Proceeding for International Conference

on

Emerging Trends in

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Editorial:

We cordially invite you to attend the International Conference on Emerging Trends in Engineering and Technology (ICET-15), which will be held in Hotel Pai Vaibhav, Bengaluru on December 13, 2015. The main objective of ICET-15 is to provide a platform for researchers, engineers, academicians as well as industrial professionals from all over the world to present their research results and development activities in Electrical, Electronics, Mechanical, Civil and Computer Science Engineering. This conference provides opportunities for the delegates to exchange new ideas and experience face to face, to establish business or research relations and to find global partners for future collaboration.

These proceedings collect the up-to-date, comprehensive and worldwide state-of-art knowledge on software engineering, computational sciences and computational science application. All accepted papers were subjected to strict peer-reviewing by 2-4 expert referees. The papers have been selected for these proceedings because of their quality and the relevance to the conference. We hope these proceedings will not only provide the readers a broad overview of the latest research results on Electrical, Electronics, Mechanical, Civil and Computer Science Engineering but also provide the readers a valuable summary and reference in these fields.

The conference is supported by many universities and research institutes. Many professors plaid an important role in the successful holding of the conference, so we would like to take this opportunity to express our sincere gratitude and highest respects to them. They have worked very hard in reviewing papers and making valuable suggestions for the authors to improve their work. We also would like to express our gratitude to the external reviewers, for providing extra help in the review process, and to the authors for contributing their research result to the conference.

Since October 2015, the Organizing Committees have received more than 120 manuscript papers, and the papers cover all the aspects in Electrical, Electronics, Mechanical, Civil and Computer Science Engineering. Finally, after review, about 10 papers were included to the proceedings of ICET-15.

We would like to extend our appreciation to all participants in the conference for their great contribution to the success of International Conference 2015. We would like to thank the keynote and individual speakers and all participating authors for their hard work and time. We also sincerely appreciate the work by the technical program committee and all reviewers, whose contributions make this conference possible. We would like to extend our thanks to all the referees for their constructive comments on all papers; especially, we would like to thank to organizing committee for their hard work.

Editor-In-Chief
Dr. Nalini Chidambaram
Professor
Bharth University

Acknowledgement

Technoarete is hosting the International Conference on Emerging Trends in Engineering and Technology this year in month of December. Technical advantage is the backbone of development and nanoelectronics has become the platform behind all the sustainable growth International Conference on Emerging Trends in Engineering and Technology will provide a forum for students, professional engineers, academician, scientist engaged in research and development to convene and present their latest scholarly work and application in the industry. The primary goal of the conference is to promote research and developmental activities in Engineering and Technology and to promote scientific information interchange between researchers, developers, engineers, students, and practitioners working in and around the world. The aim of the Conference is to provide a platform to the researchers and practitioners from both academia as well as industry to meet the share cutting-edge development in the field.

I express my hearty gratitude to all my Colleagues, staffs, Professors, reviewers and members of organizing committee for their hearty and dedicated support to make this conference successful. I am also thankful to all our delegates for their pain staking effort to travel such a long distance to attain this conference.

Er. R. B. Satpathy
Secretary
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Decision Feedback Equalization for Filter Bank Multicarrier Systems

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Abstract- **The filter bank multicarrier (FBMC) transmission system is an enabling technology for the new concepts and, especially, cognitive radio and it results into an enhanced physical layer for conventional networks. In this paper, we present an decision feedback equalizer based on RLS (Recursive Least Square) and LMS (Least Mean Square) algorithms at the sub-channel level for FBMC systems using exponentially modulated filter banks. The input to the FBMC system is offset quadrature amplitude modulated (OQAM) input symbols. Simulation results exhibit that, in spite of its increased computational complexity, the FBMC/OQAM transmission technique provides better bit error rate performance.**

Key words- **Filter bank multicarrier systems, orthogonal quadrature amplitude modulated staggering, orthogonal quadrature amplitude modulated de-staggering, decision feedback equalizer, analysis filter bank, synthesis filter bank, Recursive Least Square, Least Mean Square.**

I. INTRODUCTION

In the seventies, Multicarrier transmission techniques with digital filter banks were developed to perform the conversion between FDM (Frequency Division Multiplexing) and PCM (Pulse Code Modulation) systems. In the nineties, OFDM (Orthogonal Frequency Division Multiplexing) was preferred because of its simpler concept, less complexity and minimum latency.

