learning technique has an excellent potential to meet the new challenges of ever transitional education system. In India we can found many loopholes in current chalk and talk based education system. Blended learning can be the possible way to overcome the hazards coming on education system in India. Blended learning is in use maximally in developed countries for their education system. Many previous studies proved that it is an effective technique in improving teaching learning environment. Some LMS are introduced now in India, like Byjus, Moodle, Vedantu, Udemy, Google classroom etc. they are costly and every institute cannot able to afford it. Implementation of blended learning in every educational institution is lagging till the date. In India, two main types of schools are found: Government and Private schools. Some government schools are fully government undertaken some are aided. Where the funding are limited so that the inequality occurs as private schools are becoming too much modified by their advanced technology use and government and aided are not progressing as per need due to lack of money and resources. In India, proper implementation of blended learning strategies is lacking due to inadequate funding, lack of awareness, lack of infrastructure etc. But keeping eye in new normal, it is very important to know and understand the value of blended learning in India.

2. **RELATED**:

MOOCs and the developing world While much has been made of the potential impact of MOOCs WORK and online education initiatives for learning in developing regions such as Africa, Asia and Latin America, there is little evidence so far of successes in these regions to match the hopeful claims. Most scholarly work to date on MOOCs in the Global South comprises either general overviews of MOOCs and the issues they may be expected to run into or solve or program proposals tuned for the context of the Global South. Aside from our own work with MEC (Massively empowered classrooms) discussed in this paper, several other initiatives are now underway in India, Jordan, Rwanda, Francophone Africa, and several other countries. For example, in May of

2014, IIT Bombay announced the launch of three courses on the edX platform and there have been several government and private initiatives to introduce online teaching to Indian students. As these programs are implemented, we hope to see some studies emerge describing how they fare.

Proposed Methodology: Any lecturer who would like to take advantage of the benefits of Blended Learning could follow the four main steps that we propose as indicated in Figure 1. It is possible to modify these steps. However, they are proposed as basic to provide a practical approach from the general idea of Blended Learning of combining the attendance to the lessons with computer-based tools.

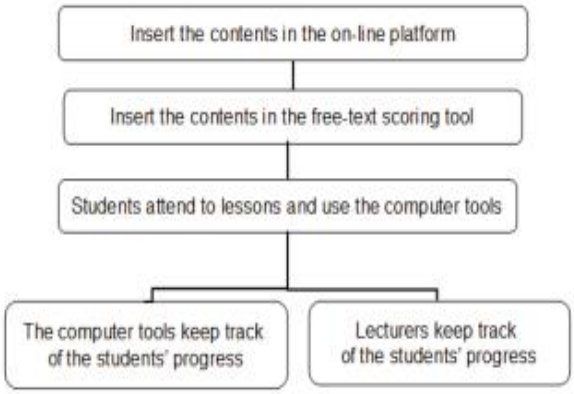

Figure 1. Overview of the proposed methodology

The first step is to introduce the contents in the on-line platform. This step is necessary because students should have the possibility of downloading the digital materials of the course before the lessons start. That way, they could print them and bring them to class, and they could also read them to have more time in class to discuss with the other students and the lecturer answering some questions. The questions could have also been posted in the platform in advance to guide the reading of the students. Some on-line platforms that could be chosen are: Moodle, WebCT, LRN or Sakai. The minimum requisites are that the platform allows to upload digital contents, to gather work and to provide some forum / chat as on-line communication channel among students, and between the students and the lecturer. Moodle could be a good choice because it is open-source, it is currently adopted by many Universities and there are many books and papers published on how using it for teaching (Cole & Foster, 2007). The second step is to introduce the contents in the free-text scoring system. This step is necessary because students should have the possibility of getting immediate feedback without having to wait for the lecturer to download the works from the on-line platform and evaluate them. Moreover, this step is useful to provide formative assessment as many free-text scoring tools just give an automatic score without explaining the failures. Usually, free-text scoring tools request from the lecturers to introduce some questions with their correct answers. That why it is impossible to automatically compare the students answer with the lecturer answer and the more similar they are, the highest the score given to the student. Some free-text scoring systems that could be chosen are reviewed in Perez Merin - (2009). The minimum requisites are that the system allows the student to provide any type of answer and get immediate feedback. The Will Tools could be a possible choice because they are free to use, and they provide feedback not only at the level of each question but also global feedback in the form of a conceptual model. That is, the set of concepts and their relationships of the topic under study. It can have a graphical representation following a semaphore metaphor in which the concepts best known have a green colour, and the concepts less known have a red background. The third step is that the students start using the computer tools. Once the lecturers have introduced the digital material in the on-line platform and the free-text scoring tool, the students should get a user account to start using them from any computer connected to Internet at any time. It is interesting to highlight that during this time, the students keep attending the lectures. Thus, it is possible that some doubts that may appear when using the free-text scoring tools can be solved during the lectures. At the same time, it is also possible that lecturers could keep track of student progress by looking at the computer tools. This would be the fourth step that is the tracking. During this step, it is possible that it is detected that some students are not using the computer tools, then some mails can be automatically sent to remind the students of keep studying with the computer too.

A web of difficulties : These so-called "second-tier institutes" face a number of serious challenges. First, there is a critical shortage of qualified teachers. Every year, the number of students in engineering increases and there are not enough instructors to meet the demand. Some first-time teachers told us that they never intended to become teachers, but only did so because they could not find a job in industry and leave if they find an industry job. This leads to enormous inequality between institutions, with a few high-performing schools and a long tail of institutions with under-qualified staff. Because of high turnover and limited experience, teachers are given very little autonomy and must follow a rigid curriculum. In addition, they are given very little latitude in grading, with the majority of a student's grade coming from standard final exams set by the university. In turn, colleges are often evaluated by their graduation rate, and thus have an incentive to evaluate students favorably. Therefore, most exams test wrote knowledge instead of deeper understanding. High marks are given to students who memorize textbook responses rather than learn subject material, and the best students have little opportunity to distinguish themselves. A lack of well-trained teachers and the limited relevance of classroom performance leads to uninspired students with little interest in subject mastery. In many instances, students spend their time optimizing for short term goals (e.g., memorizing questions from test banks) rather than learning the material. Naturally, this creates a feedback loop in which many teachers have little incentive to improve their skills or enhance the classroom experience for uninterested students who have no reason to pay attention. As a result of these problems, industry has largely given up on many colleges' ability to deliver quality education. Large companies such as Infosys and TCS hire students mostly on "raw intelligence" and then train them in custom computer science curriculum for up to 6 months before putting the new hires to work . In our view, this represents an enormous waste of time and energy and leads to the question: Can this

situation be improved through innovations in pedagogy such as blended learning and online education?

Online education in India: MOOCs and other initiatives in online education have taken centre stage in much of the public and academic discourse surrounding pedagogy in the US, Canada and Europe. However, in India these efforts are still virtually unknown outside of an elite population. While supporters cite the thousands of students from India that enroll in MOOCs, these numbers are still very small as a proportion of the student population of India (4 million undergraduates in engineering alone). Our research suggests that currently these resources are mostly used by adults for continuing education and a very small fraction of students who are driven to learn. Indeed, while students in elite institutions such as IITs are likely to be aware of these kinds of online resources, it seems that those who could benefit most from better quality teaching are the least aware of MOOCs. Our research team began a systematic exploration of how online education is currently used in India, what factors were holding it back, and how these tools might best be used to improve educational practice in undergraduate technical education. Much more detail is available in a separate report , but one finding stood out: on the whole, very few of the students or faculty we spoke with had ever heard of MOOCs (edX, Coursera, Khan Academy, etc.), and still fewer had actually participated in a course—and these were only top students at the better resourced colleges. Many teachers were aware of NPTEL (a government-sponsored archive of online lectures by IIT professors) , though again, very few students or teachers regularly used this as a learning resource. From these discussions we distilled four main reasons that we believe MOOCs and other online resources have had limited success in Indian undergraduate education so far:

1) The syllabus of online courses differ from university courses, and the level/speed of teaching is often too fast for students at regional colleges. In some ways this echoes the experience of other recent attempts to mix MOOCs with courses in other institutes . A corollary of differing syllabi is that online materials are not directly relevant for exams. Students optimize virtually all their effort around cracking exams (see below). Even if online material relates directly to concepts taught in class, if it won't directly improve exam scores then students aren't interested. At the end of the day, it all comes down to employment and currently students do not feel that online content will improve their prospects.

2) Language and accent is a serious concern. While English is the official medium of instruction for undergraduate technical education in India, in practice many students from less affluent areas have only limited competency in English. Furthermore, many MOOC teachers have an American accent that can be particularly difficult for Indian students.

3) There remain serious network bandwidth constraints for most colleges and students. In every college we visited, video streaming was difficult, if not impossible. Outside of colleges, students see huge variability in bandwidth availability and cost. However, most online courses assume the constant availability of high-bandwidth connectivity to support video streaming and other interactive content.

4) Finally, but perhaps most significantly, these tools have not been embraced by college administrations. Teaching practice in India is extremely conservative (particularly at second-tier colleges) and teachers have little autonomy; students do what their teachers tell them to do, and teachers do precisely what their administration tells them to do (and little more). Unless a pedagogical technique such as using MOOCs for blended learning is dictated from the top, it is unlikely to be incorporated into any classrooms. Simply put, in the current university structure there are no real incentives for teachers and students to use MOOCs beyond intrinsic motivation, which is why it has had limited uptake.

A trial of peer-led blended learning: While the DAA course on MEC attempted to respond to several of the limitations with MOOCs identified above (e.g., matching syllabus, using local Indian teachers, and provision of offline and mobile viewing), MEC has largely been provided to students on a purely voluntary basis. We were also interested in seeing how MEC might be more tightly integrated into class as part of the basic course experience. We have frequently observed that smart, motivated students take leadership roles in classes, often making up for absent or sub-par teachers. We wanted to see if a class based on MEC and led by a peer could be an effective way of improving learning for all students in a course, not just the students motivated enough to seek out MEC on their own. To investigate this hypothesis, we performed a small RCT (with several friends of our university. Our team member who is in 1st year of undergraduate studies in computer science from Brainware university to facilitate weekly sessions in which videos from MEC were played during regularly scheduled labs or recitations. In addition to playing videos, our class facilitator answered questions related to the video and discussed various practical applications for the material. At the end of the term, there was an exam to measure any potential differences in learning outcomes compared to a set of control colleges. In addition to the exam, we collected both qualitative and quantitative data about the MEC sessions and the students' perspectives on this approach.

3. RESULTS

MEC usage beyond the classroom We collected the usage logs from MEC to look at how students used MEC individually outside of class. Overall, MEC was not extensively used by many students outside of the classroom sessions. While 308 students in intervention colleges (about 30% of those enrolled in DAA) watched at least part of one video, 206 of those students never opened more than three videos. The median total time of video watched for these 308 students was just 10 minutes, and only 50 students watched more than an hour of total video. This was moderately disappointing, as we hoped that the classroom sessions would increase independent usage outside of class much more than it did. Of course, individual use of MEC in the control colleges was even less: only 39 students watched at least one video (about 4% of students enrolled in DAA), but about the same proportion (66%) never opened more than three videos. We expected the number of users in control colleges to be less since they would have only heard about MEC through word of-mouth or general announcements and some students were used to this idea but not know this term .

Student feedback: So we collected some data In which the short interviews with students conducted just after the sessions or in the college corridors, students said that they appreciated the interactivity of the classroom sessions and learning about the practical applications of algorithms. They compared it favorably to the standard teaching they received, which they described as largely involving the teacher writing on the board while they took notes. Some even said that labs took a similar shape (the teacher wrote the code on the board and they typed it into the computer). Student satisfaction forms were distributed to the students at four colleges (excluding college 5) during the final session and 326 were returned completed. A majority (60%) rated the overall MEC sessions good or excellent (4 and 5 on the scale), 7% poor or fair (1 and 2 on the scale) and 32% satisfactory. Most (69%) also agreed (or strongly agreed) that the sessions "improved my understanding of algorithms", with only 5% disagreeing and 27% neutral. We also asked the students to rate the "outreach MEC lecturer" (the PM) and the "videos played in class" to see if one appeared more influential than the other in the students perception of MEC classes. About 63% rated the PM as good/excellent, whereas 50% rated the videos as good/excellent. Students' ratings of the PM were significantly higher than MEC .

3. DISCUSSION

To our knowledge, this is the first study to show improved learning outcomes for a blended learning intervention in India. We found that a relatively small number of group sessions with video content led by a student facilitator resulted in an overall improvement in a cumulative exam at the end of the course relative to a control. Even though the size of the effect is relatively small (an average of about 3.6 percentage points improvement), it is statistically reliable. While this difference in exam scores is very encouraging, there are a number of factors in our intervention that may have contributed to this effect. Though one might argue that many are integral to the blended learning initiative itself, it is worth pointing them out here. Several of these factors are similar to the "confounds" noted in the meta-analysis by Means, et al. While hardly exhaustive, we discuss some of the factors that one might argue contributed to the improvement in learning performance:

1) Novel pedagogy. Unlike the standard "chalk and talk" teaching style typical of Indian classroom instruction (where the teacher writes on the board and students copy into their books), MEC sessions with the PM were very interactive. Video watching was frequently interspersed (typically every few minutes) with classroom interaction—completing problems, answering questions and emphasizing points. This served to keep the class engaged, except where problems or topics seemed too difficult for the class level. By making these sessions highly interactive, the PM capitalized on the full classroom experience of blended learning, including elements of competition, peer learning, humor and so on—all of which served to make the classroom experience more engaging. While more investigation is needed it seems likely that this is one of the most important factors and is consistent with prior work

2) Novelty. Rather than the standard recitations and labs that students were used to, MEC sessions with the PM were a break in the routine. It is possible that this basic novelty was sufficient to cause students to pay a bit more attention than they otherwise would have. The difference between these sessions and normal lectures was a positive theme reported in the satisfaction survey. 3) Quality video material. The MEC videos were simply effective at communicating the content to students.

4) Personality of facilitator. The PM is a very outgoing and energetic person. His dynamism may have been enough to cause students to pay attention when they otherwise would have been drifting.

5) Peer effect. Instead of their normal professor, a peer (fellow student) discussed the material with them.

6) Company branding and certification. Our organization is very well known and an association with the company is likely to be very motivating for students.

7) Independent use of MEC. We actively evangelized the use of MEC outside of class and more students in the intervention colleges did use MEC on their own than in control colleges. It's possible that this use by the 50 or so students in the intervention colleges is what carried the difference in the exam, though we think this is unlikely. 8) Use of code in teaching. In most colleges we partnered with, the use of code (or pseudo-code) is rarely if ever used when teaching DAA. In contrast, this is fairly common in MEC videos. The performance boost associated with the two questions on our exam containing code fragments suggests that this might be important.

4. CONCLUSION

We found that offering a peer-led blended learning session once a week for eight weeks in the place of a normal recitation or lab led to a small but significant improvement in learning outcomes as measured in an RCT in Indian technical colleges. A concurrent ethnographic study of the intervention suggests that much of the success of the intervention had to do with the way in which the combination of video and peer facilitation drove student engagement. We believe that interventions such as this could help to ease some of the serious constraints in higher education in India and other developing regions where the demand for education far outstrips the supply of trained teachers. Our research suggests that an interactive combination of video teaching by local professors and an energetic peer facilitator can be effective in "second-tier" technical colleges.

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A Review on Usability of Different Learning Management Systems (LMSs) during Covid-19 Pandemic

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Abstract
These days, education is rapidly expanding, and each of its core procedures and techniques is rapidly altering. The global education system is transitioning to a cloud-based learning model. Educational institutions have no choice but to use cloud-based learning when the socioeconomic situation is dire, such as during a global epidemic. Because of its flexibility, diversity, user friendliness, economics, and structure, cloud-based learning methods are becoming increasingly reliant on the future of the global education system. As a result of the rise and spread of the deadly new Corona virus known as COVID-19, the world as we know it has altered radically in a short amount of time, and the world will never be the same again. This study looks at the terrible impacts of a new virus pandemic, the resulting lockdown, and the need to convert the offline classroom to an online classroom. Because schools and universities are shuttered during the pandemic, education sectors rely heavily on "online learning." The urgent requirement to gradually update security inside cloud architecture has been highlighted by the quickly rising cloud-centric focuses among organizations and institutions. The purpose of this research is to look into and describe the numerous online teaching platforms, study materials, tactics, and technology, lms that are available. It also identifies the platforms and technology that can be used to administer online exams in a secure, cheat-free environment. It also looks into that the cloud-based learning management concept is mostly acceptable in given scenario.

Keywords
Online Learning, LMS, Open Source LMS, Cloud Based LMS, Moodle, Google Classroom, Usability

INTRODUCTION

The Covid-19 pandemic, rare viral infection which spreads quickly, especially from individual to individual. It was initially discovered in Wuhan, China, last week of December 2019, and the World Health Organization designated it a world health emergency of international concern on January 30, 2020. The World Health Organization labelled that quick corona virus outbreak in China a "global health emergency of worldwide concern" (https://doi.org/10.1021/cen-09805-buscon4). This virus gradually spreads over the world, killing many individuals and causes diverse financial, academic, and social activities to collapse. As a consequence of the preceding, all academic establishments are on the verge of an inescapable and indefinite hiatus. This is a preventative approach to avoid exposing children or teachers with the virus. On the other hand, this has resulted in a relaxed attitude among pupils at home, as they are inactive and therefore only think of evil. In the current educational period, educational establishments in most countries around the world, including mine, India, are implementing the Learning Management System (LMS). Because of its user-friendly character, many Indian educational institutes have already begun to employ the system. In the current Information Technology era, advanced cloud computing is generating a virtual area or classroom for both students and educational institutions [1]. The LMS, which uses cloud computing technology, provides ample capacity for numerous subjects to be taught to multiple users, simplifying the modern educational process. Now that we are in the Internet technology era and using cloud computing services, it is evident that we are employing specific software on a web platform. Though service providers such as Amazon, Microsoft, IBM, Google, and Sun Microsystems have all set up new data centre locations and are operating as hosts. Maintenance, expertise, and security challenges continue to exist globally. Schools graduate and postgraduate colleges, as well as private and public universities, all benefit from it. In this paper it is described about available online learning management services and a review on its usability based on literature survey and paper reviews.

The Research work is having following sections, Section 2 Presents a brief knowledge of Online Learning & LMS during Covid-19 Pandemic. Section 3 Described Related works till date by extensively going through related articles and researches. Section 4 said about the proposed works with optimum explanations in details. Section 5 briefly described Result Analyses. Lastly, the Conclusion and Way Forward described in Section 6.

2 Online Learning & LMS --- Covid-19 Pandemic Period

This Covid-19 pandemic is a rare viral infection which is extremely communicable, especially from individual to

individual. This sickness eventually spreads over the world, killing many people and causing economic, educational, and societal collapse. Many educational institutions have relocated classroom instruction online for the time being due to mounting concerns over COVID-19. This is an attempt to prevent the virus from spreading to children and teachers. Educators, administrators, students, and families will all face obstacles as a result of this transformation [2]. The learning's major goal is to look at how socio-demographic and other factors influence attitudes for giving online courses during the COVID-19 outbreak lockdown.

2.1 Online Learning

Content for online learning is provided in a variety of formats (text, images, audio, and curiosities) (versatile, intelligent, account, profitable). There is a plethora of web tools available for delivering online lessons. Subscribing to such online services is dependent on the resources available to the company. Each one of these techniques has its own set of pros and cons in level of protection, cost, and geographical features. Table 1 compares and contrasts the cost and security of a few different technologies.

Tool	Cost	Advantage	Feasibility
Impartus	Free hosting and $49/ module annually	The higher your number of students, the cheaper the subscriptions and have relative authentication system for security	This is feasible in developed countries where internet and power are not a challenge
Webex	Free hosting, $49/month charged for subscriptions annually	It is capable of connecting up to 100 clients at a time, and it has in build cryptographic security model	This is most feasible to Cisco hardware but not limited to Cisco and requires stable power and internet
Zoom	7-days free trial then you can choose from three different platforms ranging from $14.99/per month	Real-time feedback, custom support, and job ready skills but limited to only 40 min per session and relatively secured	This is feasible on Android and iOS software. It is a mobile application but limited to only 40 min per session
Google Classroom	Free	Dedicated to only subscribed clients, and features are customized according to clients' wants. Secure	This is feasible to low-level institutions with financial challenges. It is free and operates on both mobile and computer. It has an embedded examination evaluation software
Microsoft Teams	Free hosting and subscription of $5/month to all connected clients	Very scalable and user friendly	This is feasible to developed organizations with no financial or manpowerrelated challenges. It requires a subscription and real-time manipulation of texts documents using an inbuilt Ofce365

Table 1. Analyzing some selected tools [2]

A comparable system/platform for online examination evaluation is required for a fully functional online classroom. Many of these platforms can be found on the web. Organizations must evaluate the different systems and select the best system that meets their needs while taking into account the model's cost and security. The comparison of several online examination tools is depicted in Table 2.

Tool	Cost	Cost	Feasibility
TCexam	Free	Does not require additional hardware to run	Feasible to organizations with well-trained system analyst that can be able to use the software in accordance to their requirement
Virtualx	Free	Already on cloud, hosting is not required	This is cloud-based and makes it more portable and fexible but required a professional system analyst for the security of the information on the cloud
Moodle	Free	Very integrated and it operates according to the class size	This is very okay for a class less population; it operates according to class size
FlexiQuiz	Free	Autograding and secured with SSL encryption	This is an automated software that is fexible according to user requirement, and it is secured with SSL encryption
EdBase	Free	Creates question bank and cloud-based	This is a special package for computerbased examinations, and it has an autograding software, and it is free

Table 2. Comparison related different online examination tools [2]

Technological Burdens of Online Learning

Smart KMS (Knowledge Management Systems) and LMS (Learning Management Systems) relating software development are important keys to increase the desire for self-direction**.** It has been demonstrated that when multimedia tools are used in the classroom, kids learn more effectively. Despite institutional efforts to accommodate the use of the networking and communication in teaching, the following issues remain, presented in Table 3:

Lack of internet in most developing countries
❖ Security
❖ Lack of infrastructures like computers and ICT gadgets due to the level of poverty
❖ Lack of power supply in many regions
❖ Lack of political will due to corruption
❖ Lack of ICT knowledge/awareness among students and lecturers

Table 3. Technological Challenges [2]

The following table 4 depicts benefits of online learning

Benefits of Online Learning
➢ Easily accessible
➢ Unlimited access to resources
➢ Flexibility in learning
➢ Sharing of resources is easier
➢ Academic collaborations are enhanced
➢ Very portable and comfortable [2]

Table 4. Benefit of Online Learning

The following figure 1 depicts the universal acquisition of e-learning approaches and their mediums [3].

Fig 1. Learning methods and its mediums

2.2 LMS

Learning management system (LMS), piece of software which helps an e-learning platform run smoothly. Students learn at their own pace by using the internet as a medium. It gives instructors or mentors a venue to examine pupils by giving them online tests and assessing the results [4]. The focus of a learning management system is mostly on rapidly changing information technologies. Security, appropriate equipment, infrastructure, price, quality, and accuracy are only some of the technological challenges that users or learners face [5]. As a result, the user's technological learning is the obstacle. The purpose of a LMS varies relating to the objectives, online training technique, and intended outputs of the organization. As a result, the LMS to be used is determined by the contributing factors to the completion of the requirements. As a result, the selection of an LMS is dependent on factors such as organizational requirements, availability of suitable tech assistance, and LMS capabilities,

all of which contribute to the attainment of a specific organization's goals and objectives. Thus, when choosing an LMS, the most important variables to examine are business aims, technical advice and features, LMS design , performance, and pedagogical help supported by the LMS.

Categories ---LMS Deployment:

- CLOUD-BASED
- SELF-HOSTED
- DESKTOP APPLICATION
- MOBILE APPLICATION [6]

Categories of LMS Licensing:

- OPEN SOURCE
- FREE LICENSE
- PAID LICENSE [6]

Open Source vs. Cloud LMS

Open Source LMS and Cloud LMS are the two most frequent types of LMS. Choosing the finest LMS might be challenging at times. Users always choose their LMS provider based on cost, features, and categories. In Table 5, two learning management systems are compared and contrasted.

Open Source	Cloud Based
Having an open source code that users can access for free	Managed by specific service provider with SaaS.
Customized for specific requirement	Users can get specific user id and password
Open to use model	Pay per user model
Cost effective for basic using, need to pay for additional features	specific periodical cost involve
It needs higher knowledge of coding and IT expertise	Plug n play model, user friendly
Lack of dedicated service provider	dedicated service provider
Example: Moodle	Example: Google Classroom

Table 5. Comparisons between open source and Cloud based LMSs [7]

Benefits

When educational institutes and companies struggle to cope with the e-learning model due to technical knowledge, expense, and maintenance, LMS provides a service provider to assist them by delivering the following services [7], as shown in table 6.

- Effective cost
- Minimum infrastructure
- Maintenances and update the software
- Safe platform
- Creating both way communication environment between teacher and student
- Evaluation facilities
- Date storage support
- On time and any time access facilities

Table 6. Benefits of using Cloud based LMSs [7]

3 Related Work

Following a review of multiple studies and publications on the subject, it was discovered that continuing research and studies are being undertaken to evaluate the usefulness of various LMSs while maintaining the highest level of security. Some of the perspectives presented in numerous articles and studies are listed below:

According to a survey [1] instructors and students confront nontechnical problems while using a cloud-based LMS. The study [2] looked at user satisfaction levels, the necessity of using a cloud-based LMS in pandemic conditions, and what elements should be employed to improve user satisfaction. This study looked into the proposed cloud computing architecture based on LMSs for creating a virtual e-learning environment [3]. The research [4] focused on cloud computing and virtual platform technologies, as well as their benefits and drawbacks. Research [5] looked at the development of LMS as a product or service, as well as how it improves the educational system. The goal of this study [8] was to identify the primary myCourseVille interface flaws using a usability evaluation approach that included five usability criteria for the student and teacher interfaces, as well as LMS software suggestions. The author of [12] wants to create a preferred e-learning architecture that will help fix the problems in today's cloud-based learning system. As the number of learners grows in the next years, the top five e-learning technologies covered in this article are anticipated to gain in popularity. With each passing day, the number keeps climbing. The number of e-learners is increasing every day, and there are only a few options open, each with its own set of advantages and disadvantages, and some platforms are unnecessarily difficult [14]. The importance of cloud computing, including security and privacy, is discussed. The effect of the Covid-19 epidemic on Cloud Computing is explained in detail in the publication [15]. The behavioral goal of LMS in the context of COVID is outlined and researched in article [18]. It provides a moderated look into how pupils affected by the Corona Virus are adopting e-learning. In Paper [32], it is suggested that higher education institutions host LMS in the cloud by adapting a hybrid cloud architecture.

Various articles have described the technical implementation and adaptability of online courses in the twenty-first century, covering education systems, students, and teachers. Several articles describe the LMS paradigm, including course content, delivery, tracking, and technology enhancement. A few pertinent papers are explored in this research in order to keep the investigation going.

4 Proposed work

The goal of this proposed project is to conduct an analysis based on the usability of various LMS by learning institutions in case of Covid -19 pandemic. LMSs are software systems which facilitate the procedure of learning courses for students, whether in a traditional classroom setting or through distance learning. LMSs help higher education institutions improve the efficacy and efficiency of their educational processes.

4.1 Moodle: LMSs are either commercial software (for eg. Blackboard, Canvas, and others) or open source software that

is free to use (such as Moodle, Google Classroom). Commercial software systems are extremely powerful, but they come with exorbitant license fees that most academic institutions and universities cannot pay. Free open-source software, on the other hand, does not have such a hefty price tag. Moodle (Modular Object-Oriented Dynamic Learning Environment), that is extensively used in academic institutions and universities, is an example of a popular open source LMS. Moodle is a formidable rival to commercial LMSs, and it is often the first choice when a powerful, secure, and comprehensive e-learning system is required with no license fees [9]. Moodle is largely regarded as the world's most commonly used learning management system in both academic and business settings. It has 144,332,474 users from 228 different countries (Moodle, 2018). Moodle features a user-friendly interface that is updated and modified on a regular basis to meet the changing needs of its users. Moodle is also customizable to match the demands of its users, having been translated into over 120 languages (Moodle, 2018). Despite the growing popularity of Moodle as a learning management system, research has revealed that it has usability concerns from the perspective of its diverse users. "A quality attribute that evaluates how straightforward user interfaces are to use," according to Wikipedia. One of the most significant needs of LMSs is that it improves the efficacy of students' learning. Table 7 depicts the activities and modules of the Moodle platform.

ctivity	Module	Description
reation	Database	allows to build, display and search a bank of record entries about any topic [19]; allows to share a collection of data [15];
rganization	Lessons	represent a set of ordered topics summarizing the instructional materials [15] and allow the access to them through the respective link;
Delivery	Assignments	allow teachers to collect work from students [15]; allow teachers to evaluate the student's work and provide feedback including grades, in a private mode [19]; allow students to upload assignment files [15, 20];
	Workshops	represent a peer assessment activity with many options [19]; allow students to submit their work via an online text tool and attachments [19];
Communication	Chats	allow synchronous conversation [20];
	Forums	represent a communication tool where students and teachers can exchange ideas by posting comments [15, 19];
	News	represent a special forum for general announcements [19]; allow teachers to add posts and to send emails [19];
Collaboration	Glossary	allows creating and maintaining a list of definitions [19]; represents a mechanism for collaborative activities that can be restricted to entries made by the teacher [19];
	Wikis	allow users to edit collaborative Web pages [15]; provide space for collaborative work [15, 20];
Assessment	Choice	allows teachers to ask questions and specify multiple choice answers [19]; represents a useful mechanism to stimulate thinking about a topic [19];
	Quiz	allows teachers to design and build quizzes with a variety of questions, with different types of answers, such as multiple choice, true/false, short answer [15];
	Survey	allows teachers to gather feedback from students using prepackaged questionnaires [15, 19];
	Feedback	allows teachers to create surveys to collect feedback [19];
Reusability*	SCORM	represent specifications that enable interoperability, accessibility and reusability of the learning content [19]; represent tools that enable SCORM packages to be included in the course [15];
	External tools	enable interaction with compliant learning resources (eg. Learning Tools Interoperability) and activities on other Web sites [19]; provide access to new activities' types or materials [19];

Table 7. Usability features of the Moodle platform [10]

4.2 Google Classroom: Google Classroom is a fantastic resource for teachers and students looking for a solution to bridge the learning divide in our modern, geographically divided society. It's lightweight, easy to use, and absolutely free. Google Classroom is exceptionally useful in terms of understandability, attractiveness, and operability, according to the platform's usability review. While the site is useful for non-academic pursuits, it is especially useful for assignments and collaborative learning [11].

Following table 8,9 and 10 showing what google platform offering, benefits and features of Google Classroom

Google Classroom has:
• a grade book that will keep track of the student's assignments and grades • the option for guardians to receive emails showing their child's progress in the classroom • the ability for the teacher to assign and copy documents • a built-in Google Calendar and access to Google Drive • a comment bank to use when giving students feedback

Table 8 Google platform Offers

Benefits of Google Classroom
1. It's free! ...
2. Easy to set up in a few steps. ...
3. Recognized by many schools and organizations. ...
4. Already integrated with Google Drive and other tools. ...
5. Comes with Google's security. ...
6. Free training and learning opportunities. ...
7. Integrates with many 3rd party apps. ...
Includes "guardian" features for parents

Table 9 Benefits of Google Classroom

The Best Features of Google Classroom
•Assignments: Educators can create learning activities (assignments) using learning content like YouTube videos, Google Form surveys, or PDFs from the Drive. ...
•Customizable Grading System: Educators can select a grading system and create grade categories.

Table 10 Features of Google Classroom

Using the "Google collaborative platform" as an example, an aspect of On-learning environment development—"the collaborative learning platform," as well as "collaborative learning responsibility"—were established and given detailed in figure 2

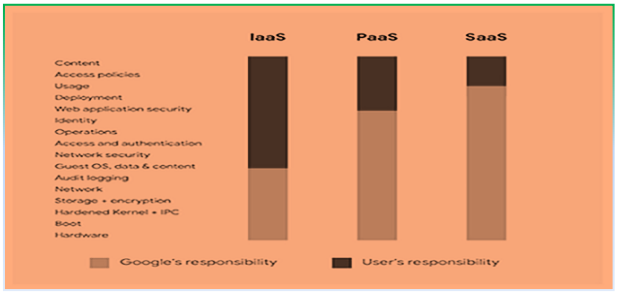

Fig.2 collaborative learning responsibility in Google Classroom [11]

4.3 Canvas:

Canvas LMS is a cloud-based learning management system (LMS) that is geared for K-12 and higher education institutions. Canvas LMS is a flexible learning management system (LMS) which could be deployed by academic institutions, from tiny classrooms to fully virtual or blended learning environments. The Canvas platform has everything you need for an online learning management system, such as standards-based grade books, customizable student assessments, course material creation, smart phone interaction, and more. This can be used in conjunction with a school's present SIS and different teaching resources. Furthermore, this App Center provides smartphone-friendly teaching tools that may enhance the platform's functionality. Educators may build courses and track participation with groups or individual students using over 200 distinct LTI tools. Canvas also has native iOS and Android mobile apps that allow instructors, learners, and parents to access essential data and facts, communicate and getting updates, and produce outcomes from anyplace at any time. Figure 3 shows how Canvas LMS provides complete, high-quality mobile learning experiences with these features.

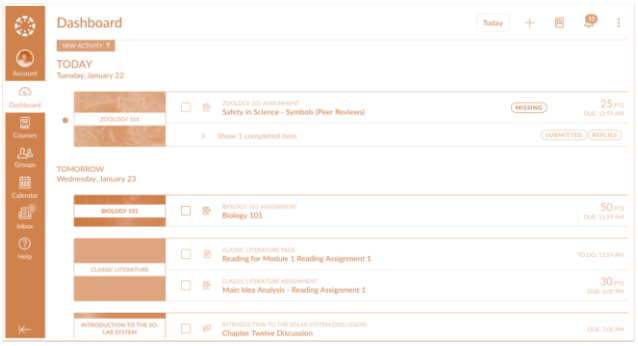

Fig.3 Canvas - Student Dashboard [16]

4.4 Kahoot!

Kahoot!, LMS enables institutions to enable games, communicate with learners via internet, automate distant learning processes, and manages class progress via related assessments. Professionals might introduce quizzes or puzzles to increase class participation by sharing reports with teachers or administrators. Kahoot! can be used by businesses to host live games with different options. Teachers can observe how many individuals or questions are present, as well as evaluate student performance and provide real-time reports to identify tough problems. In addition, higher education institutions can use video conferences to interact with students and view learning material in order to conduct exam smoothly. Kahoot! allows schools to poll students during games and adapt sessions based on their responses. The programme is offered for free as well as on a monthly or yearly subscription basis, with support provided through tutorial videos, live chat, documentation, and other online tools (see Figure 4).

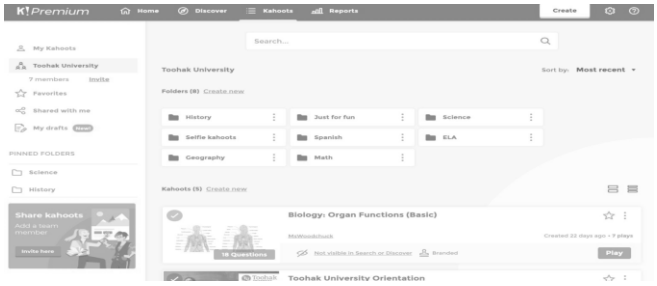

Fig.4 Kahoot! Sort games [16]

4.5 Adobe Captivate Prime:

Adobe Captivate Prime is a learning management system that allows you to create and track learning activities for your students. The features presented in Figure 5 include dynamically tasks, repeated certifications training, statistics and notifications, two functions, course equivalence possibilities, learning sessions, and a smartphone app with screen capture functionality. The Fluidic Player feature allows one for creation of an on-learning experience which is compatible with video, PDFs, DOCX, SCORM, and xAPI files. Users can use the Enroller tool. Learners can be assigned activities based on their specific skills, roles, and locations. Once prescribed courses and learning programmes are finished, the system automatically reassigns certifications. Reports, group assignments, email notifications, and reminders can all be automated. Schedule and reschedule classes, track attendance, collect student contributions, and more are all available to instructors.

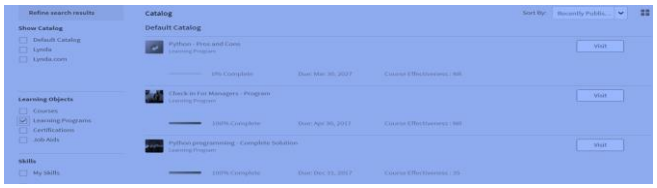

Fig.5 Adobe Captivate Prime - Learning programs [16]

4.6 Schoology:

Schoology, as seen in Figure 6, is a cloud-based lms that specializes in content management, course materials, including system-based sharing of resources and others. Users may establish their own website by uploading course material and assignments to the vendor's database. Content and lessons can then be created using flexible content creation tools and a rich text editor. HTML and CSS tools must in terms of visual presentation. Each student's profile can be accessed on the website to track their development. Workload levels are color-coded to indicate if any students are overburdened. Schoology's browser, native apps for iOS, Android, and Kindle devices allow students and instructors to interact and study from any location. Users may access only the tools they need, from district-wide notifications to communications with personalized roles and permissions. Some of the additional features include third-party software integration, audio and video recording, and extensive analysis and reporting. Educators at K-12 public and private schools, colleges, and universities throughout the world can

use Schoology for free. There is also an enterprise version, with pricing ranging depending on the implementation.

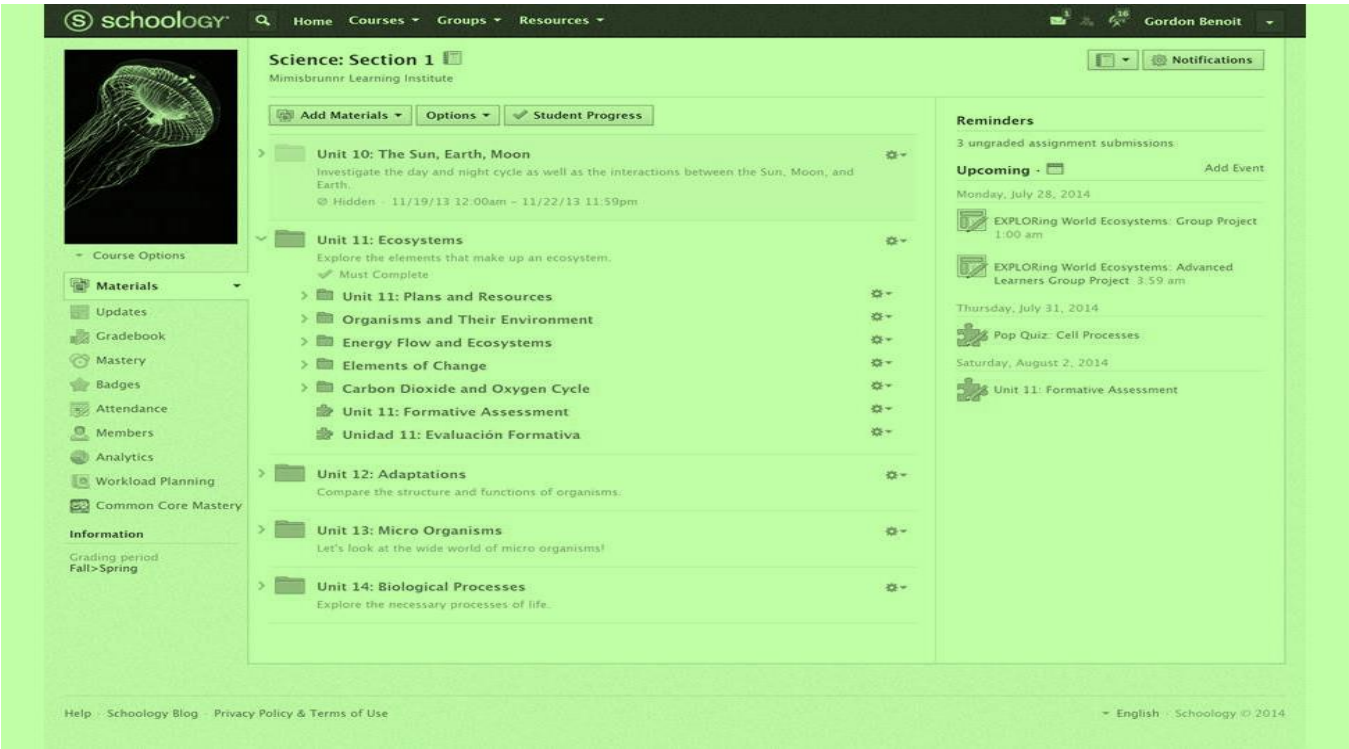

Fig.6 Schoology course materials [16]

4.7 Blackboard Collaborate:

Blackboard Collaborate is the interactive web-based learning tool mainly for K-12 schools, as well as higher education and government agencies. Blackboard Collaborate is web conferencing tool that makes it easier for professors and students to collaborate. It contains a classroom chatter feature that allows students to communicate textual, audiobased, and video content via a talking platform. The interactive whiteboard function shows PowerPoint slides so that numerous people can be engaged in a single presentation. Without launching PowerPoint, you may add or edit whiteboard content directly from Blackboard Collaborate [16].

4.8 Articulate 360:

It's a cloud-based tool that allows institutions to build and distribute video-integrating web learning courses that are collaborative. Users can create their own project template files and save them in a common repository for future use. [16].

4.9 TalentLMS: This LMS is built for training success. Its Admin Dashboard is presented in figure 7.

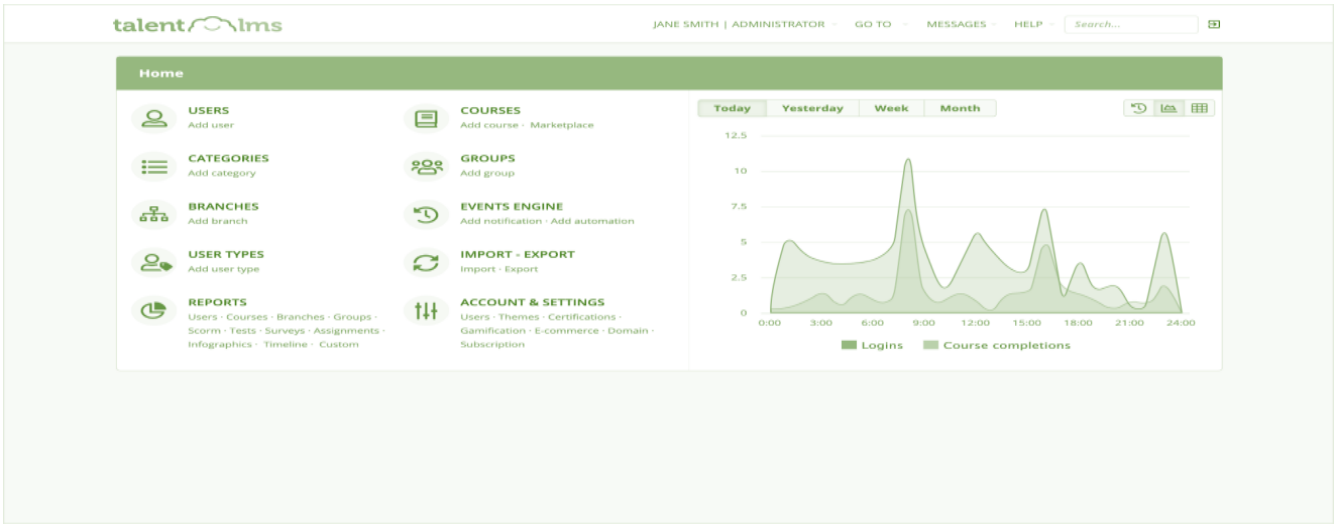

Fig.7 TalentLMS Admin Dashboard [16]

5 Result

In the current context, the usability of many LMSs has suggested that cloud-based LMS is becoming the most helpful and updated technology, aggregating the entire e-industry internationally. It is promoting fresh innovation in the current technology-based sector. It is becoming one of the most essential strategies in pandemic, particularly in the online learning industry. However, things are quite complicated with a traditional or established web-based e-learning system because of the investment cost, maintenance, software updates, expertise, profitability, and so on. As a result, cloud-based LMS is becoming a more important modality of online learning in the worldwide educational system. Users of cloud-based LMS systems are free of responsibilities like as:

A. Installations
B. Managing
C. Infrastructure
D. Startup cost factor
E. Customization/user friendly
F. Security such as **Users & Data Access, security mediums like TLS/SSL, Network, Lost of Data recovery, Data handling authorization** etc. [17].

The provider or vendor will take care of everything. Students and teachers can easily access their required subject materials via the internet using their own devices such as smart phones, laptops, and desktop computers.

6 Conclusion and Way Forward

In this case, when online education is the only method to keep the entire school system running while the Covid -19 pandemic continues to spread over the globe, it is critical to have sufficient security measures in place to ensure safe log-in and access to the online medium. To acquire an updated e-learning paradigm, the worldwide education industry is heavily relying on cloud-based LMS systems. Pupils are now using their smart phones to access cloud-based education platforms anytime they want through the internet in today's society, when information technology is at an all-time high. As a result, future study should focus on the security and privacy policies of cloud-based LMS models, as well as their optimal use.

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A Systematic Study on Impact of COVID 19 Pandemic upon Students' Mental Health

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Abstract
COVID 19 has changed the scenario of the whole world. This pandemic has affected the whole world, irrespective of ages, gender or geographical location. Uncertainty about career, financial crisis, health related worries or social distancing- those factors have created a great impact on people's minds. Like all the other sectors, academic sectors have also been influenced by this pandemic, causing an impact on the mental health of the students. According to WHO, around 13% of the world population has been affected by mental health disorders within 2021. We have performed a systematic study over the state of child- psychology and we have selected around 50 peer reviewed journal and conference papers with high impact factor and citation indexing. NCBI, PubMed, Mayoclinic, Web of Science, Elsevier , Scopus these are some popular databases we have selected for our study.

Keywords
Covid-19,Depression, mental health, Stress

INTRODUCTION

COVID 19 has changed the living style and other behavioral aspects of human beings. For maintaining social distance and protection against the super spreading disease, people have to be stuck in their home. Almost all the segments have to suffer due to the impact of COVID pandemic. According to a report by the World Bank[1], almost 93% of countries have been compelled to postpone or halt their mental service due to Covid pandemic and according to that report, most of the people face this issue within 14 years of age[1].

There are different types of mental health challenges faced by students: some major problems are: Anxiety, eating disorder, depression or any kind of addiction [3].
Recently it has been observed that students are very much addicted towards social media or gaming applications.

To give a clear idea about different mental health challenges faced by students, especially during online education mode, we shall discuss different mental health issues in our next segment.

1.1. Different mental health related issue

Mental health is one of the burning issues faced by the world today. According to WHO report , due to the world wide Covid pandemic in 2019- 2020, the total target in investment on mental health has become a shortfall.[4]. Though the promotion or the overall workforce has been increased, proper implementation was inhibited due to covid scenario or to some extent lack of planning. Today's generation is suffering from several mental health disorders like depression, anxiety, addiction issues or eating disorders. Even the suicidal tendencies among the students are being increased.

- **Symptoms of students having depression**

Depression may be defined as mood disorder but unlike normal mood swing it has a long term effect. Physically it can be observed by sleeping disorder or eating disorders or from lack of interest in doing work. There are certain symptoms of depression among students, such as low self esteem, irritability, sudden anger, thought of escaping from life, crying tendencies etc.[5].

Symptoms of students having anxiety
;L,M

Anxiety becomes a barrier to the way of opportunity among students. The National Institute of Mental Health reports that approximately that 25% of people between 13-18 years face an anxiety issue. Students have to face emotional changes, social changes. They face uneasiness. Students can face anxiety related to social changes,ragging or test related anxiety or even they can face panic attacks.

Along with depression or anxiety, students also face addiction related disorders.

2 Literature Survey

Scientists are working on students' mental health analysis and during covid situations, this has been one prime focus area. In the below table, the studies have been noted where they have been categorized based upon the approach of sample collection for the analysis- whether they are questioners or survey or interview based.

Table 1: Students' mental health analysis based upon approach of research Data collection

Based Upon	Referenc e	Algorit hm Used	Key finding s/Resul t	Sam ple Size
Online Survey	Lischer, S., Safi, N., & Dickson, C. (2021) [12]		1.They perfor med ANOV A analysi s 2. They used open ended questio n for their survey, someti me leads	5200 studen ts across 5 school s of univer sities

5.	Lischer, S., Safi, N., & Dickson, C	Univaria te(ANO VA)	Anxiet y scaled as normal, mild, modera te,sever e.Majo rity have a mild anxiety symbol having 63.3%	557 UG studen ts

The above table shows various approaches to collect information to analyze students' mental health conditions during Covid pandemic. From our study, it has been observed that covid and moreover the changed situation has created a mixed impact on students' mind and from their lack of sleep or physical workout routine the conclusion can be drawn.

3 Methodology and Search Criteria

The main purpose of our study is to focus on a specific research goal. Based on our goal we have developed the following research questions:

1. How the Covid 19 pandemic impacted the students mentally?
2. Are the students stressed due to pandemic?
3. What is the impact on students' mental health status of covid pandemic and shutdown of school and colleges?

Focusing on the following questions, we have performed a meta analysis and systematic review of existing literature.

3.1. Search Criteria and Article Selection

The present article is a systematic review of existing literature on mental health analysis of students during Covid pandemic. A search on scopus, Web of science and PubMed database have been made using keywords like "Mental Health", "Covid pandemic", "depression","anxiety", "psychology", "covid-19" etc. After initial screening of 30 articles following the above method, 16 articles have been excluded - 5 of
them were rejected because they were in other languages rather than English. Rest 11 was covering other aspects of students like drug abuse, relationship issues or public health prevention etc.

3.2. Systematic Analysis of the work

We have worked with different databases like PubMed, NCBI or Lancet etc. Initially when searched in Google search engine using the keywords related to mental health. After initial screening, we have shortlisted 20 papers, excluding other papers on the basis of language or subject relevance or timeline of the papers. With these 20 papers, we have made qualitative analysis of 16 papers and systematic meta analysis of 4 papers.

The below diagram shows a prisma study on the systematic review we have performed on the available literatures.

From the above diagram, it can be illustrated how we have selected the path of our study. The prism study helps to understand the search strategy and selection criteria diagrammatically.

4. Conclusion and Future Scope

From the above study, we can reach to a conclusion that Covid-19 has created a massive impact upon the school going or college going students' mind and to some extent has impacted their mental health. Due to the pandemic situation, they have to confine themselves and studies are online, which is quite a new scenario to the students. There is an overall mixed impact upon students about this new changed dimension of the education and they are trying to cope up with this new normal.

In future, a primary data analysis will be performed to understand the overall trend among school and college going youngstars with deep learning algorithms.

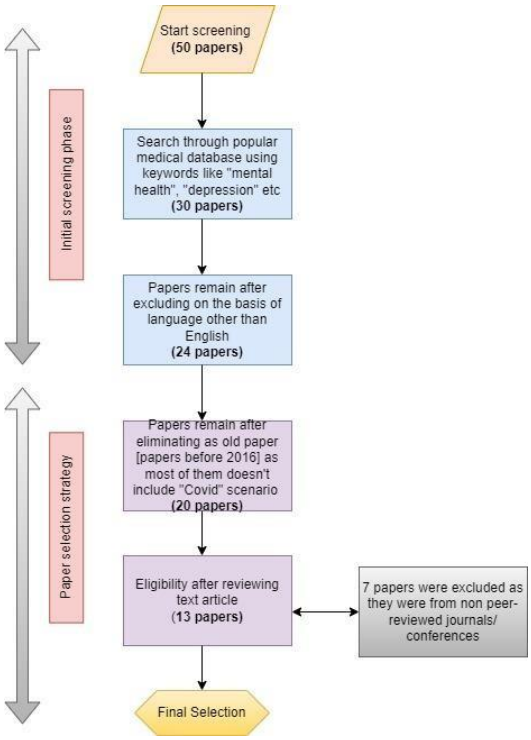

Figure 1: Prisma Study based on search strategy and selection criteria

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Enhancing The Grader: An Overview of Shortcomings Encountered In The Online Short Answer Graders

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Abstract
Reliably informative foundations lead various evaluations, which consolidate institutional and non-institutional relentless tests. As of now online tests and evaluations are turning out to be notable to decrease the heaviness of the appraisal cycle. The web-based tests consolidate either practical or choice-based inquiries. In this interaction, unique based inquiries and answers are not involved in light of the multifaceted nature and capability of the appraisal cycle. Therefore, the programming applications used to check dynamic reactions may be more useful for apportioning engravings to the customer right after really looking at the arrangements with an online appraisal. This kind of instrument/application/system should have a lot of resource informational index, including questions, relating answers. Besides, it ought to likewise have the engravings assigned to the contrasting answers. Simultaneously structure likewise need to check the reactions given by the customers by actually looking at the configuration of replies. As a postponed outcome of this man-made reasoning-based response verifier, the evaluator's time and energy can be coordinated, with additionally created work proficiency. In the future, this system can be enhanced by adding more features like NLP, Automated voice answering systems, Online Feedback Systems, Psychometric Analysis, and many more, which will be useful in the industry and education system.

Keywords
Answer grader; Machine Learning; Similarity check; Subjective grader; Online Evaluation

INTRODUCTION

In the present reality, Online Examinations have emerged as a significant gadget to review the responses of customers. For web set together tests depend with deference on veritable requests and tests are getting digitized starting with one side of the planet then onto the next. In the current situation, test questions can even be set up on excited responses. The standard tests commonly contained hypothetical responses, which were not the most ideal strategy for looking over the student's impression of the subject. Since from time to time, inspectors get exhausted by genuinely looking at different reaction sheets, and there might be increase in the fake evaluation.

Along these lines, the Artificial Intelligence-based Answer Verifier is relied upon to grade the student after he/she has tried the inquiry paper. Regardless, the construction diminishes the commitment of the examiner through robotizing the manual truly taking a gander at process. An adjusted excited request's venturing is a fundamental headway in the affiliation test framework. To manage this issue, Artificial Intelligence (AI) based Answer Verifier (AV) is relied upon to examine like an evaluating educator and think while checking questions whose answers can be established on sensations of the student.

In different establishments, the outcomes are reported later time since instructors consume a tremendous piece of the day to assess the excited papers. As a heap of replies, booklets should be assessed and every booklet might contain the response in a specific way, which requires a more widened length. Subsequently, presently, an AI-based Answer Verifier can come into work , considering the closeness hypothesis of

padded calculating. It does the altered scoring of exceptional solicitations through unequivocal reference respects. In the evaluation association, a choice based scoring calculation is perceived as a fruitful one. The construction subject to the AI will save time and exertion of reporter.

The electronic examination makes an enchanting working environment by giving quicker access. The current design decides the score subject to a few cutoff points like articulations, or reciprocals. In the "Phony Insight based Answer Verifier", it enlists the score of the student by consolidating different cutoff points, similar to articulations, question unequivocal things nearby the genuine language, which in expressing gives a more exact score. The man-made reasoning set up method will keep concerning making.

Manual response evaluation is an incredibly bleak undertaking. The manual checking is incredibly dull correspondence, and it requires package of manual work. Besides, the paper checker can't give stamps.

Our construction will similarly assess answer subject to some articulation and therefore work will be saved. One prerequisite to assess the paper then the framework will part the response utilizing OCR. At the point when watchword is found in the response then the construction will give the etchings to the solicitation as indicated by the dataset present. There is a need for such application which will offer fundamental assessment of response and can give qualified

inscriptions. In like way, this application will help different schools, school, and planning relationship to study the response shockingly quick with less work.

Checking answers requires high fixation for the titanic extent of time which consistently prompts messes up. The computerization of this errand will develop the effectiveness of answer assessment for an immense expansion. It was seen that answer sheet is reviewed remembering explicit watchwords that center people examine the reaction while evaluating a reaction. Our proposed computation will require watchwords as information sources. These watchwords will be given by these item ace. Our proposed computation will coordinate these watchwords with recognized words that are eliminated from the response sheet using managed learning estimation. Learning time of the model will require physically composed dataset for English language letters all together. These datasets are available online in various arrangements to be used to set up the model.

Online Assessment is uncommonly valuable to customers. The mark of this endeavor is to give quick, brief and basic way to appear to be the test. It can give unprecedented advantages to the understudies/competitors that can't be tracked down somewhere else through associations with workplaces/sheets that are coordinating the distinctive choice sort assessment. Understudies' licenses enrolling for the test and teacher grants enrolling for coordinating the test. This will continue to create finally giving a complete extensiveness of organizations for helpful to the understudies. Tests can be made on a sporadic reason for each understudy. The web-based appraisal structure can thus add the engravings assigned in each question to choose the outright engraving for the test. The web-based appraisal system confines the occasions an understudy can form a test. Understudies can be constrained to go through each request once, before leaving the test. Understudies can be allowed to leave the test in the wake of completing every one of the inquiries. The goal is to check, and stamp formed reactions like a person. This programming application is utilized to definitely investigate passionate reactions on the web evaluation and assign engravings to the customer resulting to affirming the answer. The structure anticipates that you should store the principal reaction for the framework. When the customer enters his/her reactions the structure then, at that point, takes a gander at this answer for one of a kind reaction written in data base and administers checks moreover. Both the reactions ought not be same word to word. System decreases the obligation of Inspectors by means of robotizing the manual cycle.

The necessity for online evaluation mixed mainly to endure the drawbacks of the current system. The essential mark of the venture is to ensure simple to utilize and more wise programming to the customer. The online evaluation brings a straightforward interesting working environment, more prominent clarity in acquainting capable information with the customer and besides it gives speedier access and recuperation of information from the informational collection.

The structure registers the score and gives results immediately. It wipes out human goofs that typically occur during manual checking. The system gives an unprejudiced outcome. Along these lines the system bars human undertakings and saves time and assets.

Suggesting that the standard pen-paper based tests are supplanted by electronic tests that have demonstrated to be both:

a. more unsurprising in administering marks and
b. faster than teachers evaluating papers

The standard test included enthusiastic reactions, which were not the best method of assessing the understudy's perspective regarding the matter. Since evaluators get depleted by really researching different reaction sheets, and there might be an expansion in the farce examination. Here, the Man-made scholarly ability based Response Verifier is relied upon to grade the student after he/she has given the responses. The framework lessens the commitment through mechanizing the manual really looking at process also. A changed hypothetical request's checking is a crucial improvement in the affiliation test framework. To determine this issue, Computerized reasoning (repeated knowledge) based Response Verifier (AV) is relied upon to explore like an evaluating educator and think while concentrating on hypothetical requests . In different establishments, the outcomes are enunciated afterword since educators consume most of the day to assess the energetic papers. Notwithstanding, the greater part of the assessments are sensible. These frameworks or some other such construction are more useful to the degree saving assets regardless, neglected to join energetic solicitations . This paper attempted to review the illustrative response. The evaluation is done through graphical relationship with a standard response. An enthusiastic response verifier was proposed by assigning the inscriptions as indicated by the level of exactness present in the solution for various clients furnishing three noteworthy responses. The framework ought to have an information base that merges questions, differentiating reactions and the etchings assigned with the taking a gander at replies. Meanwhile structure needs to assert the responses presented by the clients by checking the game plan reactions and the responses given by the client. Notwithstanding, Man-made reasoning is relied upon to perceive the center piece of the responses while controlling imprints. The design utilized a section to-talk tagger to see the client replies. The responses were completely arranged ward on the watchword likenesses to heuristic assessments. The application accomplished 70% effectiveness as it couldn't think about numerical conditions, brief portrayal, models and issues with the unmistakable affirmation of verbalization headway.

I. Literature Survey

Affiliations/illuminating affiliations dependably rely on the surveying framework through assessments. Regardless, a tremendous piece of the assessments is reasonable. These constructions or some other such framework are more useful to the degree saving assets notwithstanding, neglected to combine novel solicitations. This paper attempted to assess the indisputable response. The evaluation is done through graphical appraisal with a standard response.

A hypothetical response verifier was proposed [2] by distributing the etchings as shown by the level of accuracy present in the response for various clients offering three exceptional responses. The framework ought to have an information base that solidifies questions, relating answers and the etchings directed to the checking out replies. Meanwhile framework needs to avow the responses presented by the clients by checking the association reactions and the responses given by the client. Notwithstanding, Artificial Intelligence is an essentially required part while appointing engravings to responses. The construction utilized a section to-talk tagger to see the client replies. The responses were basically situated ward on the expression comparable qualities to heuristic assessments. The application accomplished 70% ampleness as it couldn't ponder numerical plans, brief depiction, models and issues with the ID of explanation improvement. One more framework [8] was normal for isolating the hypothetical reactions utilizing comfortable thinking states. The framework missed attesting the language structure in the sentence and execution examination. Work was done on a comparable ground [3], which gave the game plan subject to 1:1 string matching from the client replies to the educational file responses. This sort of framework is valuable to begin in any case not game plan a convincing response checks. An equivalent framework is proposed [1] to add a language structure verifier. This design was much charming with the conversations made, however no hints of execution and insistence of framework convenience.

By considering the works done in the prior years, can show up at the time being an end that misleadingly based response verifiers are appropriate to depict for the energetic responses. Furthermore, in the majority of the works, just 1:1 articulation getting sorted out was done and failed to see the reciprocals words present in the responses. Thus, thought about readiness and empowering an Artificial Intelligence-based response verifier to ordinarily achieve made by evaluator for fair and theoretical sort responses with the standard response can be dealt with in the information base [8, 3] with depictions and articulations. Here the Man-made understanding can assess each reply by organizing the watchwords or its equivalent words with the standard response. The design can in addition be relied upon to check the sentence course of action through Grammarly instruments and evaluate more weightage for researching the response. The man-made reasoning based response verifier can assess the reactions tolerating each of the assertions are fulfilled.

Sheeba Praveen, Distributed in Worldwide Diary of Creative Exploration in PC and Correspondence Designing. Vol. 2, Issue 11, November 2014. As seen that these frameworks contain just unique decision requests other than there was no course of action to relax these constructions to process demands. The paper presents a technique for dealing with the level of learning of the student/student, by looking over their unquestionable test answer sheets. By keeping an eye on the undeniable response as framework and separating it and standard response are the essential stages in our strategy. Fundamental weakness of the framework will be Non Numerical subjects as it was. Less feasibility in closeness arranging. Different sentence answers are difficult to grade. There are various events of padded string coordinating then again string closeness calculations being utilized in client organization conditions for eliminating proper data.

[1] proposed a robotized naming construction for bug trackers what's more client organization. They portray their terrible neural association game-plan, where the message is tokenized into vectors of words and sentences. The paper [2] portrays utilizing a Characteristic Language Handling (NLP) based instrument for a watchword extraction. It moreover decides use of the Levenshtein distance for word putting together, yet the review rotates around the improvement of the AI (ML) tagger with a Twitter model utilizing past client care facilitated endeavors.

Paper [4] utilizes word and character embeddings with neural models. They examine indisputable interacting strategies with the padded string arranging, which works out the Levenshtein Distance between their solicitations utilizing support tickets. Notwithstanding including approaches for string closeness, there has been essentially no current work separating string closeness system or their plan limits when utilized in client help computerization. String gathering structures has been considered to name what's more handle an assortment of text strings. Going before any string appraisal one necessities to pick the text to keni sation. A line of text can be separated into things, similar to words, articulations, letters, and so forth Things can be utilized to make n-grams. A ton of all strings of a number length n, in a limited letter set Σ is suggested by Σn. An n-gram (now and again called a shingle or a q-gram) considering letters is essentially an any string from Σn [5]. In the end, a strategy of n-grams is delivered utilizing a text of interest (see Tab. I for models). Exactly when strings are separated into substrings, the evaluation of their similarity is conceivable. Presumably, there exist an opening in the forming that we truly need to fill. This paper rushes to look at execution of changed string resemblance assessments for an articulation extraction utilizing test strings tokenized into characters.

Cushioned string matching contemplates close, presently not all around, matching strings to be taken a gander at and taken out from social events of message. As essential, they are basic in structures which in this way concentrate and affiliation reports. We summarize and consider grouped existing appraisals for achieving string likeness measures: Longest Typical Eventual outcome (LCS), Dice coefficient, Cosine Resemblance, Levenshtein distance and Damerau distance. Considering really amassed customer help enquiries (tickets), we considered the sufficiency of different estimations and plans to normally see watchwords of premium, (for instance, wreck phrases, thing names and reprimanding messages) in conditions where such key articulations are mistakenly spelled, imitated incorrectly or are by and large verifiably molded. An ideal computation confirmation is made ward on adroit evaluations of the actually alluded to similarity measures on text strings tokenized into characters. Such assessment in like manner saw as an ideal closeness edge to be seen for various plans of enquiries, to reduce perplexed strings while allowing optimal joining of the precisely combined key articulations. This induced a 15% improvement in the level of phony up-sides of

really specific portrayals over the current technique used by a customer care structure. The Advanced Web, which is engaged by enormous data reasonable developments, passed on dealing with, sorting out developments and seeing, has been getting an immense heap of thought in the cutting edge part considering its actual limit with regards to eminent and more achievable present-day signs.

Joined by the meet of amazing contraptions and sharp plans with information progressions, the Cutting-edge Web will work on the ability to help data through the absolute current creation process [2]. The consolidating of different fields and progressions opens up beast significant opportunities to use data compromise and assessment, as such the data resources in the site could be made the most of and utilized totally. Present day field data use frameworks are coordinated and used to respond to needs for the above [3, 4], which uses various estimations including standard part examination and cushioned gathering, and joins authentic procedures, data mining and man-made cognizance.

Plan assembling, which gives an employable movement of Data Disclosure, offers a useful perspective to handle an issue by reviewing a previous near situation

other than reusing information and supportive model. Various investigators had focused in on the utilization of model readiness, especially in Expert or data based system and Case-based reasoning (CBR) [5, 6]. A case-based decision help system used cushy techniques was presented, which expects to work with experience reuse and decision explanation by recuperating previous case [7].

A mutt closeness measure system with five relationship of huge worth credits was proposed, which achieves game plan matching by conglomerating brand name equivalent attributes using direct added substance weighting strategy [8]. Configuration matching advancement subject to incorporate certification was comfortable and applied with the endeavor of adenocarcinoma in [9]. A coal and gas sway dynamic figure framework coexisted with PCA and CBR was proposed. PCA was used in loads circulating for case recuperation and matching to additionally develop the recuperation support and assumption precision [10]. A flavor model matching method was presented by introducing decline framework in merge decision and pack appraisal if association, so the mystery case base can be detached into a couple of little subsets with moderate plan [11]. Regardless, customary model readiness computation is obligated to manage's experiences, especially toward the early phases, similar to part decision and case affiliation.

With the quick development of Current Web and massive data, enormous expansion case base is turning out to be more normal. Nonetheless, a colossal case base may deal with the prospect of the issue locale, it additionally makes several issues of recuperation capability.

In this outline, a multi-moderate construction case-based straightening out framework is proposed with additionally made FCM estimation. The instatement of FCM appraisal is invigorated by PCA model which executes perspective decreasing on explicit case base. Additionally, the resemblance examination is changed by introducing the piles of isolated rule parts. In the critical matching stage, the sort of test is obtained by matching the focal signs of the sensitive gathering. Normally, the general contemplations have extra limited ways from one arrangement to Different ontologies are being utilized to find the likeness of text utilizing the information outline based way of thinking. WordNet is a huge lexical educational file of English language overall used for finding the equivalence of texts. It packs Things, activity words, modifiers, and intensifiers into sets of insightful equivalents, which is called synsets. Synsets two or three relations among these similar word sets or their kin. WordNet is a blend of word reference and thesaurus. These synsets are coordinated into an organized development gathering a semantic organization in which semantic relations between synsets can be extricated without any problem. WordNet like word references is open for other well known vernaculars as well.

Ganggao Zhu, et al. [12] This paper proposes a strategy named wpath for joining information based and corpus-based semantic closeness moves close. Normal corpus-based information content is taken care of from the considerations over scholarly corpus, which requires

high computational cost. Since the cases are now wiped out from printed corpus and commented on by contemplations in information chart based IC, the wpath semantic closeness method shows significant improvement over other semantic similitude procedures. The wpath strategy besides shows magnificent execution in a real class classification assessment to the degree of exactness and Fscore.

Hai Jin, et al. [13] This paper presents ComQA - a three-stage data based solicitation answer structure by which customers can propose to ice breakers and find plans. In ComQA, a request is separated into a few triple models. accordingly, it recuperates contender sub graphs matching the triple models from the data base and reviews the semantic similarity between the sub outlines and the triple advisers for find the response. It is a critical issue to assess the semantic likeness between the solicitation and the heterogeneous subgraph containing the response. Several testing over a development of QALD challenges confirm that the acquaintance of ComQA is second with none with other top level methodologies in stating of precision, review, and F1-score.

Nilima Sandip Gite [14] In this paper, an association-based technique is being embraced for in regards to the response books. Promising new kids in town's charming responses are separated and a specific standard drawing as needs be saved on the server machine. The philosophy is on a very basic level set up on text mining method which incorporates watchword matching in much the same way as movement organizing. WordNet is being utilized for the articulation organizing.

Riya Goswami, et al. [5] This paper proposes a way of thinking to realistic response book evaluation utilizing lexical and semantic similarity systems. The objective of this construction was to evaluate expressive response books normally and lessen the time and exertion needed for the valuation. Different tests show that the construction can give moderate accuracy while differentiating and the human valuation. In the going with stage, the Semantic likeness approach is utilized with the WordNet word reference for the response book assessment and acquired precise outcomes than the past one.

Marek Kubis [16] This paper presents one more design for dealing with the semantic closeness of words and thoughts using WordNet-like enlightening lists. The imperative benefit of the proposed approach is the capacity to do closeness measures as more modest articulations in the inserted request language. The system was gotten to show the semantic proportionality of things got from Clean wordnets. Approaching outcomes are gotten for this model in the testing structure. Producers are expecting to expand the system with extra activities and to cover the substance of Pol Net even more broadly as their future work. The middle explanation of using PCs to additionally form our knowledge into text-based components has for a long while been accepted to be an award in unraveling created language.

In her investigation, Marti. A. Hearst [17] made an endeavor called the Essay Grader, where she used different direct backslide to find the best mix of weighted features. This system was precarious and experienced different difficulties. She thusly changed her work to making Latent Semantic Analysis, a methodology for assessing more straightforward measurements of composing quality (LSA).

Anna Filighera [18] focus on the adaptability of the system against cheating as broad badly arranged trigger use explicitly. These are brief representative groupings that can be added to students' test responses to help their thus given out mark misleadingly. They uncovered triggers that allowed students to float through tests with passing constraints of half without reacting to a single request fittingly. Finally, they proposed a system for focusing in the assault on flipping tests from a given source class to a particular objective class.

Alzantot et al. [19] composed GA, a nonexclusive computation based philosophy that produces poorly arranged models that are semantically and linguistically basically indistinguishable. They similarly use a language model (LM) to disallow impending substitute terms that aren't fitting for the situation. Finally, they explore a besieged undertaking at using badly arranged getting ready as a watchman, highlighting the strength and assortment of their poorly arranged models.

Burrows [20] in his investigation expected to give a bound together overview of ASAG systems, taking into account their arrangement of encounters and techniques. Their chronicled focus on recognizes 35 ASAG structures that fall into five common subjects, all of which tends to a phase forward in method or evaluation. Their part examination, of course, dissects six typical angles, from pre-dealing with to ampleness. The most exceptional example in ASAG research is a time of appraisal, which is preparing for the field's hardening, according to one critical end.

Maybe the best representation of Automated Essay Grading was the TOEFL test (AEG). Siddhartha Ghosh [21] presented an AEG system, which achieved significant advances in Indian Text Categorization and Machine Learning research

Independent Bayesian Classifiers license you to give probabilities to files considering the way that they are so at risk to have a spot with explicit classes. The decisive analysis was made using a lot of devices that recognized the paper's disclosure structure, perceived negative elaborate points of view, and surveyed and gave comments on language, use, and mechanical issues. Psychometric Analysis was furthermore a target of the suggested framework. Basu [22] familiarizes one more system with machine helped short reaction looking into. He explains that when the assessing resources are limited, the power auditing strategy of disengaging and defeating the short response assessing errand can impressively reduce the amount of activities fundamental; on the other hand, it can exceptionally grow the effect of not many customer exercises. It grants teachers to perceive ordinary techniques for confusion among their students and give quick and dirty contribution to social events of students with near erroneous reactions. Finally, it was seen that this technique capacities splendidly when a reaction key wasn't free.Anyway unique choice inquiries (MCQs) have been the most notable system of assessment since numerous years, they have requirements. MCQs are generally used by and large for investigating solace, yet while their summative worth is self-evident, their formative worth is questionable (Davies, 2002). Plus, taking note of a MCQ requires the affirmation of the right answer(s), which is seen to be a more straightforward endeavor than tending to the request (Laufer and Goldstein, 2004). Articles are another kind of appraisal that has been demonstrated to be accessible to customized assessing (Burstein et al., 2004), though the assessing isn't useful because it doesn't give input with respect to the introduction of the paper.

Disregarding their sweeping accomplishment in a variety of employments, neural associations have been exhibited to be obligated to not well arranged pesters (minor changes in the data) that make them give wrong results. Melika Behjati [23] proposed an astute strategy for making general badly arranged aggravations for the text considering tendency projection; that is, a gathering of words that may be familiar with any commitment to misdirect the classifier with a high probability.

Eric Wallace [24] proposed a human-on top of it badly arranged age, which is a strategy wherein human columnists are coordinated to break models. Through an instinctive UI, we help the columnists in unraveling model assumptions. This creating framework is applied to a request reacting to game called Quizbowl, in which irregular information fans make badly arranged requests. The created questions are supported by live human-PC matches, which show that while the requests appear simple to individuals, they dependably puzzle neural and information recuperation models. The badly arranged requests uncover open inconveniences in overwhelming request tending to, going from multi-bob thinking to substance type distractors.

Akhtar [25] reviews the work that make not well arranged attacks, dissect whether they exist, and give countermeasures against them. They overview the responsibilities that evaluate hostile assaults in authentic conditions solely to underline those not well arranged attacks are possible in practical conditions. Finally, they present a general framework of this assessment bearing taking into account the reviewed composition. P. Selvi [26] proposed a technique considering an original strategy got together with torpid semantic examination. The inventive procedure perceives composite and unrefined characteristics, while the LSA module works out the amount of words right after stemming. Mixing the two procedures further creates viability and

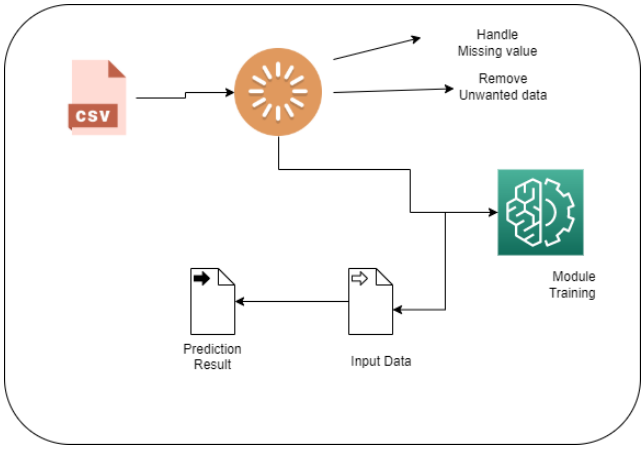
displays that joining a couple of computations is a down to earth way for looking over a student's reaction. Michael Mohler [27] devised an appraisal system and a similarity model that endeavors to chip away at the assessing of new kid on the block answers. The essential objective of the structure is to construct a dependence graph that normally selects a score for the student answer from the related center points. A mix of lexical, syntactic, and semantic components is used to enlist individual heaps of the investigator and new kid in town answer. Nicholas Carlini and David Wagner [28] in their paper contemplate ten assorted area systems and perform assessment over them. They then, make inductions as to the possibility of the space of badly arranged models and the ability to remember them with different strategies. They close by communicating that the procedures couldn't actually bear a white box attack. The huge diminish their investigation were: existing assurances need sweeping security assessments, and badly arranged models are obviously harder to recognize that as of late perceived.

II. DISCUSSION

In the existing system, the answer checker is a feature available. The system implemented is based on a supervised machine learning approach. Therefore, the system's accuracy wasn't as expected compared to our proposed approach. Hence our approach towards this would be to implement a system with a neural network approach which will give more accuracy than the existing system. The aim of our model would be to deliver and provide a platform to educational institutions, that will help them in enhancing their teaching methods and grading systems.

III. Proposed Method

System Design and Implementation



Working Principle:

A while later, the proposed arrangement will be carried out with all fundamental info and result boundaries.

Then, at that point, the execution will go through an intensive presentation investigation and itemized examination with the current models. We will prepare a module on a dataset of Q & A. Initially, we make an engineered dataset.

Then, at that point, preprocessing of dataset to deal with missing worth and undesirable information. Information preprocessing is fundamental in any data mining process as they clearly the accomplishment speed of the undertaking. Data should be muddled in the event that it is missing quality, attribute regards, contain upheaval or exemptions and duplicate or wrong data. Presence of any of these will corrupt the nature of the results

Subsequent to preparing on the module, we will test our module exactness.

We will isolate our dataset into two sections.

1. Preparing Data.
2. Testing information.

In this way, we will isolate the dataset into 70% preparation and 30 percent for testing.

We use the planning data to fit the model and testing data to test it. The models created are to expect the results indistinctly named as the test set. As you raised, the dataset is segregated into a train and test set to truly check out the precision, precisions by means of planning and testing it on it. In our framework, we first gather the dataset of inquiries and replies from the Kaggle site.

The information model here proposed would comprise of a Question dataset and an Answer dataset. These datasets would be tried for different boundaries. Then, at that point, we will preprocess information to deal with missing qualities in the dataset. We additionally eliminate undesirable information from the dataset and cycle just the required dataset. In the following stage, we will carry out the calculation to prepare our framework model in light of the dataset. The response model will chip away at approving the dataset subsequent to applying the most fitting calculations. In the wake of preparing the model client will pass replies as a contribution to a preparation model. A prepared model will anticipate the result. The examination gave from the model would be utilized for foreseeing a few results and framing a few significant experiences. The effectiveness of the model is minded the premise of F1 score, accuracy, and review upsides of the model.

IV. FUTURE SCOPE

In this system, we will be planning to add an automated voice answering feature using the NLP approach. Currently, the system is working with short textual forms of answers and in the future, our aim would be to grade all types of answers including numerical-based questions and figures. The work with the voice answering system can prove to be useful in various interviews exams and education fields. Also, the grader can be trained to support multilingualism. To increase the graders' efficiency would be our primary aim. To end with, this paper talks about a brief idea of an automated grader functioning system. We would love to have anyone contribute towards this approach with their own ideas; so that this theoretical approach could be implemented successfully.

V. Conclusion

Unlike typical ML tasks, where improving validity on a single reference point is a meaningful and intriguing outcome within itself, safe ML requires more. We should investigate how an intruder would react to any proposed security and assess if the security is still effective against such an adversary who understands how it operates.
The proposed work is strong due to the response reaction being checked by the AI structure. The framework was prepared on a dataset of Q&A. The system similarly has scope for future enhancements. Subsequently, any language checking can be changed on the standard essentials Machine learning strategy to get more exactness. The aim would be to form the basis of a full functioning system that could grade short answers..

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Examination of Heat Transfer and Pressure Drop Characteristic of Different Fins Geometry

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Abstract
Calculation contemplates did by utilizing different blade math (rectangular, three-sided, roundabout shapes).with consistent on heat move and pressing factor Variation. Generally used to upgrade heat exchanger's exhibition. The trial and mathematical investigates of blades calculation rectangular, three-sided and roundabout and its application were survey in the current paper. The qualities of warmth move and frictional pressing factor variety of blades with various calculations and working liquid were examine along with two stage stream (water, air) and single stage stream (refrigerant). The propose experiential relationship from writings were summarize for both single stage stream and two stage stream. Its accommodation in pressed together warmth exchangers was likewise survey broadly. In this examination, the impacts of mathematical boundaries and balance on wind stream and warmth move various blades mathematical qualities are mathematically researched.

Thick warmth exchangers are of gigantic subject of fixation simultaneously as we are trade through the improvement of warmth move time. In this investigation, a rectangular, three-sided blade stuffed together warmth exchanger is being used into consideration. The explanation of this investigation is to grow an arithmetical portrayal to amend the warmth move singularity just as the pressing factor variety distinction. In this investigational update related to warm exchange, the exploration of Zinc-water (Zn-H2O) nanofluid includes the single stage track strategy, though the examination of Zinc oxide-water (ZnO-H2O) utilizes the single stage step method.

Keywords
Heat trade, Plate blade Exchanger, Fins (rectangular, three-sided, round), Pressure Variation

INTRODUCTION

Warmth move and pressing factor variety by utilizing different balance mathematical have been applied to a wide assortment of the rmal designing fields utilizing frameworks, for example, cooling, water warming, measure cooling, and so on Balances are utilized to improve heat move on the air side of air – fluid warmth exchangers. These blades go about as broadened surfaces and give the warmth move surface region for the air side. It is realized that the majority of the warm opposition is on the blade side in such gadgets.

Past trial considers have been completed on single-stage stream and two of various working media to research the impact of various mathematical (assistant triangle round and) on the warmth move qualities .

Air-cooled heat exchangers are widely utilized in refrigeration and cool framework, vehicle assembling and petrochemical producing. They can finish remarkable exchange and industry benefit in the utilization of nuclear power, reuse of discard warmth and saving untreated gear. There is diverse sort and construction of blades collects noticeable all around side for the improvement of warmth move is an assortment, for instance, balances (rectangular .three-sided, round). Puncture balances, etc, rely upon the trouble and reason environmental factors. Distinctive mathematical blades (rectangular .three-sided, roundabout) are on numerous occasions second-hand in the vehicle air cooler, intercoolers and new compound assembling heat exchangers. Vehicle air cooler is second-hand to cool descending grease up water which can make sure in safe hands methodology and presence of the motor. Low-discharge minuscule motors are embrace to diminish vehicle emanation, so the water cooler ought not just have far over the ground great association in heat eliminate and little siphon authority, yet in addition be considered in pressed together design. The ingenious and stuffed together warmth exchanger second-hand in motor framework for energy saving is of immense ramifications for the portable assembling. The distinctive mathematical balances are often second-hand in stuffed together warmth exchangers to diminish the breathing space, mass and hold up structures. They can be finished in a variety of gear like aluminum; tempered steels as indicated by the functioning Air-cooled heat exchangers are generally utilized in refrigeration and cool framework, car assembling and petrochemical creation. They can finish exceptional productive repayment in the utilization of nuclear power, reuse of discard warmth and economy untreated hardware. There

are distinctive sort and design of balances gather noticeable all around side for the improvement of warmth move. Low-discharge

Minute motors are embrace to diminish vehicle outflow, so the air cooler ought not just have far over the ground ability in heat move and little power authority, yet additionally be planned in pressed together construction. The equipped and stuffed together warmth exchanger use in motor course of action for power economy is of tremendous ramification for the movable assembling. The distinctive mathematical blades are oftentimes use in dense warmth exchangers to contract the breathing space, weight and keep up with structure. They can be finished in an alternate of gear like aluminum, tempered steels as per the working quickly laminar line. It very well may be acquire through various debilitating identical to the slope change of the j and f bends

Muzychka and Yovanovich et al [1] To created insightful model intended for foresee the warm water powered attributes for high pressing factor stream, join the downer or abominable stream asymptotic execution through laminar and tempestuous limit layer come around model plan.

M.R. Shaeri and M. Yaghoubi et al [2] Numerically explore heat eliminate and the liquid stream from a gathering of fluid and puncture blades that are perpetual on a level plate through incompressible air as working liquid. Their result realistic that, longitudinal opening by assets of blades, have distinguishable warmth move advancement just as to the outsized decline in weight from start to finish relationship with balances.

H.A Mohammed et al [3] study the impact of utilization different sort of liquid stream attributes and warmth move in three-sided ,rectangular and round framed of the warmth move go under the surface and pressing factor variety . To discretionary simply the thing overall warmth move improvement and low-pressure drop correspondingly look at through unadulterated water.

Muzychka et al [4] To reachable a portrayal for warm – pressure driven qualities for various mathematical blades for enormous Prandtl number fluids. This modification generally center around dissecting the warmth move and pressing factor variety attributes of various mathematical blades .The essential of various mathematical balances is displayed in figure.

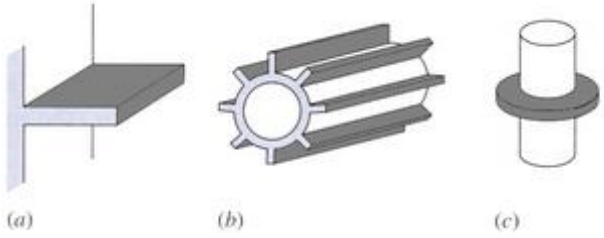


Fig:-1 Different Types of Fins

Improvement of choice functional liquid through further developed warm property is very an extraordinary exchange needed to reestablish traditionalist liquid. Colloidal clarification of an amount of platform arrangement with concrete nanoparticles isolates in it, which is called as nanofluid, is promising as substitute warmth move liquid. Zinc, animal natural substance, is select as segregated fragment in water to augment zinc–water (Zn–H2O) nanofluid. Zn–H2O nanofluid is incorporate by single step procedure and portray. Thermo mortal property are unsurprising by existing theoretical model. Unsurprising property demonstrate with the expectation of nanofluid is have improved thermo physical property contrast with the platform fluid exceptional to which nanofluid can end up being plausible functional fluid for heat trade system. Combine nanofluid is conveyed from start to finish heat move round to survey its show in confounded stream organization notwithstanding at perpetual divider heat circumstance. Warmth move coefficient and pressing factor variety be unsurprising start investigational results notwithstanding both are thoroughly examined as show appraisal basis for heat move show assessment. 82 % broaden in Nusselt number with 10 % increase in pressure variety is experiential for the nanofluid contrast with flood.

Heris et al. [5] To numerical look at the laminar stream constrained convective warmth move of Al2O3/water nanofluid in a three-sided conduit underneath consistent divider heat circumstance. They report that the numerical arrangement show that the Nusselt number increment by expanding declining the component of the nano molecule at a lasting retention and becoming the nanoparticle mindfulness by fitting the component of the nanoparticle.

It is clear starting the composing that, modest work has been finished on the cooler high temperature with a trench by use ZnO/water nanofluid to scatter temperature. In this paper, heat move analysis on channel heat with ZnO/water nanofluids is acknowledged out numerically with the goal of utilization ZnO/water nanofluid as cooling on heat move coefficient, Nusselt number, constancy, and impact consumption of semiconductor.

In this paper, numerous investigational and impersonation explores of single stage stream have been direct to get hold of new types of connection, which can correctly anticipate the warm and water driven show. Specifically it was bring into being that the hazardous Reynolds was around 800 which was an appropriate number to separate the laminar stream and violent stream in the diverse mathematical balances . The investigational explores on the warm water powered execution of two-stage stream are additionally incorporated. Also, the new connection of j and f factor along with the resultant water driven impediment and the accommodation Reynolds locale are sum up. The main

target of in participation assessment are to summarize the current development on the warm water powered show investigation of various mathematical blades and its application in pressed together warmth move . The assessment, cover the trial, relationship and numerical reproduction, is orchestrated as the accompanying:

Heat move and pressing factor variety execution of single stage stream and two stage stream .

Performance of warmth exchanger with rectangular, three-sided and round blades .

Various sorts of balances mathematical boundary be knowledgeable about a broad Reynolds number reach from 600 to 8100 by Dong et al. [5]. The relationship of j and f factor be projected beginning 245 information focuses. The term $\gamma = d/l$, the negligible portion of pour length d and balance length l, be extra inspired by the Manglik and Bergles [6] The outcome of the blade boundary be subjectively refined by Dong et al. [5] and Peng et al. [7] with three gathering of various mathematical blade in the reach $500 < Re < 5000$.

In appraisal through investigational results of various mathematical blades , both warmth move coefficient and pressing factor variety increment while the balance freedom or the balance height expanded. Various balances mathematical boundary rambling in intervallic render the edge line covering roundabout beginning and finish in flood way and the vortex stream happen on the blade wake. Dong et al. [5] Report to the result of the limited balance profundity be complimenting justifiable which complete extra swirl and whirlpool occur. As per Peng et al. [7] results, sway speed would grow in the blade decorations. As an outcome, the incline of j and f bend would form into extra plane as Reynolds number increment. The 'position of progress' where the j and f slant change perhaps will be experiential in the reach 600-5400.

The ordinary deviation of the relationship for j and f factor were 0.17% and 1.3% think about via the examination data. Reynolds number reach from 11,000 to 130,000 perform by Michna et al. [9] .while $Re < 20,000$, the opposition include act monotonically falling with Reynolds number. however, at upper Reynolds numbers the obstruction highlight more prominent than before drastically as the Reynolds number expanded. At the point when Re was around 40,000, the deliberate harshness include was just around multiple times of that anticipate by the extrapolation of the affiliation private from abominable Re data, with the exception of neither of these past expectation catch the unforeseen increase in unpleasantness quality. In adding up to, the data show regular increment and abatement in unpleasantness include at high Re number region. The notion that extra lively or extra focused whirlpool falling off cause the increase in unpleasantness include was raise by Michna et al. [9]. however, j factor didn't show the comparative increment or decline with Reynolds number change. Kuchhadiya and Rathod [11] Investigate the warm exhibition of touchy flood plate blade heat exchanger through various by enrapturing nitrogen gas as freezing liquid and environment as bubbling fluid. The extent uniqueness between the warmth move coefficients acquire starting investigational livelihood and that discretionary by Maiti and Sarangi [12] appraisal wide-going from 6.23% to 6.28% proposed for bubbling liquid and wide-going from 2.48% to 6.67% planned for freezing fluid. The component of warm water powered show for a plate-balance heat exchanger with various be proposed by Du et al. [13]. The plate balance heat exchanger work in a fluid to oil heat constituent. The distinctive mathematical boundaries, for instance the balance stature, blade width, balance length, were thoroughly examined as streamlining boundary. What's more, the two matter of the inherited calculation use to achieve the most ideal mathematical boundary of various mathematical boundary be the most elevated entire speed of warmth move and least sum full sum pressure variety. Through modifying the advancement boundary, the outcome of the mathematical boundary be represent. Through the help of getting assessment and the symmetrical devise method, 10 arrangements of data be acquire dependent on the most favorable plan size of various blades mathematical. The relationship be implicit from the data. Analyze, the functional liquids were divergent and the Prandtl number (Pr) made a significant position. Furthermore, the scopes of the calculation boundary were not comparative. At long last, there exist the connect with warm a conflict and the data botch. The 3D model through porous medium past. at first and following improvement were construct song of devotion multiplication outcomes show enhancement through the connection from Wieting [1] and Manglik and Bergles [6], Du et al. [13]Recognized the difference to the resulting reason that the absolute warmth move more noteworthy than before by about 6.23% and everything pressure variety decline by about 40%. Nusselt number more noteworthy than before with developing Reynolds number and Prandtl number (Pr). This force have happen since stream through cutting edge Prandtl number had longer warm mounting area on each blades, which add to the achievement of a high level warmth move speed. The warm field of various balances mathematical be capably biased by Reynolds number and Prandtl number. For different liquid the advocate of Pr strength be disparate [14]. Hu and Herold [15] worn cold flatware which could make reachable normalized heat vacillation to ascertain heat move and pressing factor variety for various blades mathematical warmth exchangers. The working fluid was water and grease (SAE-300) oil and the Prandtl number went from 3 to 155. It was begin that the j trademark for air was just about double the j factor for fluid at the comparative Reynolds number. The connection of the j factor for air may not effectively imagine the course of action of fluid accommodation. At the point when the Prandtl number went from 140 to 45, the j factor show a significant

Prandtl number outcome. The j highlight more noteworthy than before through an increase in Prandtl number. For the f factor, it should be indistinguishable for a certain balance mathematical and Reynolds number. Be that as it may, the resource of burrs could prompt difference for water and lubricant(sae-300) oil. Moreover, an arithmetical portrayal be work to ascertain around the conductive and convective warmth move. The functional situation was in liquid warmth move and the functional liquid was water and 11–32 wt% ethylene glycol fluid arrangement. The investigational capacity comprised of the examination section and two clogged circles, the cool fluid circle and the warming clarification circle. The temperature of the cool fluid was denied by a refrigerate association, and the warmth fluid round was banished by a baggage stall heater and a radial siphon. The self-governi

2 .List of abbreviations

l = Length of fin (m)
w= Width of fin (m)
t =Thickness of fin (m)
H =Height of fin (m)
D =Diameter of fin (m)
P =Density of fin (kg/m^3)
C_p =Specific heat of solid (j/kgK)
K =thermal conductivity (W/mk)
μ =Dynamic viscosity (kg/m-s)
Zn =Zink metal
s= fin breathing space
a =Constant
ð= Constant
Ȳ =Constant
Θ =fin angle(In Degree)
Re =Reynolds number
SAE 300 =An Oil Grade
p=Pressure (bar)
Δp =pressure Variation
Q= Flow rate (m^3/s)
Nu =Nusselt number
h =convective heat transfer coefficient (W/m^2K)
Re_{th} =Thermal Resistance(K/W)
CuO =Copper Oxide

2.1 Availability of data and materials

In this section we have to show the availability of data and which type of material we are used.

2.2 Material determination

The material which is chosen for creation of balances plates is aluminum (6061) .It is a solidified aluminum combination ,containing magnesium and silicon as its major alloying elements.It is utilized regularly for assembling balances materials

(B) In this paper we have utilized various kinds of blades profile .we have utilized explicit shape and size of various sorts of balances.

3 Experimental Detail (Methodology)

The test set up as displayed in fig, in which various parts are shown plainly and their position.

3.1 Aim of study

There are following point of this exploration work
Heat Transfer (Q) And Pressure Variation
Both Single Phase And Two Phase Flow
Performance of Heat Exchanger With Rectangular Triangular And Circular

3.2 Design and setting of exploration work Mathematical Parameter:

In this perusing three example have been utilize intended for examination. The terminologies and size of the example given table

Table: 1 Geometrical Parameter of fins

S.NO.	Name of the specimen	Geometrical Parameter
1	Rectangular fins	Length =12.5mm Width =7mm Thickness =1.5
2	Triangular fins	Width =0.746mm Height =0.6mm
3	Circular fins	Diameter =0.6mm Height =0.6mm

3.3 Description of materials

In this research work we have to use following material which are listed below

Table: 2 Material Parameter

Material	(Kg/m^3)	(C_p) (j/kg-k)	(K) (W/m-k)	(μ) (kg/m-s)
Pure Water	998.2	4180	0.62	0.001787
Zn	7140	389	196	
Zn-water	6620	4187	0.755	0.0222

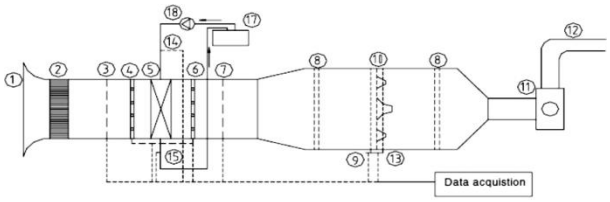
Where Cp K and μ are thickness explicit warmth ,warm conductivity and dynamic consistency

3.4 Research incorporate the Brand name

in this exploration work we need to utilize a motor oil of grade SAEJ300.
Car Lubricant Viscosity Grades: Engine Oils – SAE J 300
High-Temperature Viscosities
Kinematic thickness at 40 °C and 100 °C - low-shear consistency - decided by ASTM D445, where the elective strategy as per ASTM D7042 conveys similar outcomes.
High-shear thickness (10/s) at high temperature of 150 °C - HSHT consistency - decided by ASTM D4683, CEC L-36-A-90 (ASTM D 4741) or ASTM DS48

Table 3 Liquid viscosity at different temperature

SAE Viscosity Grade[°C]	Min. Viscosity [mm2s] at 100 °C	Max.Viscosity[mm2/s] at 100 °C	High Shear Rate Viscosity[mPa.s] at 150°C
40	**12.5**	**16.3**	**3.7**
50	**16.3**	**21.9**	**3.7**
60	**21.9**	**26.1**	**3.7**
40	**12.5**	**16.3**	**2.9**



1. air inlet
2. oney cone strightener
3. T/C inlet temperature measuring station
4. pressure tap (inlet)
5. test unit
6. pressure tap (outlet)
7. T/C outlet temperature measuring station
8. setting means
9. static pressure tap
10. multiple nozzle plate
11. variable exhaust fan system
12. air outlet
13. difference pressure tap nozzle
14. inlet temperature tap water
15. outlet temperature tap water
16. data acquisition systems
17. hot water tank
18. water pump

3.5 Double Phase (water, grease oils SAE-300)

Generally Investigation region was medium size. Once in a while, the sucked cools could be legitimized by cooling/Most of investigational research was supported missing in the tempest way as displayed in Fig. 2. The air stream device comprised of a divergent fan, a water/oil flow framework and a data obtaining plan. The experimentation segment was an impervious warmth exchanger, of which the crabby segment warming association. For data accomplishment plot, the water/oil inlet and opening temperature were determined by thermo couple and ASTM. Pressing factor Variation was determined by two sorts of level of contrast power transducer. The power balance be theoretical to be affirm past to investigational occasions and data decline procedure would be use to inspect all the assessment outcomes [4]. The most significant investigational encompassing material of the basic boundary in twofold stage modify be sum up as Table 4.

3.6 Parameter Measurement for Double Phase Flow Investigation

Authors	α	δ	γ	Re
Dong et al. [5]	0.3407–0.0.4172	0.163–0.214	5.4–15.2	600–8100
Manglikand Bergles [6]	0.143–1.431	0.041–0.053	0.045–0.185	130–1100
Peng et al. [7]	0.1354–0.175	0.0222–0.0667	0.1333–0.2	600–5000
Michnaet al. [9]	0.1671	0.1252	0.1252	11,000–130,000
Du et al. [13]	0.0969	0.0290	0.0806	300–1750
Fernández-Seara and Diz [22]	1.4444	0.1	0.023–0.0714	200–650
Chennu and Paturu [32]	0.254–1.693	0.1–0.2	0.023–0.0714	400–550

3.7 Single Phase (refrigerant)

Various blades of mathematical use in inside flood still in single stage stream circumstance. The most significant investigational winning states of the basic boundary in single stage study was sum up as Table 2. Kim and Sohn [24] examination intentional the warmth move and stream singularity of single stage and two stage stream burning in the refrigerant development. For single stage stream of water and R113, the investigational data of the f highlight shows a decent quality congruity through the estimation by Manglik and Bergles' affiliation [6]. however, the j reason determined in the investigation be about 25% less significant than the computation for Re < 1000. Since the j computation by Manglik and Bergles [6] was related for the little Prandtl number, like air. The progression of a predominant Prandtl number had a more drawn out warm vertical territory on the stream divider and on each one blade, which brought about a raised standard warmth move beat however a less significant j include. A brand new relationship of the Colburn j highlight was get and 92% of the data lied within±12% and the root-mean-square misstep was 6.3%. For single stage pressure variety, the investigational data was interrelated as the encompassing line relationship projected through a mistake obstacle of 20%. The single stage multiplier in various balances math be in abundance of half prevalent than that in encompassing cylinder at far over the ground conduct. Warmth move data for the single stage necessary convection be shining compare by the Reynolds number factor use for convective boiling in around tube. The disparity in the Reynolds number component between the stream in the balances path and around tube be worked on through the compromise of the Lockhart-Marginally impediment up to 100% at the higher edge of greatness estimated in the correction. The determined nearby stream intense warmth move coefficients may be anticipate within±25% of the affiliation projected by Bennett et al. [25]. look at through the results set up by Mandrusiak and Carey [26], the irregularity be better taking into account the way that the individual property of pull designed by blade become valuable significant at elevated Quality. investigational data on the single stage obstruction multiplier in a stream through various balances math were associated from one finish to another a mix-up obstacle of±20%. Chennu and Kabelac [29] perceived an experimentation hardware to update the stream intense warmth move of R134a in an evaporator through various blades mathematical. The analysis section part restricted a water circuit to make accessible bubbling water through stream speed deceitful start 0.023 to 0.18 kg/s and temperature of 10, , 20, , 30, 25,40 °C. A CFD assessment was direct for a solitary covering

of various blades math to discover the j and f highlight on the water surface. It was set up that the outcome of arithmetical impersonation in the visible presentation of j factor of water was concerning 32% lower than the j connection for air, and the f esteem played out a decent concurrence with the relationships for air. Furthermore, the connections for j and f factors were moderate. Nucleate searing was abrogating in the laminar stream the executives through almost no Reynolds number. The water rise heat move coefficient was around multiple times progressed than that of the refrigerant. Fujita and Kashiwagi [30] investigate shared warmth and mass exchange for the NH3-H2O declining movie assimilation in a plate heat exchanger with various balances mathematical and acquire heat move coefficients. Nusselt number (dimensional warmth move coefficient) more noteworthy than before as liquid and fume Reynolds in succession increment. The fume speed should be boost to build ingestion show in synchronized NH3-H2O . An experimentation perform for circular,triangular and rectangular blades miniature warmth go under set up Zinc - water nano¬ liquid execute better then Al2O3-water nano liquid [9]

Table: -5 Parameter Specifications for Single Phase Flow investigation

Authors	s/mm	h/mm	l/mm	t/mm	Re
Kim and Sohn [24]	3.7	2.4	1.4	0.3	21-7500
Pulvirenti et al. [27]	3	2.4	6	0.3	300-1100
Chennu and Kabelec [29]	4.32	3.23	1.853	0.2106	11-9500

3.8 Heat move and pressing factor variety qualities of various mathematical blades

Diverse mathematical balances (Rectangular, Triangular and Circular) are to a great extent use for air side warmth move improvement which could be amass for inside and outside . In motor cooling framework, Different mathematical balances could be second-hand as air side warmth move among water/compacted ointment liquid over external side or encompassed by tube just as in oil cool course of action smooth working oil liquid is oil.

4 Empirical connection utilized in research work

Nusselt Number-

It is characterized as the proportion of conductive protection from convective resistance.it is composed as Nu.Mathematiclly

Nu

=hL/k……(1)

Nu

=q_mL/kdT……..(2)

h

=q_w/dT……(3)

Reynold Number-

It Is defined as the ratio of inertia force to viscous force. It is written as Re.

Re

=ρu_mL/μ……..(4)

Heat loss coefficient K=

(-dp/dx)L/ρu_m^2/2……..(5)

Thermal Resistance –

It is the resistance offered by material or substance to resist heat transfer.

Conductive Resistance

=L/kA……..(6)

Convective Resistance

=1/hA……..(7)

Convective heat transfer coefficient-

The rate of heat transfer between a solid surface and a fluid per unit surface area per unit t

$$h = \frac{q}{\Delta T}$$

where

q is the local heat flux density [$W.m^{-2}$]

h is the heat transfer coefficient [$W.m^{-2}.K$]

ΔT is the temperature difference [K]

Fin Spacing –

Blade dividing is the distance between the two balances .it is meant by s. This coefficient shifts dependent on a wide assortment of elements, including temperature rise and balance length. Firmly separated balances require a higher strain to move warmed air away from the blades than normal convection can give.

Pressure Variation – in this part we need to discover change in pressure regarding thickness ,contact factor,velocity of surrounding fluid.it is meant by Δp.mathematically

Δp

=fV^2cρ/2……..(8)

Flow Rate –

The impact of the mass stream rate at consistent speed on the convective warmth move coefficient of an incompressible liquid in a violent stream system is given the assistance of dimensional examination. ... Multiplying the mass stream rate will bring about a 92% expansion in the warmth move coefficient.. As is clear, the warmth move coefficient of the cylinder side generally increments with the expansion in the stream pace of the cylinder side. The justification this is that the higher the speed of the liquid is, the lower the distinction

in temperature between the liquid, and the outside of the cylinder will be.

(5) Governing Equation

According to Continuity Equation or conservation of mass equation

$$\partial p/\partial t + \nabla \cdot (\rho \tilde{V}) = S_m \quad \text{..... (1)}$$

The above condition is the overall type of mass preservation condition and is substantial in compressible and incompressible streams. The additional mass to persistent period of the second period of dispersion is, for example, vanishing of fluid drops or some other characterized source.Momentum:The protection condition for energy in each non-speeding up facilitate is characterized as follows

$$\partial(\rho V)/\partial t + \nabla \cdot (\rho v \tilde{V}) = -\nabla p + \nabla(\text{ג}) + \rho g + F \quad \text{..... (2)}$$

In the above equation, p is static pressure, ג_ is stress tensor, $\vec{g}$ and $\vec{F}$ are the volumetric forces of gravity acceleration and external forces, respectively

5 .Results And Discussion

The diagram under compare pressure variety and show of progress from far over the ground Density overlay Fins over ordinary balance parts.

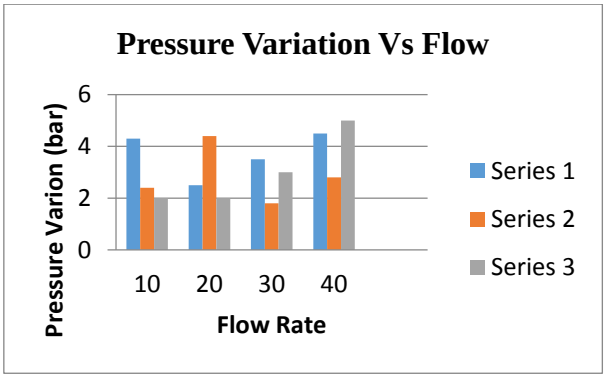


Fig:4 Pressure Variation Vs flow rate

consolidate Aavid's far over the ground Density overlap Fin capacity with information in noteworthy complex machining calculations, firmly disallowed brazing measure as physically fit as incredibly precise pressing factor variety and warmth move recreation convey ideal arrangement utilized for your warm supplies.

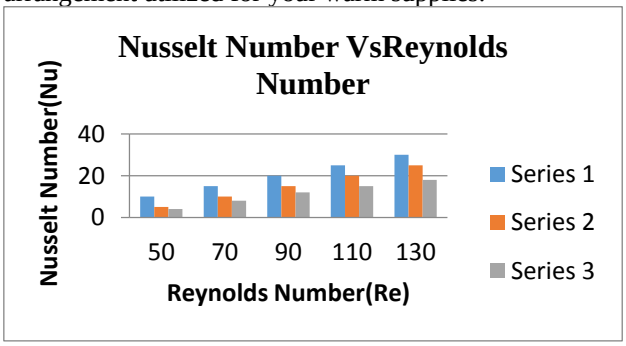
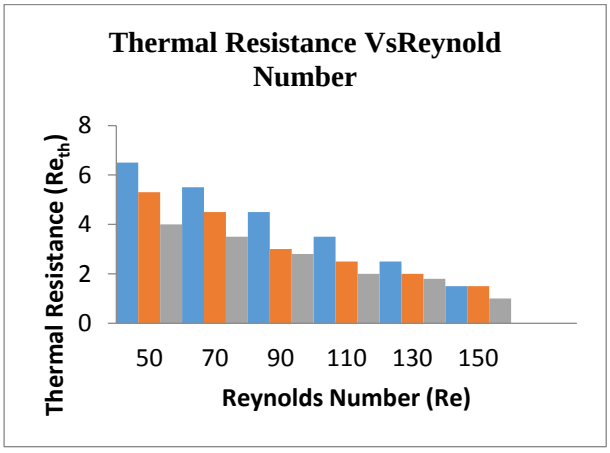
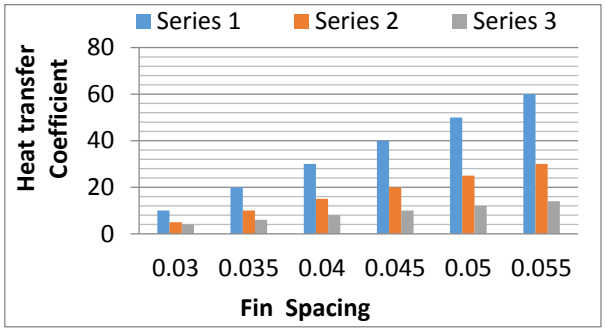


Fig: 5 Variations of Nusselt number with Reynolds number

Show the variety of Nusselt number as a reason for Reynolds number with different limit assimilation of CuO/water nano liquids. It is set up that utilize o CuO/water nanofluids in the stream heat be lowered further develop the warmth move distinction. This chart additionally show that by developing the amount fixation (0.20%, 0.5%, and 0.70%) of nanofluids the Nusselt number increment. It is inspect that unrivaled the Reynolds number, predominant the Nusselt number (Nu) and the Nusselt number are build up to be 20 %, 40 %, and 65% prevalent than water for 0.20%, 0.5%, and 0.70% of CuO/water nanofluids individually. This is since of extra convective warmth move existing. The basic component use in semiconductor heat revelry is the warm transmission which the upset of warm a showdown to learning the overall warmth move show. The warm opposition measurement is the idea of information impact present to the conductor .



This present the relationship between the Reynolds number and the warm a showdown with the volume grouping of 0.20%, 0.5%, and 0.70% of CuO/water nanofluids. From this figure, it very well may be comprehend that prevalent Reynolds number has a lower warm opposition in the stream heat descending. The thought process in declining the warm obstruction is because of the greater speed when Re is higher. This higher liquid speed decreases the warm obstruction between been the liquid particles with the MWCNTs and higher fixation nanofluids has more warm conductivity. This outcomes the more warm transportation and this is contrarily interrelated to the convective warm opposition. It is seen that the higher volume groupings of CuO/water nanofluids have lower warm opposition than water. Likewise, the warm obstruction of the channel heat sink utilizing CuO/water nanofluid nanofluids is 20%, 40% and 65% higher than the water individually. The further developed warmth move coefficient is because of the greater warm conductivity of nanofluids and the presence of more nanoparticles in the base liquids. Here, the greatest warmth move coefficient is happen at 0.70% nanofluids.



It is obvious from the chart in the event that we expanding the blade space the worth of convective warmth move coefficient is increases.it is obvious from the diagram heat move coefficient is high for Zno and low for copper nickel combination

6 Conclusions

1 The standard figure of the blade is rectangular; we have contorted the consider along with three-sided. The inability to pay width of balance is 7mm; we are tumbling it to 0.7 mm.

2 We have total warm assessment on the balance stays by problematic hardware, calculation and thickness. By notice the assessment results, utilize rectangular balance, substance of both Zinc combinations of 389 ,196 and thickness of 1.5mm is improved, Since heat move rate is beneficial contrasted with 4 mm.

3 Triangular finned-heat be lowered gives the better cool rate analyze than other blade heat move for all standards of Reynolds number. After three-sided, square shape and roundabout blades heat move execute better in heat move highest point of standpoint in sliding control.

4 Circle blade heat move gives littlest sum pressure variety at all norms of Reynolds number follow by square shape and triangle. Rectangular and three-sided balance heat move in the request for has comparable show in heat move and pressing factor variety .

5 In all baggage, spread throughout some stretch of time calculations execute better compared to in arrangement to roughly 5%. At subordinate standards of pressing factor variety and siphon authority, round ,rectangular, and three-sided balances work best than different balances execution.

6 The speed of warmth move is more prominent than before by utilize the nanofluid yet the pressing factor variety additionally increments.

7 Declaration of contending interest

The creators announce that they have no known contending monetary interests or individual connections that might have seemed to impact the work detailed in this paper.

8 Funding

There is no financing given in this exploration work.

9 Authors commitment

In this work creators gather all the data releted to blades which are utilized in various regions and exploration work .aside from this creator likewise study most recent work on balances which is helpful for our work.

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Assessment of Digital PLL using Micrometer Technology

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Abstract
Digital phase locked loop act as a game changer to the expansion of application specified integrated circuits. By this technology, the throughput of any specific circuit is decreased. For the different digital circuits uses PLL for clock generation, microprocessors and input output phase locking. The main property of PLL is to achieve the lock at input and output waveforms so it is widely used in all sectors like RF transmission, wireless transmission and many more. The simulated design of PFD, LPF and VCO is made by 120nm CMOS Technology; the duration of glitch in the PFD is 1.016 ns to 1.426 ns. For first order filter the value of R1 is 300kΩ and C1 is 10 pF. So by the calculation using these parameters the centre frequency 98.76 MHz is achieved. The ring oscillator's total delay time for 5 stages is 20.25ns and the oscillation frequency is 333.4MHz at 1V power supply.

Keywords
Digital PLL, VCO, Charge Pump, and loop filter

INTRODUCTION

Phase locked loop arrangement has essentially a feedback control mechanism to compare the output signal towards the input signal. Lying on the signal worn, the PLL can be characterized like analogue PLL, digital PLL and all digital PLL. In analogue PLL, the entire building blocks are analog in nature. It will inspect the output and generate feedback signal to adjust the input signal. By the assessment of both signals, an error voltage will produce [1, 2]. Furthermore this voltage will rework to the output signal with reverence to input.
Nevertheless this type of PLL has numerous drawbacks; like clock screw, noise effect, coupling effect and jitter management. In application specific Integration, this technologies is much complicated at low supply voltage.

The building block diagram of a DPLL is discussed by the Fig. 1. It consists of four main blocks:

1. Phase Detector or Phase Frequency Detector
2. Low Pass Filter (LPF)
3. Voltage Controlled Oscillator (VCO)
4. Divide by N Counter

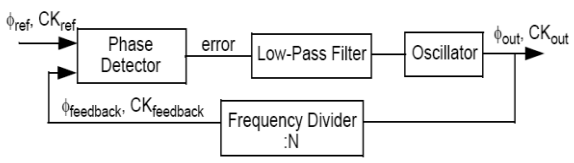

Figure 1: Basic DPLL Block Diagram

Phase detector is the essential block for PLL. It compares the input and feedback clock frequency and phase. By the comparison of both signals (CK_{ref}, $CK_{feedback}$) it will produces an error signal. By the deviation of error signals, up and down signals will be generated. This error signal is fed to the low pass filter to produce a DC control voltage. This voltage changes the phase and frequency of the voltage controlled oscillator [7, 13]. Output signal (CK_{out}) is feedback to the input using a divide by n counter to alter the input signal.

An idyllic PLL generates clock pulse with fixed duty cycle. Conversely actual PLL clock suffer with tiny variations in the timing pulse from their idyllic time. This is called jitter. By using loop filter, high frequencies jitter can be filtered to smooth out the response of the system.

RANGE OF DPLL

The PLL have three basic regions of operation for which it can work. If it is not locked (input and output are on different phase) PLL is in dynamic state. And if both phases are same it is called as static state.

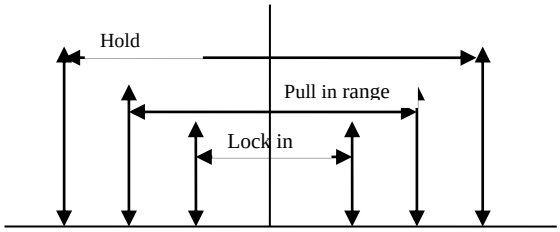

Figure 2: PLL Region of Operation

2.1 Hold range
It is the range of frequencies in which PLL can maintain phase tracking between input and output. If reference frequency is gradually condensed or enlarged, the PLL will be unable to find lock. This is called hold range. It will be temporarily stable just in this range [9].

2.2 Pull in range
In dynamic state it will constantly locked. Initially PLL is unlocked. It will obtain locked state if reference frequency is applied in the pull in range. If input frequency is outside then this, the PLL will never acquire lock condition.

2.3 Lock range
The range frequencies from which loop can uphold the lock state. All the region of operation is shown in the Fig.2.

2.4 Pull out range
The frequency, facilitate the PLL to release. If input frequency is below the pull out range the PLL remain lock. On the other hand if it will exceed, PLL will not be capable to follow the output signal. After some time it may obtain lock. It is called static state of PLL.

DIGITAL LOOP DESIGN

In DPLL, a locked loop is obtained by the comparison of input and output signals. By the combination of charge pump and VCO, it maintains a constant phase and frequency of output signal. Suppose input signal and output signals phases are Φ_{ref} and Φ_{out}. The main function of PLL is to calculate the phase difference of two signals. But due to negative feedback loop, the output phase is to be adjusted subsequently to synchronize with the input phase [5]. By the following analysis, it can be concluded:

$$\Phi_{ref} = \Phi_{out} \quad (1)$$

$$f_{ref} = Nf_{out.} \quad (2)$$

where: Φ_{out} is output signal phase, Φ_{ref} is the reference signal phase, f_{ref} is input or reference frequency and f_{out} is output frequency and N is a numeral value of the divide by N circuit.

3.1 Phase-Frequency Detector
In the digital PLL many logical circuits can be used as phase and frequency detector. The main function of this block is to compare the input and feedback signal. The most important type of PFDs are Ex-OR phase detector, JK flip flop type, flip flop counter phase detector double edge triggered PFD and phase frequency detector. Some of the phase detectors are explained below:

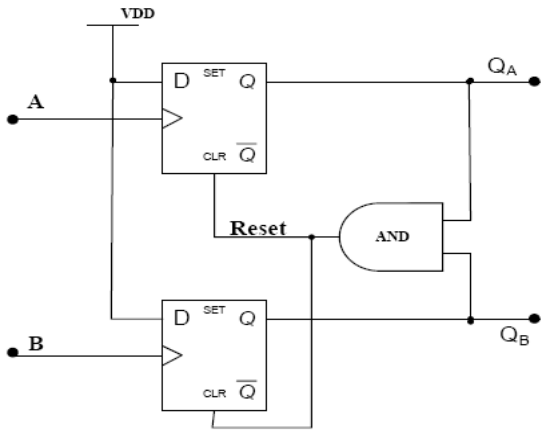

Figure 3: Circuit diagram of phase frequency detector

The circuit (in Fig.3) uses two flip flops D_1 and D_2 with reset clock terminal (the output of the AND gate) [7]. The input terminals of both flip flops are connected to V_{DD}.

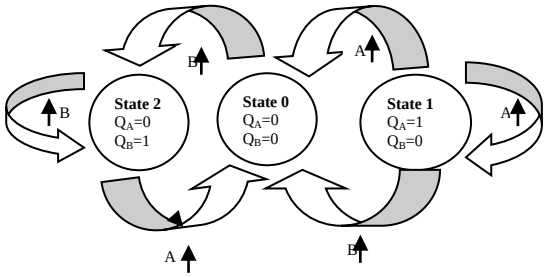

Figure 4: state diagram of PFD

The outputs Q_A and Q_B are called as UP and DOWN signals respectively shown in Fig.4. If PFD is in '0' state, circuit change state 'A' to state '1', then values of outputs are $Q_A = 1$ and $Q_B = 0$. Until a positive change come the circuit, it remains in this condition [8]. The changeover from state '0' to state '2' is similar like the changes from state '0' to state '1'. The merely dissimilarity is a positive change at 'B' occurs in its place of 'A'.

3.2 Low Pass Fliter
Another block of the DPLL is loop filter. This is basically a low pass filter that converts the PFD's output to the DC control signal. This control signal will alter the output of VCO. This filter may be passive or active. Loop filter manage the characteristics of the PLL like locking range, confine range and bandwidth.

The 1st orders filter generally common in DPLL to owing its fast sensitivity. But it enhances frequency jitter because of intrinsic voltage jump at resistor R_2 [12].

The total ranges of frequency over which the loop can follow the changes of input frequency. When circuit attain the phase locked condition, it is capture range.

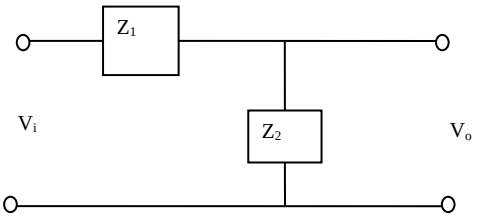

Figure 5: Simple Low Pass Filter Structure

The transfer function of this filter system is (as shown in Fig.5.)

$$\frac{V_o}{V_i} = \frac{Z_2}{Z_2+Z_1} \quad (3)$$

Where: Z_1, Z_2 are resistor and capacitor of the circuit. So gain could be calculated by the following equation:

$$\frac{V_o}{V_i} = \frac{1/sC_2}{\frac{1}{sC_2}+R_2} \quad (4)$$

$$\frac{V_o}{V_i} = \frac{1/j\omega C_2}{\frac{1}{j\omega C_2}+R_2} \quad (5)$$

$$\frac{V_o}{V_i} = \frac{1}{j\omega C_2 R_2+1} \quad (6)$$

The magnitude response is given by

$$\left|\frac{V_o}{V_{in}}\right| = \left|\frac{1}{sC_2R_2+1}\right|$$

$$= \left|\frac{1}{j\omega_c C_2 R_2+1}\right|$$

$$= \left|\frac{1}{\sqrt{[1^2+(\omega_c C_2 R_2)^2]}}\right| \quad (7)$$

The expression of cut-off angular frequency is given as

$$\omega_c = \frac{1}{C_2 R_2} \quad (8)$$

Loop filtering introduces poles to the PLL transfer function. That will enhance the PLL bandwidth. As the order of filter increases the noise cancellation would be better so second order or more is required for ASIC technology [9].

3.3 Voltage Controlled Oscillator

VCO is conceivably the most significant block of PLL. It is used to manage the mid range frequency so that bandwidth will be controlled. Tuning range will follow the centre frequency changes [3, 4]. As the gain of the VCO changed with the error voltage, non linearity of tuning range will occur.

The main characteristic of VCO is to achieve a constant oscillation so that the generated voltage will maintain the lock condition. Yet a constant error voltage is given to the input of VCO, the VCO output is not ideally periodic. Mainly all the electronic devices suffer with supply noise that added up to the output and causes jitter [6, 10].

The most frequent oscillator used in PLL is the ring oscillator as shown in Fig.6. In this, odd number of inverters is connected in series and the output is feedback to the input of first inverter.

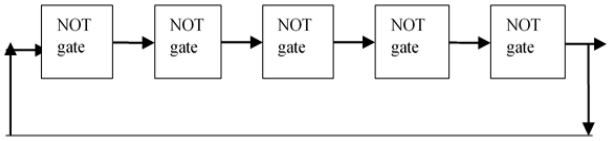

Figure 6: five Stage ring oscillator

By using odd numbers of inverters, the circuit cannot have fixed operating point. As a result the output should be oscillating. The propagation delay is shown in the Fig.7. By this the total oscillation period given by

$$T = 2\tau_p N \quad (9)$$

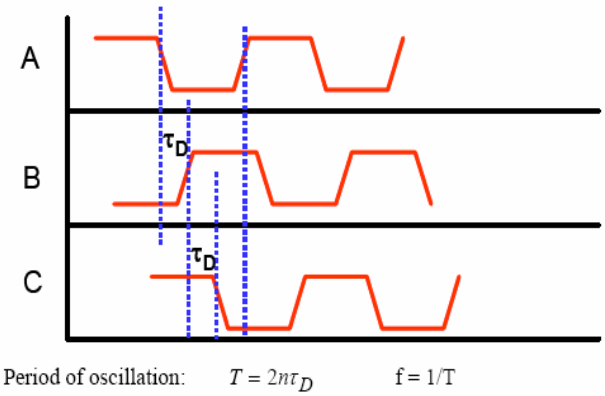

Figure 7: Output response of ring oscillator

Where: N is the total number of inverters and τ_p is the propagation delay of each block. For all the inverter circuit the fan-out is one [11]. The main benefit of ring oscillator is the designing of circuit: with transistor designing, it uses very less area so the power density is very low.

This oscillator is easy to tune so it provides wide bandwidth. The major problem with this oscillator is poor phase noise. As a result this is mainly used for clock recovery, generation, and synchronization.

RESULT AND DISCUSSION

From the above figures this would be clear; the purpose to limit the centre frequency is the scaling of transistor at the different levels. As a result the locking time of the PLL is reduced as compared to the paper [9]. As the same supply voltage is used in both papers transistor's

size would change the all parameters. The oscillation frequency is far better to the compared paper. The power consumption is almost 1.08mW with five stages of oscillator. The comparison parameters are shown in following table 1. By varying the low pass filter parameters the oscillation frequency can be changed.

Table: 1

Parameters	Proposed design	[9]
Technology	120nm	130nm
Supply voltage	1v	1v
Power consumption	1.08mW	2.07mW
Centre frequency	98.76 MHz.	500MHz
No. Of Stages	5	5
Oscillation frequency	333.4MHz	800MHz
Register R1	300kΩ	1.38KΩ
Load capacitance C1	10 pF.	15pF
Glitch of PFD	1.016 ns to 1.426 ns	1.5µs
Delay time Td	20.25ns	----

Phase frequency detector is designed by the D flip flop so one glitch is coming at the simulation result at 1.06ns time period. After that the PFD generates the up and down pulses shown in the figure 14.b. These pulses can change the control voltage of VCO. The maximum peak occurs at 98.76 MHz frequency.

CONCLUSION AND FUTURE WORK

DPLLs are extremely open for future CMOS scaling techniques. It has outstanding performance for wide range of frequency. The relative study of DPLL building blocks is done in this paper. The DPLLs are good in phase noise, low power consumption and it enhanced the tuning range for mid frequencies. Locking time mostly depends on the parameters used for PFD, VCO and Loop filter. So via changing the parameters an improved lock range can be achieved. By scaling the transistors the better centre frequency would attain. The order of the Filter will control the circuit bandwidth. The locking time is inversely proportional to bandwidth of circuit. As soon as the PLL achieve the locking range the BW and noise jitter will also reduced.

Ample range applications are available for DPLLs. They admired for radio wave applications. Due to small size with respect to analog PLL they are widly used in clock generation and recovery [13]. By using this technique, analog to digital and D to A technique would reduce. Revival of low frequency signals is easy otherwise it vanished in noise. As they are used to match frequency and phase of input signal, so input sampling can be digitally process. It can also be used in clock generation for different microprocessor units. It will also used for speed control of motor.

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A Survey on the Recent Advancements of Fall Detection Techniques

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Abstract
Among the population of elderly individuals, falls are one of the main reasons of instant decline in physical health which may turn out to be fatal if the concerned is not rescued in time. This is especially a problem for elders who live alone or are left alone during working hours, who cannot afford the cost of caregivers. Scientists and researchers try to cope up this prevailing issue by actively developing new fall detection solutions using sensor-based and machine learning approach to achieve affordability and practicality. This literature survey's goal is to review the state-of-the-arts fall detection techniques and compare their performance to get a better understanding of the hurdles to overcome them. This survey tries to provide a summarized view of the selected reviewed literature. The challenges and overarching problems of fall detection are also discussed.

Keywords
Fall detection, survey, state-of-the-arts, sensor-based, machine learning

INTRODUCTION

The population of the entire world is increasing at a steady pace and the death rate is slowing down due to advancements in the medical science. According to Population Division of World Population Prospects this will result in growth of number of older adults aged above 60 years old up to 1.4 billion by 2030 [1]. It should be in our upmost interest to pay attention to well-being of the elderly. World Health Organi-zation estimates that fall is the second most alarming cause behind accidental or sudden undesired damage and deaths worldwide and astounding 37.3 million falls are severe enough to require medical attention each year. 28% to 35% of the senior citizens aged 65 years old and 32% to 42% aged above 70 years old constitutes to this number [2].

The chances of falling only rises with age as the body becomes frailer. Factors like mental conditions, illness, environmental hazards, neurological, muscle weakness, poor sight, medication, etc. may contribute to fall risks. Some of the common perils of non-fatal falls are internal bleeding, bruises, and bone fractures. And unfortunately, more falls occur at home, where they might be alone and nobody can help them. The ratio of indoor and outdoor falls is 60:40 according to [3]. An increasing aging population, mixed with growing healthcare charges has glimmered new research and skills to detect and to some extent, prevent fall related injuries in high risk persons. Fall detection and prevention are two of the more researched areas along with the review of fall related systems/research papers. It is especially the case for Fall detection methods which have been comprehensively explored by researchers. However, the problem doesn't have a distinct universal solution. Several different types of sensors are used in various orientation and locations with machine learning and threshold-based systems to detect falls. These sensors can be classified as shown in Figure 1.

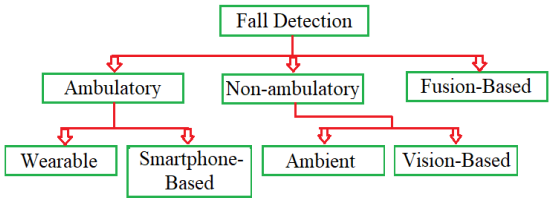

Figure 1. Classification of various fall detection techniques

This literature survey paper focuses on the state-of-the-arts techniques that have recently emerged (2019-2020). We have searched and found 97 fall detection journal papers on IEEEEXplore, out of which we have chosen 13 literatures to focus on.

The rest of the article is structured as follows. Study of existing literature is done in Section II. Section III summarizes the selected papers in the form of a comparison table A discussion based on the categorization of fall detection systems is presented in Section IV. And finally, Section V concludes the survey

STUDY OF EXISTING LITERATURE

This section compares the performance of the existing literatures in this area and evaluates their performance accordingly.

A. Detection criteria

Fall detection systems are triggered by the impact that is made during a fall. One of the biggest reason falls are

tricky to detect is that there are many ways to fall. Most of the ADLs like walking, running, standing, sitting or even sleeping can lead to falls. All falls are not the same. Authors of [4-5],[14] and [15] have considered multiple scenarios and ways in which a fall can occur. While Huang et al. in [5] only considers slipping and tripping, it is still more descriptive than papers which have not mentioned it at all. Author of [4], [14] and [15] creates a scenario where test subject does a mentioned ADL falls and data is recorded.

B. Dataset

Several studies using supervised learning to train a machine learning algorithm uses a pretrained dataset. Researcher of [4],[5],[7], [8],[10],[11] and [16] has used either standard or publicly available dataset such as Mobifall, MobiAct, ImageNet, UR fall detection, etc. While [9],[12],[13] and [14] has constructed new datasets to suit their model and produce more accurate datasets.

C. Sensor

The most commonly used sensors are accelerometers, gyroscopes, depth sensors, etc. Output of every type of sensor varies a lot with respect to their precision. Accelerometer senses parameters of motion and it is very popular as it is fast and effective. Most ambulatory systems use an accelerometer ref [10-13],[15] and [16]. Gyroscope are used in smartphone-based [14] and wearable [11] systems to check the orientation of the person that is being monitored. Depth sensors or RGB cameras are primarily used by vision-based systems [7-9].

D. Method

Machine Learning (ML) and Threshold Based (TB) or the combination of the two are mostly used in fall detection. Only Lee et al. [15] uses TB in our selected papers. In recent years most of the techniques are utilizing supervised ML algorithms. An exception to that is [13] which uses unsupervised training and does not need labelled data.

Authors of few papers [4], [9], [11], and [14] have tested out several supervised ML algorithms i.e. KNNs, RF, SVM, Decision Tree, Naïve Bayes, etc. and they have picked the best performing algorithms for their models. Hassan et al. [16] has used CNN and NSTM hybrid algorithms to the model for fall detection.

E. False alarm

The problem and risk with fall detection are that if the person being monitored falls and the system fails to notify the event, then it becomes useless. And if the system misidentifies an ADL as a fall event, then the party being notified is bothered for no reason. Huang et al. [5] overcame this problem by using EoA to triangulate the position of an event that triggered HMM. [6] capable of 3D tracking, reducing the number of false positive and false negative event to zero. Jariyavajee et al. [8] proposes a voting strategy that boosts performance as well as reducing the number of false alarms. A fusion-based approach is used by Kim et al. [12] to minimize the false detection.

Comparison table

Cate-gory	Ref No.	Sensor(s) used and location	Performance	Method & algorithm(s)	Feature(s)	Drawback(s)
Amb-ient	[4]	1 Ultra-wideband Radar (External)	Acc = 95.64% Pre = 96.12% Sen =96.73%	ML {TL}	- The proposed TL based method provides better accuracy than other methods	- Cannot use pre-trained network directly applied to the radar time series.
	[5]	3 Geo-phones (External/3 corners of a room)	Pre = 95.74% FA = 5.30% With EoA: FA ~ 0%	ML {HMM, EoA}	- Device-free indoor positioning. - Vibration-based smart sensing. - Near zero false alarms.	- Not in practical use yet
	[6]	1 2.45-GHz RFID reader	Reliable	ML{RF}	- Remote monitoring of tagged individual. - Capable of 3D tracking. - No false positive or false negative event	- Height detection errors of 20 cm can occur.
Vision	[7]	1 RGB camera (External)	Sen = 98.15 Spe = 97.10	ML{SVM}	- Frames on-the-fly for real time processing.	- Camera position ambiguous - Raises privacy concerns.
	[8]	3 Depth cameras (External/2	Acc = 96.48% Pre = 90.20% DR = 96.65%	ML{CNN}	- Introduces voting strategy to improve performance.	- The number of cameras increases the cost

		at corners, 1 on the edge of a room)			- Voting strategy can be used with other sensors	
	[9]	1 Depth camera (External)	Good	ML	- Analyses effects of various camera heights	- Does not provides a concrete solution
Ambul-atory	[10]	1 3-axis acceleromet er (Upper thigh)	FMFP: Sen = 97.8% Spe = 99.1% SMFD Sen = 98.6% Spe = 99.3%	ML{NLSVM }	- Capable of fall prediction	- Only SVM is used to detect the fall. This may result in high false alarm.
	[11]	1 Acceler-om eter, 1 gyroscope (waist)	Acc = 99.80% Pre = 100% Sen = 98.5% Spe = 100%	ML {KNNs}	- Uses gyroscope to reduce false positives.	- Room for improvement for more complex falling scenerios.
Fusion	[12]	one 3-axis accelero-m eter (Wrist), 1 depth camera (External)	Acc = 90%	ML{RF}	- Can be applied to low performance system. - Uses more realistic dataset.	- Elders may forget to wear or charge such devices - It's not an optimal combination
	[13]	1 Heart rate sensor (finger), 1 accelero-m eter (wrist)	Sen ~ 93.09% Spe ~ 89.58% Acc ~ 92.22%	ML {GMMs, BIC}	- Uses unsupervised learning.	- Heart rate sensor is costly and unmanageable. - Sensitivity varies a lot by location.
Ambu-l atory (Smart-phone)	[14]	Gyroscope (pant pocket)	Max Acc = 95.65%	ML{SVM}	- Considers multiple scenario in which a fall can occur	- Does not use standard dataset
	[15]	3-axis acceleromet er (pant pocket)	Acc = 99.38%	TB	- Uses different kinds of ADLs for testing	- Smartphone is kept in pant pocket - Cannot consider all type of falls
	[16]	Accelerome ter, gyroscope (pant pocket)	Acc ~ 96.75%	ML (Deep CNN and LSTM hybrid)	- Uses MEFD framework - Uses MobiAct dataset for training	- It is an online fall detection system - Assumes it can send data after a fall accident.

CHALLENGES AND FUTURE SCOPE

The state of the arts techniques has come a long way since the first fall detection system. The research in this field, compared to prior few years have also improved. But there are still certain problems that are still unresolved. These overarching problems or challenges can be classified into following categories.

A. Non-ambulatory

Although vision-based model provides a great performance and are unobtrusive in ADLs of the older adults, there is a fundamental problem about being under surveillance 24 x 7. This raises huge privacy issues as someone can misuse the images obtained from the cameras. This is less of an issue for depth sensors [8-9], since they don't take clear images of the individual or the room which is being monitored. [7] Might suffer as the researchers have proposed the idea to make the footage available to the caregivers. According to the studies, cameras fixed at place it can only monitor a single room, and if we want to expand the system to different rooms, the cost of the system will increase very quickly.

Privacy and expenses concerns are generally lessened by ambient models [4-6], but it is still limited to a particular room. Also, both camera and depth sensor are vulnerable of being obstructed.

B. Ambulatory

Ambulatory devices/models overcome almost all the challenges of non-ambulatory models. The monitored individual can walk around with the system anywhere at home or even outdoors. They don't have to be captive inside a room. This type of sensors is generally cost effective

However, the fall detection systems are developed for the elderly people. They tend to be forgetful. They might forget to charge or carry the device. Location of the device greatly affects the performance [11]. Moreover, smartphone can adversely affect a person's health if positioned near chest of a heart patient.

During a fall a possibility is there that the device that is being carried, might get damaged.

C. Fusion

Fusion systems are primarily developed to reduce the false alarms [12] that can occur during ADLs. It also improves accuracy [13].

The challenge of creating a fusion system that involves both ambulatory and non-ambulatory model has benefits and drawbacks of both classifications [12]. Making the processing light for fusion system is difficult due to multiple sensors. It is more expensive than fall detection systems using single sensor.

CONCLUSION

Falls have a very adverse effect on the older adults especially who live alone or might have a health condition. This has resulted fall detection to become of the most active research area. Rural Health care is one of the largest challenges to the Health Ministry of India. Therefore, this paper is a valuable contribution in the technological advancement for rural population.

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Survey on Security Challenges in Fog Computing

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Abstract
The Internet of Things (IoT) has created a revolution by turning ordinary objects into intelligent objects which process data automatically. Fog computing model expands cloud storage, networking, and computation to the edge of networks by offload- ing data to the cloud data centers and thereby reducing service latency for end-users. The properties of fog computing, however, create new challenges to security and privacy in achieving the benefits of the IoT. Due to the characteristics such as versatility, complexity and large-sized geographic distribution, the current security and data protection metrics of cloud computing cannot be applied directly to fog computing. This paper gives a general review of current security and privacy issues, especially in the field of fog computing. Finally, open research topics on ongoing research, open problems, and research developments in fog computing issues relating to privacy and security are discussed.

Keywords
Fog computing, IoT, Security, Privacy

INTRODUCTION

CISCO had coined the term fog computing. It is also known as edge computing that deploys data centers on the edge of the network, delivering location flexibility, low latency and increasing quality of service (QoS) for applications that are nearly in real time. Fog Computing decentralizes the system without centralization, such as with cloud computing. Gener- ally, fog computing is deployed to overcome latency issues. Because of the significant physical gap between data Center and end-user, cloud computing experience a major delay from end to end data communication, network congestion, massive data processing and connectivity costs. Fog computing has been proposed as an alternative to traditional cloud computing to assist the geographical distribution, high latency and IoT applications with better quality of services.

A. Edge and fog computing

The term 'edge computing' and 'fog computing' are quite similar that is used interchangeably by both industry and academia. While the main purposes for edge computing and fog computing are the same, i.e. minimizing end-to-end la- tency and reduce network congestion, it varies in the process- ing and management of data and the location of information and computing power. Devices in the network edge plays its part in locally handling data instead of sending data to the cloud, whereas the fog node is intended to process the data by making use of its own resources or to send them to the cloud from multiple data sources. In comparison, Edge Computing cannot support a number of services including Software-as- a-Service (SaaS), Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) or other services related to cloud comput- ing, but these can be expanded to include in fog computing.

B. Fog computing architecture

Traditional fog computing architecture consists of three lay- ers i.e end-user, fog and cloud layer. The layers are discussed in brief as follows:

- Layer 1 – End-user: This is the bottom-most layer in the three-layered architecture. This layer contains IoT-enabled devices such as sensor nodes, sophisticated mo- bile appliances (e.g. iphones, tablets and smartwatches) etc. Functions that are performed by the end-user layers are,
  - To classify physical objects and collect information from such items.
  - Conversion to digital signals of sensed data
  - For network communication and retrieval, send data obtained from surrounding objects to upper layers.
- Layer 2 – Fog: The fog layer consists one or more fog nodes. The fog nodes can be any network devices such as router, switch, gateway, access-point etc. The main function of this layer is to allow various applications to be handled. Such fog nodes can share data and computer equipment in partnership.
- Layer 3 – Cloud: The topmost layer consists of tradi- tional cloud server and cloud data-center. Generally, it is assumed that cloud server has huge storage capacity and resources to process data seamlessly.

LITERATURE SURVEY

Extensive number of studies [1] can be found in security issues in fog computing. In [2] and [3], authors have discussed a brief overview of fog security and confidentiality concerns whereas authors in [4], [5] have discussed the privacy issues. Ni et al. [6] have discussed the privacy preservation in fog- based vehicular

networks which focuses mainly on vehicle crowd-sensing whereas Wang et al. have focused on fog forensic in their study in [7]. Eventually, authors in [8] have discussed the access authorization in fog network. However, all the researches above either takes limited account of security and privacy challenges or is very early on. Hence a comprehen- sive overview of these privacy and security issues is lacking in fog computing. The main aim of our work is to fill the gap by providing an up-to-date detailed study on the advancement of security and privacy mechanism in fog computing. Apparently, the open research issues are addressed along with the possible future research directions to overcome those issues.

SECURITY AND PRIVACY ISSUES

Data centers usually belong to cloud service providers during cloud computing deployment. However, different de- ployment choices allow fog service providers to be different parties. For instance, cloud service providers that are interested in increasing their cloud services at network level may build fog infrastructures at the network edge. Likewise, internet ser- vice providers with control over home or wireless base stations can constitute fog network with their current infrastructures. Even the end users can also convert their local privately owned cloud into fog to cut down ownership costs. Such versatile nature complicates the security and privacy situation of fog.

A. Trust and validation

The most important key aspect in any fog computing network is to provide end-user reliability and secure services. In order to achieve this, each and every device associated with the fog nodes should have a degree of trust among themselves. Both the fog nodes and the end-users should validate to earn the trust level. In one hand, the fog nodes that provide IoT system services should be able to confirm that the requesting services are real i.e. they are coming from a legitimate source. In comparison, the end-user devices sending data and other useful information along with data processing requests should also be in a position to test the protection of the targeted fog nodes. Therefore, a strong trust model is needed, so that the fog network can be reliable and safe. The reputation-based trust model [9] in e-commerce service is commonly used among many models for trust management in cloud computing. Damiani et al. [10]have suggested a comprehensive resource selection system for P2P networks using the distributed polling algorithm to test the reliability of a resource before downloading. However, this service model is highly dependent on overall opinion that makes it less suitable for fog nodes having dynamic nature. Consequently, the cloud services and end users have received considerable attention by the service level agreement (SLA) in the design of trust model for cloud computing. Some other well documented, hardware- based security models for trust utilities are Secure Element (SE), Trusted Execution Environment (TEE), Trusted Platform Module (TPM) etc.

B. Authentication

Authentication is a major issue for the security of fog computing since fog nodes offer services to large-scale end- users. A device must first be authenticated into the fog network in order to access the services by a fog network. This is important to avoid unregistered nodes joining the network. Authors in [11] have suggested authentication based on Public- Key Infrastructure (PKI) with multi-cast authentication for secure communications. However, traditional authentication based on PKI is poorly scalable and inefficient. Likewise, NFC can also be used, in case of cloudlet, to ease the authentication process [12]. This operational model would prevent non- authorized nodes from entering the fog network. Further, the fog nodes would be able to restrict malicious / compromised nodes' service requests.

C. Secure communication

The wireless network security is important for fog net- working because of the predominance of wireless networking. Though it is possible to offload the storage and processing requirements to the fog nodes, same is not true in case of secu- rity requirements. Generally, when an efficient management of network resources or network administration is important, fog nodes interact with each other. The following communications between these devices should be secured in order to ensure contact in a fog network environment.:

- Communication between end-user and fog node
- Communication between inter fog nodes

In general, an IoT system can communicate with one of the fog nodes in the fog network when processing power and storage is needed. Rather, the end-user may be unaware of the existence of the fog nodes in the network that delimits the usage of symmetric cryptographic techniques to provide security. The introduction of software-defined networking (SDN) in fog computing can make deployment and management of the network simpler and improve network scalability that leads to reduce costs. In addition, the application of the SDN technology in fog computing will create new challenges and opportunities for fog networking security.

D. Privacy

The misuse of private data attracts attention as end users use technologies such as the Internet, WLAN and IoT. Privacy protection in fog computing is even more difficult as fog nodes, in the proximity of the end-users, can gather sensitive data, e.g identity and location, from end users when compared to the centralized core network cloud server. It is difficult to centrally control the fog nodes as it use to be geo-distributed. In many cases such as cloud [13], Wireless network [14], smart grid [15], and online social network [16], privacy-preserving strategies are discussed. Location privacy, as illustrated in [17], is one of the most important data protection model as the location of

devices is connected with the owners. However, when the end-users offload their tasks into the nearest fog nodes, an attacker can reveal the location and even the mobility pattern of the particular user. Techniques like homomorphic encryption may be used to ensure that aggregation, that is privacy-preserved, is not decrypted at local gates. Differential confidentiality [18] may be used to ensure that, in the case of statistical queries, the confidentiality of arbitrary single entry is not disclosed. As shown in [19], smart meter readings can reveal information about the time, the house or even television programs the consumer likes to watch. Although there is a framework for protecting privacy in smart meter [17], they cannot be applied directly to fog computing because of the lack of trustworthy third parties. A smart partitioning method would be devised to ensure that the offloaded resource does not reveal information about privacy.

E. Intrusion detection

In fog-computing intrusion detection system must be implemented at all three architectural levels to track and analyze fog-nodes, devices and cloud service traffic and behavior. The security of a single system level is not adequate for ensuring that a virus or malware will not spread to the rest of the network from a infected node. Fog computing offers new possibilities to explore how it can be used to detect intrusions on the client as well as the centralized cloud side. Authors in [20] have introduced a security architecture focused upon a cloud mesh that can detect intrusion into the distance domain, protecting mobile device, server and web communication. However, there are challenges, for example, to implement intrusion detection in a large-scale, geo-distributed fog computing environment that meets the demand for low latency.

OPEN RESEARCH CHALLENGES

Generally, cloud computing is highly secured by cloud providers, but for many reasons, all security solutions cannot be easily broadened to fog computing. While several studies in [6], [8], [14], [20] have considered a secure interaction between fog nodes, authentication and authorisation, intru- sion detection and key agreements in fog computing, these approaches have been addressed either partially or in the early stages of security and privacy issues. In this section, we have pointed out some open research challenges which directs towards some future research scope in the field of fog security.

- Trust issues in the fog network are somewhat more com- plex when compared with cloud computing. As discussed earlier, fog architecture needs a two-way trust model but due to the dynamic characteristic, implementing and maintaining of such trust model is very challenging.
- End-users' information, those are shared among the close proximal fog servers, need to be protected as any kind of network attack, e.g. Man-In-The-Middle (MITM) attack, can easily exploit the sensitive information of the users. Hence, it is a challenge that how fog computing should provide privacy of location and identity.
- In a heterogeneous network, authentication and key agreement in each layer as well as different gateway levels are important in fog computing which is a major challenge for the future prospective.
- A mobile fog node can join or leave a fog network frequently. Thus, implementation of any security mechanism or maintaining privacy issues in a mobile fog is very challenging.
- Cross-border issues comes under legal dimension in both cloud and fog computing network. As fog computing have the feature of geographical distribution, such issue is less important than that of centralized cloud forensics. Still there are some challenges to overcome cross-border legislation in fog computing as there are still requirements of international jurisdictions in fog forensics.

CONCLUSION

Security and privacy problems are well investigated in cloud computing, however, due to various different features and a wider range of fog devices in the edge of the network, they are not all appropriate for fog computing. This paper addresses many security and privacy issues in the field of fog computing which is a modern computing model to provide local end- users with elastic tools at the edge of the network. We also discuss data protection concerns, data privacy and safety, which may need more in-depth research if new challenges and improvements are to be addressed.

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An Effective Tool for Deaf and Dumb People

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Abstract
Today, the applications of artificial intelligence are very popular and there are lots of applications. But in this paper, we discuss an application idea where we detect the thoughts of dumb or/and deaf people and provide our suggestion about their thought to them instantly and easily by using artificial intelligence and targeting how much of this work can be done at low cost. In today's world, we separate the people who can speak from the people who cannot speak i.e. dumb or/and deaf people. As a result, they can't associate with anymore and they keep themselves away from any work. Many times, maybe they have special ideas that can help the whole world move forward. But they can't move because they can't express their thoughts properly or normal people don't understand their thoughts.
So, if such an application can be made for them it will be easier for normal people to understand their thoughts and feelings depending on their gestures and posture. As a result, dumb or/and deaf people will get self-confidence and will be able to make a lot of progress in their carrier.

Keywords
automatic speech recognition, speech recognition, gesture recognition, finite state machine, NLP, HMM, N-gram

INTRODUCTION

In artificial intelligence, lots of applications are there, but now we are working only on two components: Image recognition and Speech recognition.
Image recognition, in the thesis of machine vision, portrays an ability to classify any places, people, text, and actions or objects from images using the software. Computers use machine vision technology along with cameras and software using artificial intelligence to achieve image recognition.
Speech Recognition refers to the conversion of a spoken word into text.
The communication between dumb or/and deaf people with normal people Sign language plays a major role.
Since most people become handicapped while using hand sign language. Therefore, at the time of emergency, communication between both parties becomes very difficult. So the solution for this problem is to translate sign language to audible human voices along with the supporting text.
There are mainly two techniques that humans achieved for detecting hand motion or gesture i.e., vision and non-vision techniques. Using vision-based techniques, cameras use gesture detection and for non-vision-based techniques sensors are used. For this project, a vision-based technique is to be used.
By using these two application algorithms we proposed a low-cost mobile application where images or hand gestures are converted into text as well as audio. On the other hand, audio is converted into hand gestures as well as text.
Here we use the image recognition process for identifying the activities of dumb and deaf people to express their feelings or emotion to us and use the speech recognition process to identify our voice to convert an image or video as well as text to them.
This application will help to minimize the communication gap between normal people with dumb or/and deaf people.

EXISTING WORK

Following are the different hand gestures to audio and text recognition systems:
Prof. Neelam Phadnis , Vedant Pandey, Neeraj Yadav, Rupesh Prajapati,Nupur Jamindar, [1] capture image using web cam which sent benearth pre-processing for process the attribute of images. Accuracy is 90% and work successfully within the tremendous lion's share of the tests.
Mihir Rathod, Akanksha Shetty, Sharmila Gaikwad, Pooja Shah , Akshaya Satam, [2] utilized SIFT, the era of highlight the image, capture image, and change this. The motion would be interpreted into corresponding letter set.
T. Prem Jacobthe , I. Puneeth and Kollipara Sai Varun [3] made a system where user will give hand gesture as a input data which will arrange by neural processing and then it will prepare data within CNN.
Wei Du and Hua Li [4] proposed a system which is taking input employing a CCD camera. This image goes through a division step where extraction of the user's hand from the input image is done utilizing skin color channels. The binary formatted output of this step is received. Feature extraction is done after this. Both global and local are used for the upgrade of the strength of the system. Utilizing the finite state machine the cluster is done.
Zhi Li, Ray Jarvis [5] used a web camera to capture the depth information. Thereafter a few preprocessing methods, depth information utilized to portion of the

hand and after that find hand in Three-dimension space. The 3-D hand direction can be recognized using Finite State Machine. Every signal comprises a few states. 3D hand position decides the state move of each signal recognizer. Tests appear that the framework performs dependably for recognizing both inactive hand shapes and spatial-temporal directions in genuine time.

Following are the different audio to text recognition systems:

H. K., A. L. Pranjal Ingle [6] advised that for STT conversion, at first capturing the audio after that convert to corresponding text. For TTS conversion, plaintext converted to audio, after that it should be played to the user. STT conversion, TTS conversion, and IVR are three modules used in the proposed email system based on voice.

N. T. D. B. Sunanda Mendiratta [7] outlines the fundamental processes that occur in a STT system, that including the architecture of ASR. Machine Learning use in SVM , ANN and ASR with the Cuckoo search method and back propagation classifiers, is the main topic of this article. Machine learning is used to investigate the basic phases of the STT system, including pre-processing, feature extraction, and classification.

S. K. Saksamudre [8] suggested the pace of STT conversion can be improved by combining several strategies, resulting in higher-quality text. The goal is to create a continuous STT system with a considerably larger vocabulary and speaker independence that can accurately distinguish the voices of different speakers. A combination of ANN and HMM will be heavily used in the development of such a system.

N. K. P. K. Bhupinder Singh [9] looked into how HMM implemented STT and proposed creating a voice-based machine interaction system. The technology might be used to assist two different categories of user's, people with disabilities those are unable to access their own email using a keyboard and mouse. People those are not comprehend or ineffective in English and prefer to convert their original mother tongue, such as English, Punjabi, or Hind.

SPEECH RECOGNITION

Speech recognition, which is formally known as Automatic Speech Recognition. Speech-to-text, is one of the feature which may helps computer software to convert human audio/speech to plaintext. Sometimes it makes a confusion with Voice Recognition. The difference is voice recognition focused on identifying a particular user's voice and speech recognition focused on converting speech from audio to text.

3.1. Speech recognition algorithms

To convert speech to text and increase transcription accuracy, a different type of algorithms and computer approaches are applied. There are some most regularly utilised approaches, with brief descriptions:

i. Natural Language Processing (NLP): It strictly a distinctive method for speech recognition, it's a branch of artificial intelligence that focuses on human-machine relations through languages, such as speech and text. Like for voice searches, most of the devices inculcate speech recognition to enhance their systems.

ii. Hidden Markov Models (HMM): It allow us to incorporate hidden events, such as part-of-speech tags, into a probabilistic model. It used as sequence models in speech recognition, assigning labels to each item in the sequence, such as words, syllables, phrases, and so on. With the available input, these labels create a mapping, allow to identify most relevant sequence.

iii. N-grams: An N-grams are a collection of N no. of words. i.e. "order the pizza" is called trigrams, "please order the pizza" is called 4-grams. To increase recognition, accuracy, probability of particular word sequences is used.

iv. Neural networks: It is mostly used for analyse training data and deep learning algorithm. inputs, thresholds, weights and outputs make up each node. If the output value exceeds a given threshold value, then passing data to next layers in the same networks.

v. Speaker Diarization (SD): It recognise and segmentation of speech based on the identification of the speaker. This enables programmes to discern between people in a discussion and is commonly used in contact centres to distinguish between customers and salespeople.

GESTURE RECOGNITION

Gesture recognition is a system that capture and interpret hand movements as an instruction using sensor. It usually to control the IT system without touching any buttons or screens — in the automotive industry.

A gesture recognition system begins by taking frame-by-frame photos of hand placements and gestures using camera focused at specific 3D zone within the system. This camera is usually positioned on the roof module or another unobstructed observation point.

These photos are evaluated in real time system using machine learning, that use a prepared library of signs to interpret the hand motions into commands.

PROPOSED MODEL

If we build an Android based mobile application to communicate with dumb and deaf people, it will be convenient and easy for everyone to access. Nowadays everyone uses smartphones. Every smartphone has a built-in camera and speaker. So if we build a mobile application that doesn't need another camera or speaker. As a result, the cost will be reduced.

We propose building a mobile application which we think will be the work as translators between dumb and deaf people with the non-deaf and non-dumb people. In this app, if a deaf or dumb person login then he or she will be able to type or record the sing gesture, and then with the help of Gesture Recognition and text to speech conversion we can provide the audio version generated by analysing the recording or text input. Similarly, if the user is a non-deaf or non-dumb person then he or she can

provide the message which needs to be conveyed by text or audio format. With the help of speech to text conversion, we can get the input string and with the help of reverse engineering we can generate the pictorial representation of the input i.e, the output will be the sign gesture for the given input.

ALGORITHM

i. Gesture to Text and Audio:

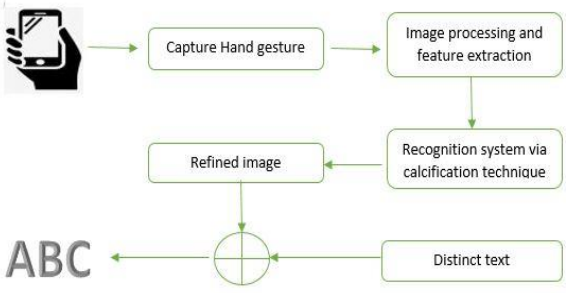
Step 1: A simple mobile camera is used for capture hand gesture image.
Step 2: After the image has been acquired, it is processed and some features are extracted.
Step 3: These features are then sent into a recognition system via a classification technique.
Step-4: Once the gesture has been identified, it can populate the data by mapping the refined images to its distinct text i.e, map each letter with the refined images signifying the sign symbol associated with each letter and generate text.
Step-6: Convert the text data to audio locally.

ii. Audio to Gesture and Text:

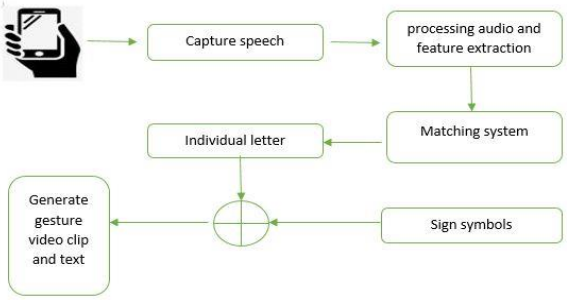
Step-1: The speech of normal people is captured using a simple mobile voice.
Step-2: After the audio has been acquired, it is processed and some features are extracted.
Step-3: These features are then sent into a matching system to match the individual letter to sign symbols.
Step-4: After the matching is done it can show the images of the sign symbol fluently by tweaking the framerate of the output and we will also print the words whose pictorial representation is getting displayed for the better understanding of the user.

FLOW CONTROL

i. Gesture to Text and Audio



ii. Audio to Gesture and Text



CONCLUSION

Through this paper, we are proposing an algorithm for all deaf and dumb people. The key factor is to facilitate these people from these risk factors and to help them become more confident to manage their situations. The main advantage of the modern world is that many people use smartphones so very easily they can access them wherever the need comes. A simple interface will be made to make the mobile application simpler. It will be a true friend for both dumb and/or deaf and normal people as well in this digital era. We shall try to make this application as friendly as it can be for learning procedures.

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Judgment of Lockdown Depending Upon the RR Ratio

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Abstract
Covid19 has spread all over the country. which is a major health concern. We have tried to create a model considering the previous lockdown experience. In this paper, we are using a mathematical model and we will try to understand when covid can be spread. It is also important to know when to do Lockdown. The basic Reproduction Rate(rr) is calculated and also calculated correlation coefficient(r) with the help of New cases and new death as worldwide. In our algorithm check mainly two things r and rr value. when r<0 then we consider the rr value. If we will see that rr value is lesser than r value then that country will not make any lockdown if rr value is greater than r value then we should make a lockdown.other case we may release the lockdown procedure slowly.

Keywords
RR Ratio, Lockdown

INTRODUCTION

Covid is the biggest epidemic in the whole world. Covid declared global widespread by the World Health Organization (WHO).1st spread on china[1] 11th March, 2020[2]. The beginning of the covid symptoms is Coughing, fever and respiratory problems then it is growing day by day. It can seriously affect to kidney failure, and pneumonia of patients, and even death. This virus moves from one human body to another through respiratory droplets[3]. Vaccines are not enough, the most important thing is that public lockdown, social distancing can be improved to minimize the spread of covid[4][5]. Among the South Asian countries, India is not in a good position to suppress the covid. India is a developing country with and second-height population so very challenging for India to control the spread of covid[6]. There are several rules for preventing infection of covid19. Make some social events and people need to understand the current scenario. social interaction should be closed like schools, colleges, cultural, theaters, and sports but should open the essential service like the hospital, bank e.t.c[7-9].

PROPOSED ALGORITHM

This part provide decision tree of the algorithm which gave us the proper prediction for spread of covid in a particular country. We will try to understand from this algorithm how covid is spreading and also when covid can come to any country. There is a two module .1st module of algorithm will take the data from dataset. Then after it fetched data like new_case, new_death, total population,bitrth_rate for a particular country. This algorithm makes a decision tree for predict our case.

Algorithm 1:Input
Step 1: Start
Step 2: take the country name and birth rate for that country as input from a user.
Step 3: extract the data from dataset as database of our algorithm.
Step 4: Now prepare the dataset.NC as New_Case,ND as New_Death,TP as Total Population,BR as Birth_Rate
Step 4: call the function Decision_For_Lockdown(NC,ND,TP,Country,BR)
Step 6: Return prediction wheather the country should be lockdown or not.

Algorithm 2:
Decision_For_Lockdown(NC,ND,TP,Country,BR)

Step 1:Calculare r.where r is correlation coefficient.

$$r=\frac{Cov(NC,ND)}{\sigma_{NC}-\sigma_{ND}}$$

Where,
Cov(NC-ND)=E(NC,ND)-E(NC).E(ND)

$$\sigma_{NC}=\sqrt{E(NC^2)-(E(NC))^2}$$

$$\sigma_{ND}=\sqrt{E(ND^2)-(E(ND))^2}$$

Step 2:We calculate Reproduction_Rate(RR)

$$RR=\frac{birth-death}{population}*1000$$

Step 3: if r > 0.5
Step 3.1: Then Show “Lockdown”
Step 4: else if r >0 && r <0.5 and SI > 50 and RR>1
Step 4.1: Then Show “Lockdown”
Step 5: else if r >0 && r <0.5 and SI < 50 and RR>1
Step 5.1: Then Show “Lockdown”
Step 6: else if r >0 && r <0.5 and SI > 50 and RR<1
Step 6.1: Then Show “Unlock”
Step 7: else
Step 7.1: Show “Unlock”

Step 8: Above algorithm is valid for where population is not more than hundred crores.if population cross hundred crores then we assume r as 0.75 due to huge population

RESULTS AND DISCUSSION

Total confirmed or positive cases, active cases,death cases collected from[09-11]] which is plotted in Supplementary. Table 1 and Table 2 list parameters estimated from our model for COVID19 outspread in France and India.

Case Study

Predictions for France for the year 2020 -2022

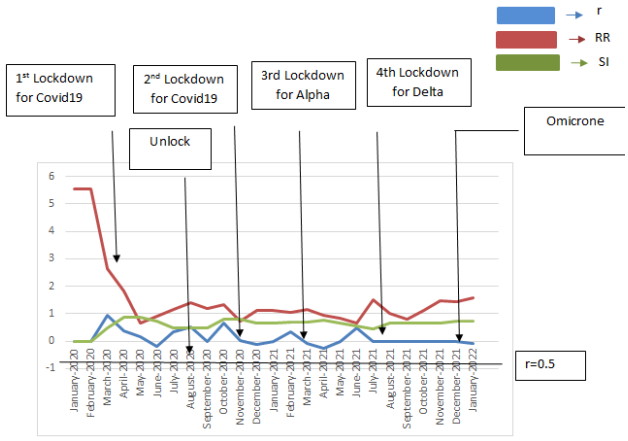

Table-1

Predictions for India for the year 2020 -2022

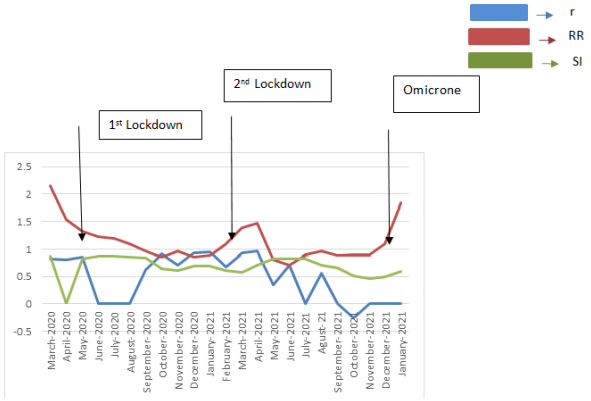

Table-2

population of India is very high.thats why r is vary for country to country.If population is more than hundread crorers then r vary to 0.75.so above diagram shows the clear picture.

Lockdown Effect

The situations are taken into consideration for social distancing ,lockdown[12]. In order to tighten the lockdown, we have to maintain many restrictions.some of these are travel should be banned,social events should be reduced ,masks should be distributed at low prices[13], have to focus on increasing the covid test.We are continue checking r and rr value.when the rr and r value going to same then we predict that the lockdown can be relaxed.many country relaxed the lockdown many phases.If we slowly start unlocking process then spread of covid should be reduced[14].

CONCLUSION

From this algorithm we predict when Lockdown should be done[15]. We understand that the rate of infection is reduced by lockdown and also decrease the new effected people and death case[16]. We have seen that when the infection reaches its peak, then Government is thinking lockdown decision. Every time we check the rr and r value.If we compare rr and r value with population density then we may take some good decision. If we understand in advance that this time the situation is going to be very out of control then Government should take some decision that can prevent the virus[17]. If you want to get something good, you have to make some tough decisions and We need to raise awareness among the people[18].

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Intrusion Detection System using the Empirical Classification Algorithms

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Abstract
Digitalization, social media, Automation caused enormous use of the network for communication. To ensure the privacy of the system, the entire network needs to be secure. Internet of Things and excessive use of mobile and websites is causing a lot of data and traffic. Extensive use of networks for various applications attracts threats. There are several ways to accomplish the attacks, compromising the data privacy to compromise the information about the individual or to perform the attacker exploit the vulnerabilities.
Intrusion Detection System (IDS) and Intrusion Prevention System (IPS) mechanisms help in achieving security. As intruders are also aware of the conventional security mechanisms, there is a chance of overcoming the existing security system. These security mechanisms are exploited to breach the defense; so, Continuous up-gradation in the security requires the usage of AI (Artificial Intelligence) and ML (Machine Learning) techniques to ensure security keeping eye on the up-gradation of the security system. The challenge is to create a model with a data set of all the probable identities pertaining to intrusion and benchmarks of the normal functioning of the system. The research work proposes the solution by designing the Multiclass classification system for the identification of the attack. Empirical classification approach solving the multiclass classification is used in this Intrusion Detection System. The novelty of the algorithm lies in the use of balanced training for the Multiclass Intrusion Detection System. The multiclass intrusion detection system performs the identification of the threats with an accuracy of 97.56%.

Keywords
Intrusion Detection System, Machine Learning Model, Multiclass classification for intrusion detection

INTRODUCTION

Internet security is one of the challenging issues nowadays, considering the advances in techniques and the number of devices. A lot of data is generated so a lot of attacks to misuse that data can be expected. All these attacks and be made to the network. So, the protection of on-network from intrusion is necessary. The development in the field of security is not in the proportion of development that took place in the technologies, so there is a deficiency of a
security model to ensure Internet security. The best way to address this challenge is to gain knowledge from the intrusions of the past. Though analysis of earlier attacks includes various levels of intrusions, the flow of data during the intrusion, environment, and network components.
The improvement in the intrusion detection and prevention model is necessary for the accuracy and the cost incurred. Machine learning and deep learning can deliver essential information about the attacks and the mechanism to prevent these attacks.

LITERATURE SURVEY

XGB is an ensemble approach to combine various classification techniques, Random Forest technique is used for shortlisting the features [1]. The author has proposed a multi-classification model in which the recursive model is built to shortlist the features. [2] To select the best features out of the features finalized after the shortlisting follows the select K-based approach where the top dash in features is selected for further classification. Stream gradient boost in bracket XG boost is used to detect botnet attacks based
on the identity of threats.[3][4][5] XG boost is a tree-based ensemble learning classifier that is effective in the implementation of decision trees based on gradient boost. The performance of this XGB model is evaluated by using confusion matrix accuracy, F1_score, Kappa, MCC, sensitivity, specificity, threat score, balanced accuracy.[6][7] Also, the auto seeker is used to check the true positive rate against the false-positive rate. Accuracies further compared video other existing models; the result is 99.94% correct.[8][9] There is scope to design A model which will detect unknown attacks in IoT in an IoT environment. [2] The author has proposed the concept of Federated learning architecture. In Federated learning architecture the training takes place to add clients in, the individual client acts as a fat client, and the database associated with the intrusion and other noteworthy information is maintained at the server's end.[10][11] This type of training and database maintenance mechanism helps in maintaining the global database about the various identities of an intrusion, which are detected add different machines [5] Temporal

convolution neural network is an architecture that handles an unbalanced data set, and it is based on machine learning algorithms random forest and logistic regression.[12][13] The use of LSTM and CNN gives extra strength to the model del so as to deliver an accuracy of 99.986%. The performance of this temporal convolution neural network is superior to the other approach is used during the experimentation. [14][5][9] The author suggests that system and intrusion prevention system requires the focus on the development of security mechanism which able to distinguish between the internal and the external attacks in the network.[16][17] To overcome this challenge, the use of neural networks and fuzzy logic is necessary. The training data set helps in designing the rules by using neural networks. The database of Rules is maintained, and the intrusion is compared by using the process of fuzzification and defuzzification.[18][19] The accuracy of this model is 96.11%. [8] Deep DC algorithm is an intrusion detection system that tries to mimic the immune system which is available in
humans.[20][21] [23]The cost required to, and the action imported to minimize the effect of intrusion, needs to be extremely low.[24][25] To accomplish this cost reduction the false alarms, need to be minimized, the proposed algorithm [26][27] performs this activity by using the conventional classification algorithm along with the concept of event databases, analysis, response blocks. The accuracy achieved by using the deep DC approach is 98.73%.[18][28]

3. THE ARCHITECTURE OF SYSTEM

components of the proposed architecture is mentioned in Figure 1. The architecture represents the use of a multiclass intrusion detection system for the identification of intrusions using multiple classification methodologies.

3.1 Data set

KDD 99 data set [29] [30] is used to collect information about an identity of intrusions. The parameters involved in this data set are filtered in consequent phases.

3.2 Feature extraction

All the fields available in a data set cannot be used directly for training purposes. Therefore, the most influencing parameters [31] [32] are required as a feature of a data set. The feature extraction process provides the superset of all essential features which may be required in the phase of training. [33][34]

3.3 Feature reduction

Extracted features are further filtered in the feature reduction phase [35][36]. Dependency of one parameter over the other; the association among dependent and independent variable forms the base for shortlisting best features necessary for correctly identifying the intrusion.[37]
Multiclass classifier model is a set of various classification algorithms combined for delivering the best results. The logic used to combine these classification algorithms or to improvise these algorithms is the key parameter of this entire approach.[38]

3.4 Model training

Training phase is used right from the feature selection and reduction process. Now, specifically to train the system to identify the intrusion depending upon these statistics observed in the phase of training. The training process does not follow the conventional approach to split the data set [39] [40] into major and minor categories. Instead, randomness gives extra potential for the phase of training.

3.5 Model testing

The training phase delivers the wait is, which is to be verified in the testing phase [41]. To effectively classify the intrusion, unknown data set is used to classify the intrusion based on the training accomplished. The accuracy of the model should be enough to deliver the result accurately.

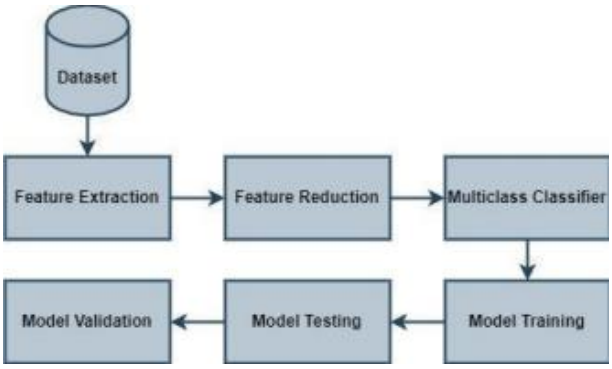

Figure 1: Architecture of Multiclass Intrusion Detection System (IDS)

3.6 Model validation

Validation of result based on the classification technique used to correctly identify the intrusions in a system take place indie validation phase. The accuracy of the algorithm proposed is 97.56%

RESULT

Accuracy of the classification technique can be calculated by using precision, recall, if major. The accuracy of a multi-class intrusion detection system is evaluated by considering sensitivity precision and if measured. Also, they are OC curves plotted for the further examination of the classification of intrusion. The accuracy of the system is compared with existing classification algorithms. Some of these algorithms are individual classification algorithms and the others are hybrid classification algorithms. The comparison reflects that the accuracy of the proposed algorithm is higher than any other classification algorithm used in the experimentation. The accuracy of the multi-class intrusion detection system is higher by 4 to 5% in comparison with the other algorithms**.**

Name of the Classifier Algorithm	Accuracy Precision	Recall F-Measure
Naïve Bayes	89.92 88.82	85.22 86.98276718
Decision Tree	92.58 90.36	89.55 89.95317659
SVM	88.258 81.59	79.99 80.78207823
Random Forest	90.55 89.25	88.54 88.89358232
XGB	93.55 91.22	92.59 91.89989446
Neural Network	87.98 90.01	89.34 89.67374854
Multiclass IDS	97.56 94.28	95.33 94.80209272

Table 1: Accuracy, Precision, Recall and F-Measure

Table one suggests that the accuracy of the decision tree, random forest, XG boost is comparatively higher. The accuracy of multi-class intrusion detection systems is highest than any and any other hybrid model individual or hybrid model. Figure 2 indicates the association between the True Positive Rate and False Positive Rate, the curve indicates that the association is acceptable as it is far away from the straight line.

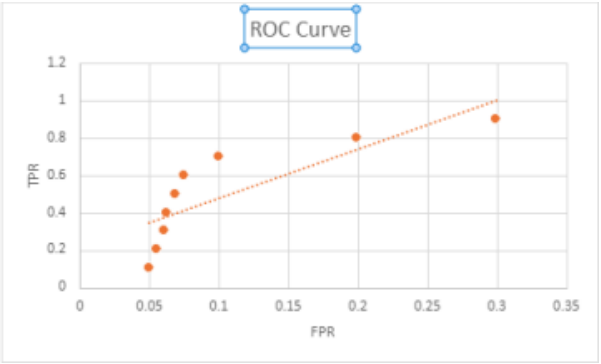

Figure 2: ROC Curve

CONCLUSION

The multiclass intrusion detection system delivers an accuracy of 97.56% for the KDD 99 dataset. The accuracy of classifying the intrusion is higher than the individual algorithm and in symbol algorithms as well. The improvement in the classification is because of the multiclass classification model, which regulates the weight assigned to each node 4 accurately classifying the data. The feature selection process also contributes to the accuracy of the multi-class intrusion detection system. The attempt is to design a model to classify any type of data set with higher accuracy. Thus, identity and behavior best intrusion detection system will deliver the accurate result Overtime. The classification technique used covers all permissions and combinations of approaches to precisely classify the data. This type of novel and unique approach delivered the higher accuracy with an error margin of 2.44% only.

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Digital Pathology in Clinical Practice

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Abstract
Digital Pathology has transformed the way histo-pathological slides were analyzed. Digitization of pathological samples have improved the normal pathological testing workflow. The process has become more efficient in terms of time and quality. Opportunity to store the images and analyze them remotely have introduced a new dimension in pathology. Computer vision applications and development of artificial intelligent based computer aided diagnosis system is now possible with the huge set of annotated images generated using the digital pathology system This will lead to better healthcare system exploiting the advances in technology. This paper surveys the workflow of Digital Pathology, challenges that exists with this new technology and applications of digital pathology in the field of modern medicine.

Keywords
Digital Pathology, Whole Slide Scanning, Laboratory Information System, Artificial Intelligence, Artificial Neural Network

INTRODUCTION

The term "Digital" has ushered in a new paradigm shift in Clinical Pathology. Involvement of technology in the medical domain was a constant endeavor throughout the history of medicine. Pathology is an important branch of medicine that deals with investigation of body parts/tissues for identification of aberrations that are unnatural or diseased. The involvement of computers in disease determination has led to the term computational pathology (CP). Significant development in imaging technology has contributed to improved digital images that can be analyzed and interpreted with the help of modern technology. Improvement in medical technology has enhanced the quantity and quality of captured images. Images are now easier to analyse and interpret by medical experts. Histopathology is the study of human tissues and are of great interest for several disease detection. Similarly, cytology is the investigation of individual cells through microscopy.

The use of imaging technology is considered an important tool in clinical pathology. The invention of X-Ray machines introduced the idea of medical images of body as a diagnostic tool. With rapid technological advancements, other imaging modalities became equally popular and widely used. These improvements in the field of Radiology introduced new challenges to the medical domain. High volume of information storage and archival was an important challenge with the popularity of radiology in disease determination. With superior computation techniques analysis and interpretation of image was being used as an additional aid to medical practitioners. However, such information dissemination was restricted and localized. Improvements in networking technologies and development in web technologies, cloud computing was utilized to archive imaging data. The stored data is standardized and made globally accessible to every corner of the globe for analysis.

Clinical pathology involves complex manual techniques for extraction and mounting of tissue segments on a glass slide. Automation of such techniques are still in progress. However, analysis of tissue sample by using traditional light microscope have changed significantly with the advancement in microscopy. There has been a significant progress in optical and digital technologies with the development of high-resolution digital cameras, digital microscopes and whole slide scanning technologies. The process of digitization of images obtained during pathological examination is shifting the paradigm with new terminologies Computer-aided pathology (CAP), Computer-aided pathology Diagnostics (CAPD), CP and Computer-Assisted Pathology (CAP). All of the terminologies are synonymous and refer to the basic workflow that involves digital image capturing technology/hardware coupled with a set of methodologies, utilization of computer hardware and software for interpretation of pathological images [1][2]. The Digital Pathology Association has extended the terminology of CP to involve Machine Learning (ML) techniques on all captured relevant data (imaging, clinical and metadata) to implement Artificial Intelligence (AI) systems for image interpretation.

DIGITAL PATHOLOGY

The term "Tele-pathology" was introduced in the 1980s that introduced a decentralized pathology system. A remotely operated microscope was used to generate image that was remotely viewed (a portion only) for the

purpose of second opinion. Success and popularity of radiological image analysis was an inspiration for the development of Digital pathology (DP). However, the development of such a systems was constrained due to unavailability of appropriate capturing equipment and imaging technology. Successive technological development in microscopy, digital image capturing cameras and image processing techniques have contributed to the development of Digital Pathology.

The normal workflow for pathologist was to use tissue samples on glass slides that was individually examined by the pathologist to detect any abnormalities. Such a system was being used for more than a century and since the invention of the light microscope. Antony van Leeuwenhoek was the first scientist to utilize microscope as a tool for observing living organisms and tissue samples. Later, Carl Zeiss introduced different lighting mechanism (other than natural light) that further improved the quality of pathological imaging. However, introduction of digital microscope was the first step towards introduction of DP in clinical analysis of tissue samples. A digital camera mounted on a stereoscopic microscope was able to capture images of microscopic samples at different lighting conditions and resolutions. The pathologist viewed such images generated remotely. It was also possible to archive images to see the progression of disease and other educational purpose. The advent of Whole Slide Scanners (WSI) made it possible to scan the entire slide sample into a single image. Optical Scanners digitized the captured image to obtain high-resolution pictures that are at par with best digital microscope, The term DP and WSI have since become synonymous for high resolution images that can be viewed, analyzed, transmitted over network and archived either locally or in cloud storage.

USE OF AI IN IMAGE ANALYSIS FOR DIGITAL PATHOLOGY

The digitization of pathology images using WSI technology have introduced a collection of images for analysis. The images can be analyzed by experts remotely. For the purpose of workload efficiency, it is important to leverage advancement of computer vision algorithms along with WSI images. Image processing through implementation of ML algorithm have revolutionized computer vision. Such ML algorithms are used to generate artificial intelligence (AI) techniques to analyse images. AI is based on automated rule generation through image training using labelled images. Such rules are used by the AI system to classify images. There has been a tremendous progress in computational pathology with the use of deep learning algorithms and Artificial Neural Networks (ANNs). However, deep learning algorithms need huge volume of training data that can be obtained by WSI. The use of Convolutional Neural Networks (CNNs), that is a type of feedforward ANNs are very popular in implementing deep learning in DP. These are very often used in computer vision applications of DP [3]. The use of Computer Aided diagnosis (CAD) systems as an analytical tool is being actively pursued that utilizes AI techniques for implementing DL models [4].

WORKFLOW OF DIGITAL PATHOLOGY

A DP system contains three major sub-components. The first major sub-component is the Information system (IS). This system is a seamless integration of other major information workflow in a hospital/pathological center environment. The IS system utilizes different hospital information from hospital information system (HIS), maintains patient/test related metadata in the electronic medical record (EMR), uses the laboratory information system (LIS) to manage the laboratory process flows and utilizes picture archiving and communication system (PACS) software for the purpose of viewing, analyzing and archiving the images generated during the DP workflow. The IS provides an interface for the DP system to interact with other relevant information. The DP system consist of image acquisition modules in terms of WSI scanners and viewers. The DP system consists of two basic hardware, an image capturing high-resolution slide scanner and a workstation to control the parameters of image acquisition. The workstation is also used to view, analyse and store images. The final component is the System tools (ST), which is a collection of software tools for image analysis and use of third-party software for image processing.

Digital images obtained by the DP system have two basic application, clinical and non-clinical use. In case of clinical utilization, the information is collated for the primary task of disease detection and diagnosis. Diagnosis is either possible locally or remotely called remote intraoperative consultation (IOC). Similarly, the popular tele-pathology or second opinion consultation, discussion medical boards with consultants of multi-disciplinary expertise, documentation of findings for future referrals, image processing/analysis, archiving and for quality assurance. The non-clinical applications are utilization of the DP resources towards education, marketing, bio-banking, utilization for the purpose of research and development of CAD systems and proficiency testing. The integration of DP with pathology laboratory, research institutions and hospitals have made the information available globally. Such integration of DP will help in cost effective diagnosis of disease. Moreover, DP will lead to CP with big data analytics for improved patient care.

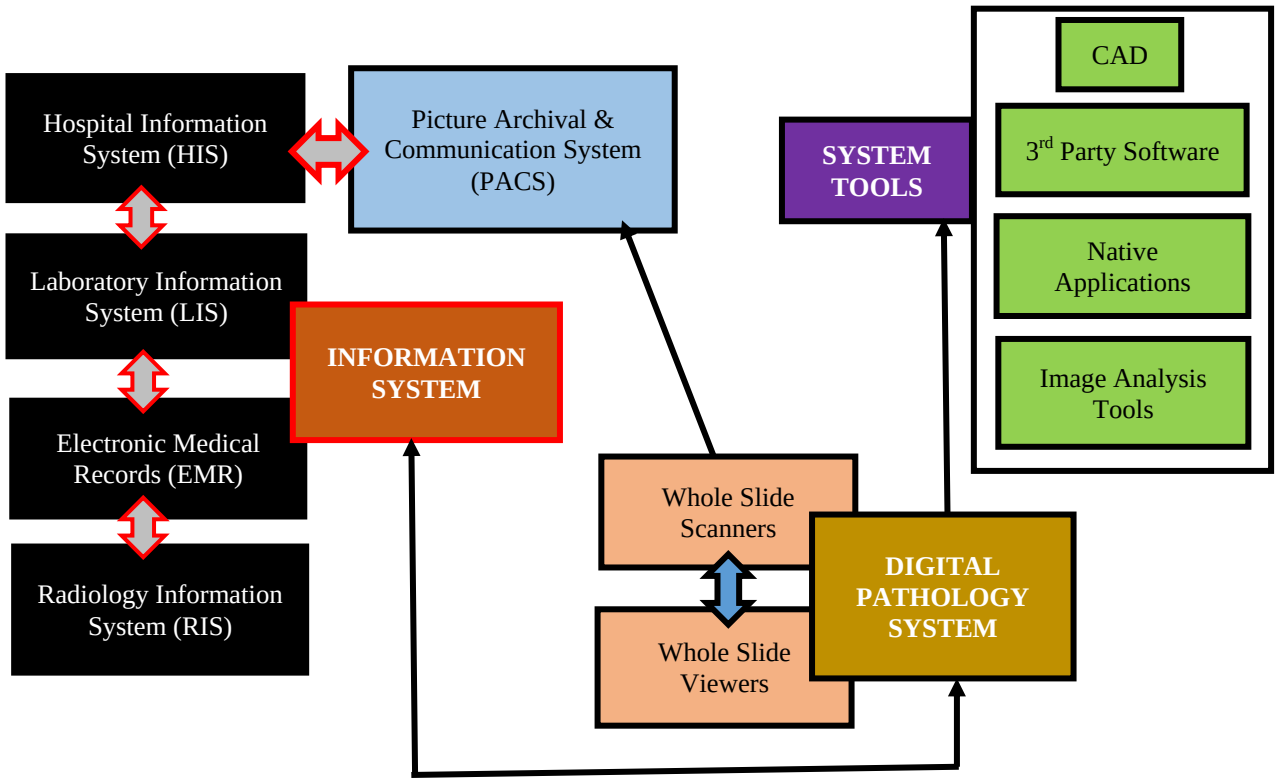

Figure 1. The components of Digital Pathology (DP) system along with their sub-components, namely Information System (IS) and System Tools (ST) towards DP system workflow

The normal, manual workflow that was the part of pathological study of specimen was being followed for decades. The glass slides were prepared and analysed. The slide carrying the specimen moved across the workflow from start to the end. However, introduction of computers did modernise the maintenance of the laboratory records using a Laboratory Information System (LIS). Previously, manual recordings on documents was used to keep track of every step of progress of specimen processing in the workflow. LIS systems made it easier to maintain records by keeping track of progress from the specimen acquisition to report generation. LIS also involves other software and utilities for quality assurance and analysis. During the entire workflow, the quality, safety and efficiency of each specimen is well traced. A well-equipped laboratory often uses bar code or radio frequency identification tags (RFID) to keep track of every specimen in the workflow thus preventing errors in patient identification. Use of full-scale barcoding of samples have prevented patient identification errors by 62% [5] and helped in real time tracking of individual specimen, assets usages and different laboratory processes ongoing within the laboratory [6]. The bar codes often carry information regarding allocation of resources like the name of specific pathologist to whom the specimen will be routed for analysis, staining protocols and additional processing data.

The workflow introduced by DP changed the pathway of the glass slide. The glass slide completes its journey after getting processed/scanned by the whole slide scanner. The digital slide obtained after scanning takes part in the rest of the workflow. Absence of physical slide improves the workflow efficiency as it is easier to view, search and organise a digital slide/image. The digital slide not only saves precious time of pathologist but also improves productivity of the laboratory. The new DP workflow helps in better management of pathologist time and optimizing resource utilization of the laboratory. Several studies in digital radiology [7] and Haemato-pathology [8] showed improved turn-around time and efficiency. The DP workflow improves quality and efficiency as it is easier to label images, identify region of interest (ROI) and can be easily associated with patient related data. Moreover, use of voice recognition software (VRS) can improve both time as well as prevent transcription errors. A study on inter-observer variability for glass and digital slides in prostate cancer biopsy [9] analysis and measurements revealed that the agreement was better in case of digital slides over glass slides. For better maintenance of patient records, the DP workflow system must ensure that LIS must communicate/update with HIS regarding e-labelling information. Moreover, parity in imaging format also helps in increased efficiency and quality outcomes.

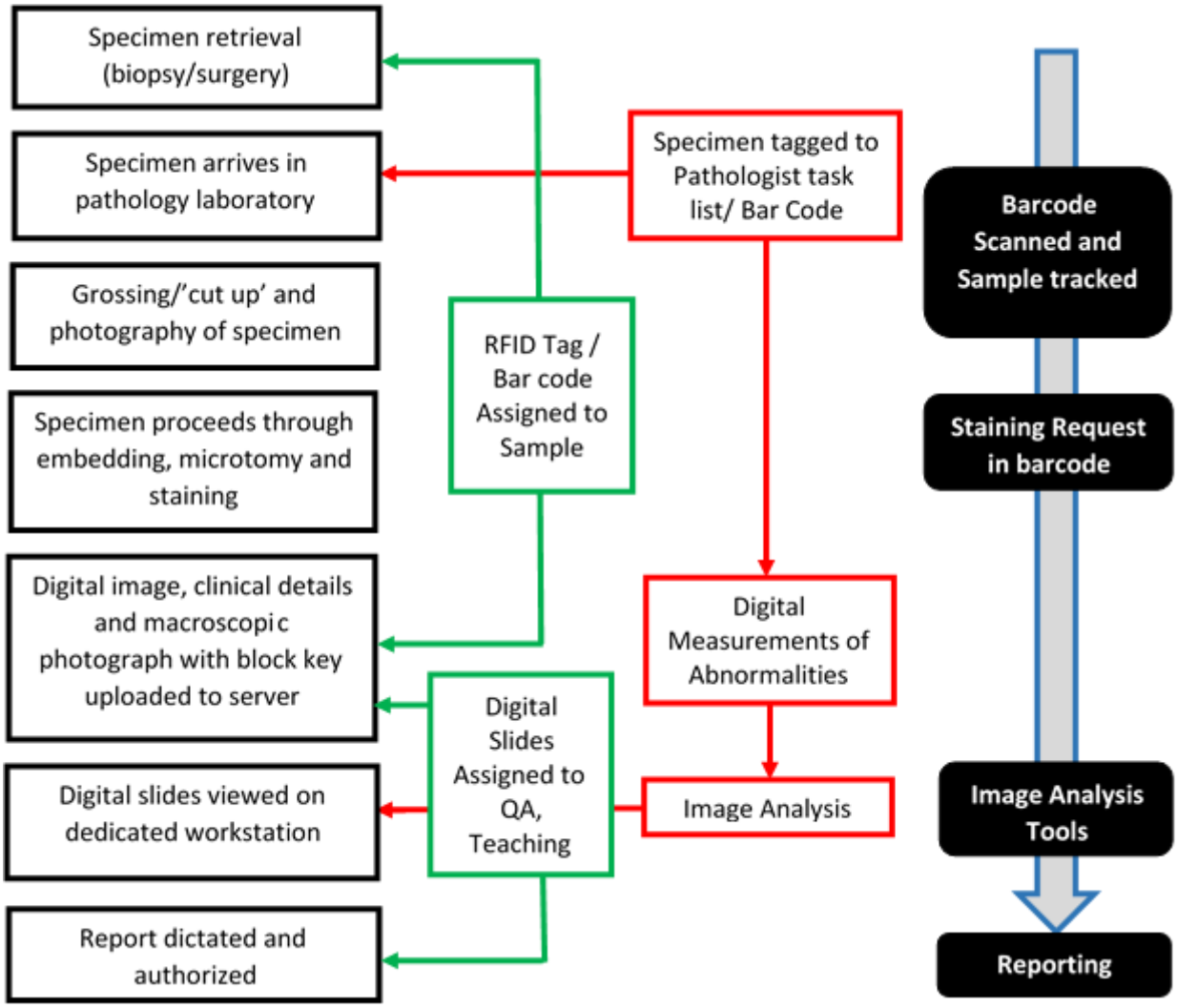

Figure 2. Work Flow Diagram for Digital Pathology Systems in a Laboratory.

COST BENEFIT ANALYSIS OF DIGITAL PATHOLOGY

The increased accuracy of DL systems in automating the DP workflow has made such systems popular. However, the cost incurred by such systems is an additional load on the existing workflow. Such cost has to be borne by the pathology centers. Few studies are present in the literature that has dealt with cost benefit analysis of DP systems and most of such studies are generalized that often do not consider the improved efficiency in the digital workflow. A study by Ho et al. [10] on cost-efficiency analysis, considered cost saving gains from presumed avoidance of over/under treatment and laboratory efficiency gains that was achieved at Pittsburgh Medical Center.

CHALLENGES AND OPPORTUNITIES OF DIGITAL PATHOLOGY

There is immense opportunities with DP as an effective tool for clinical pathology examination. However, there exists several constraints. Quality of AI solution depends upon the presence of abundant training data. Such data needs to be annotated by experts so that the AI system is able to learn from the labels. Lack of proper annotated dataset is a huge impediment in DP domain. The images exhibited by the pathological slides often are complex. This complexity arises due the overlapping nature of tissues in the sample. So analysis of such tissue samples are complex and the only solution is to have a huge annotated training dataset that encompasses all possibilities. The classical AI problems are mostly binary selection problems like malignant/non-malignant. However, DP exhibits complex relationship that cannot be expressed in binary terms. Similarly, WSI images are large as they have huge dimensions. These high resolution images having large dimensions are inappropriate for Deep Learning (DL) solutions. In any case DL down samples images hence the possibility of information lost is real. Implementation of DL solutions in DP requires huge investment on Computation hardware. High GPU rates are achieved during the execution of AI on DP and this cost the user must bear to implement DP solution. Another major drawback of DL systems is that the ANN networks lack transparency. The systems work as a black box and it is not possible to

explain the outcome. These constraints make deployment of AI systems in DP complicated.

To overcome some of the constraints, solutions are present within AI systems and DL algorithms. In this scenario, the algorithm that has gained popularity is transfer learning. In case of transfer learning the DL is first trained on a well-established training set that is unrelated to the problem set. Such pre-trained system is further trained on a smaller subset of problem data. The learning from the previous problem set is transferred to the present system. Use of Handcrafted features that are well understood can be used successfully to substitute black-box systems. Similarly, use of generative networks can solve the problem of lack of enough data by augmenting synthetic data that are difficult to discriminate. To solve the issue of absence/lack of labelled data AI provides the solution of robust unsupervised algorithms that can generate their own rules for classification. The opportunity to automate the mundane processes is a boon to the medical industry. Proper human resource utilization is possible when high accuracy rates of such automated systems help the pathologists to work only on limited datasets.

DIGITAL PATHOLOGY IN CLINICAL APPLICATIONS

The use of images generated by Digital Pathology along with implementation of image processing, machine learning and Artificial Intelligence algorithms formulates into a computer vision problem. The image analysis may further be enhanced by integrating other clinical information, genomic data and radiological inference data to develop decision support systems for medical applications. Such integration of data supports Computer Aided Diagnosis applications of Medical Imaging. Diagnosis of histo-pathological tissues obtained from a particular patient can be converted into a virtual slide. Further information obtained during radiology investigation (sonography, X-ray and MRI) can be corroborated with the result analysis obtained from the virtual slide.

The DP workflow can be adopted for screening solutions in the diagnosis of several diseases by analyzing the biopsy tissue samples and further corroborating with other clinical examinations and radiological data. The AI based systems should be able to differentiate normal tissue segments from abnormal tissues for correct diagnostic outcome. Tissue samples or biopsies are considered gold standard for disease determination for samples derived from but not limited to colon, prostrate, brain, breast, liver, kidney, skin and abnormal (tumorous outgrowth/ lesions) in such organs. The DP system coupled with AI for image analysis can determine quantitative features such as immune-histochemical biomarker, cell counting, spatial cell distribution patterns in a tissue sample, cell architecture, and density of cells and cellular components [11], [12]. Such DP solutions are also implemented for the purpose of standardization of scoring on morphological attributes for a wide range of biological processes such as breast cancer grading, glioma grading or Gleason score for prostatic carcinoma [13], [14]. The challenge in analyzing biopsy samples is the wide range of tissue variations that are categorized as normal tissue distribution. Such categorization is based the absence of any distribution that can be labelled as abnormal. The distribution variations are owing to age, type of biopsy done, location of tissue sample and even habits of the individual patient [15].

Development of complete diagnosis system for a specific disease that will assist the pathologist/oncologist/radiologist to derive a graded conclusion/inference/prognosis of the disease. Such a Computer Aided Diagnosis (CAD) tool are not complete without the intervention of the concerned medical practitioner. Such tools will be able to effectively eliminate human error, bias and make detection more objective. CAD systems will be able to segregate normal tissue samples over the abnormal tissue sample so that the pathologist will be able to focus their attention on the abnormal cases than the vast set of normal tissue samples. Moreover, system might label potential/perceived abnormal section over the large tissue sample area, thus, reducing the workload of the pathologist by reducing search area. CAD systems will provide solution for a particular disease like breast cancer, brain cancer, hepatic cancer, solution in nephrology disorders, colon cancer, prostate cancers, carcinoma in lungs, hematological disorders/disease, skin and wide-range of other applications. Inference drawn from such solution will based on integrating the clinical/non-clinical data, tissue patterns, quantitative metrics/scores obtained during AI based automated histopathological tissue sample analysis and detection of abnormal patterns in the sample. Development of CAD solutions have become a reality due to the DP workflow that generates enormous data to feed AI, ML, DL algorithms.

A major research area and application of DP workflow is to combine the morphological or phenotype features obtained by the process of image analysis from tumor biopsy sample with the genomic/genotype profile of the patient. Such combination can unearth the underlining reason behind the aberration hence a target response/therapy. However, the challenge remains on how to integrate the Next Generation Sequencing (NGS) data with the present CAD systems. Moreover, the processing, training, testing, validating models for large volume of data along with the high-dimensional feature set for both genomic and imaging samples, poses the greatest challenge.

AI with the DP workflow is an essential tool that is utilized for training of pathologists and preparation of updated course material to enhanced teaching experience for trainee medical practitioners. The new workflow supports automatic annotations. The use of AI helps to make reporting easier for the trainee pathologists/researchers/scientists. The normal educational processes are enhanced by supplementing the courses with these modern tools.

CONCLUSION

Clinical Pathology is an important field of medicine that tries to identify underlying abnormalities of a patient by conducting examination on body fluids, tissues and organs. The samples are extracted by doctors/surgeons/phlebologist/ technician and processed accordingly as per protocol. The normal workflow in the pathological laboratory was transformed with the introduction of digital technology. Conversion of a histo-pathology sample from a physical entity to a set of images opened up a new dimension towards disease detection and subsequent report generation. The use of digital microscope to capture ROI from samples mounted on slides introduced the possibility of review of samples. The PACs system could then be used to view, analyze, annotate, archive, share and manage the image remotely. The introduction of WSI made the process even simpler. The entire content of the sample mounted on the slide can be scanned to the resolutions equivalent to that of a high-end digital microscope. The entire sample as a single image is stored for further analysis. It is possible to get a set of images corresponding to different sections of the sample. A whole slide scanned image can be divided into numerous images hence the use of ML algorithms was possible. The large set of images can be annotated by several experts to test intra/inter observer variability and to create a labelled dataset for research and analysis/academic purposes. Moreover, use of deep learning algorithms require large dataset to train and test. The generation of a huge set of images exhibiting all possibilities will help in development of a robust data model and as a training data to ML and DL algorithms. Integration of WSI for DP with other information systems in Hospital/Pathological Lab will support a AI based solution and improved CAD systems. This will be a giant leap to a complete AI based patient care system that will revolutionize the whole patient care system. There are opportunities for further research in this area as there are innumerable diseases that can be brought under the ambit of AI based CAD systems. However, challenges remain in development of such an intelligent system. Thus, there is a scope of further research work in the domain of Digital Pathology.

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An Enhanced Playfair Algorithm with Dynamic Matrix Using the Novel Multidimensional Element-in-Grid Sequencer (MEGS)

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Abstract
This study introduced the enhanced Playfair Algorithm using the novel Multidimensional Element-in-Grid Sequencer (MEGS) as a dynamic matrix to optimize security. A novel scheme for character sequencing before substitution for a more secure encryption process is introduced and is added to the body of knowledge. The proposed modification in the Playfair algorithm will pave the way for a robust system to secure information where similar plaintext letters may not have the same encryption value and generated ciphertext will only contain printable ASCII characters. Simulation results revealed a 57.88% average avalanche effect when tested using varied plaintext with 10, 20, 30, and 40 characters. As a recommendation, it is suggested to test the algorithm using other performance metrics in cryptography, such as the randomness test and brute force attack analysis.

Keywords
Modified playfair algorithm, MEGS-based playfair algorithm, matrix rotation, matrix rolling, matrix shift

Sustainable Student Engagement in Online Learning Environment Using Machine Learning

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Abstract
The idea of online learning has perceived an increase in the recent times with the advancement of technology. The global epidemiological scenario (Covid 19) has stimulated the use of online learning not only in Higher Education Institutions (HEIs), but at all level of education (ISED levels). In these trying times, technological innovations have played a bigger role, but they haven't been able to boost students' self-motivation and engagement as much as physical education has. Several challenges are associated with online learning systems, one of the most significant issues educators face today is the dearth of self-motivation and inconsistent involvement. The challenge of entangling students during online class is a difficult task for them. Using artificial intelligence and machine learning, this research lays the path for new approaches to scale up the enticement. Addressing this issue necessitates a detailed grasp of the underlying causes as well as appropriate intervention strategy. Machine learning approaches can help detect the Low Engagement Students (LES) and arrange interventions in a timely manner. The goal of this research is to develop an intelligent predictive system that can identify a student's degree of involvement and then offer feedback to help them improve their motivation and devotion. This prediction can also assist in identifying impending dropouts and can raise an alarm well ahead of time to prevent at-risk students from dropping out.

Keywords
Low Engagement Students, Machine learning, Online Learning, Supervised ML Algorithms

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