Now, radio communications are moving in directions that make the objections to the filter bank approach unfounded and, in fact, make filter banks particularly attractive. First, in order to achieve quality of service (QoS) and high throughput, radio transmission is resorting to multi-antenna terminals (MIMO), which is a considerable increase in complexity. Second, communications are migrating to all-IP networks, which implies packet transmission and, therefore, minimum latency at the physical (PHY) layer is no longer crucial and the actual constraints are put on the upper layers. Scalability is a function that is being introduced and it is easily implemented with filter banks because of the independence of sub-channels. In addition, the new concepts such as cognitive radio and DASM (Dynamic Access Spectrum Management) require high resolution spectral analysis, a functionality in which filter banks superior over the discrete Fourier transform of OFDM.

Filter bank-based methods were the first multicarrier methods that were developed, prior to OFDM. The first proposal came from the author of [6], in the 1960s, who presented the conditions required for signaling a parallel set of pulse amplitude modulated (PAM) symbol sequences through a bank of overlapping vestigial side-band (VSB) modulated filters. A year later, author of [7], extended the idea and exhibited how the author [6]'s method could be modified for quadrature amplitude modulated (QAM) symbols transmission. Author [7] showed that a perfect reconstruction FBMC system can be implemented using a half-symbol space delay between the in-phase and the quadrature components of QAM symbols and by proper transmit and receive pulse-shapes in a multichannel QAM system while having the maximum spectral efficiency. In 1980s, author of [8], progressed more on FBMC and presented an efficient polyphase implementation for the author [7]'s method. The method proposed by author [7] is referred to as OFDM based on offset QAM. The half symbol shift between the in-phase and quadrature of each QAM symbol with respect to each other introduces an offset. We refer to this method as staggered modulated multitone (SMT), where the word staggered refers to the time staggering of in-phase and quadrature components in each QAM symbols. The first solution to the equalization problem in an FBMC/ OQAM systems was presented by Author of [8]. An MMSE equalizer was proposed by the authors of [4][5], takes into account intersymbol interference (ISI), and intercarrier interference (ICI) coming from adjacent subchannels.

In this paper, we propose a modified decision feedback equalizer based on RLS (Recursive Least Square) and least mean square (LMS) algorithms, which operates efficiently at the subchannel level in order to reduce or eliminate inter symbol interference present in the FBMC/OQAM systems.

II. FBMC/OQAM System Structure

The basic principle of filter bank multicarrier system is shown in Fig. 1 & Fig. 2. The transmitter contains a synthesis filter bank (SFB) and the receiver comprises an analysis filter bank (AFB).

A QAM modulated input symbols $c_k[l]$ are fed into OQAM Staggering block, shown in Fig. 3, where a symbol is symbol period (T/2) is applied to either the real part or the imaginary part of the QAM symbol. For two successive sub-channels, say k and k+1, the offset is applied to either the real part of the OQAM symbol in subchannel k, while it is applied to the imaginary part of the QAM symbol in sub-channel k+1.

An analysis filter bank (AFB) present in the FBMC receiver, divides the high rate received signal into M low rate subchannel signals again. Decision feedback equalizer (DFE) at each subchannel level is used to compensate for the intercarrier interference (ICI) and intersymbol interference (ISI) introduced by the frequency selective radio channel. The equalized symbols are then fed into OQAM de-staggering block, where the symbols are down-sampled by a factor of 2 and an offset is introduced as shown in Fig. 4.

A fundamental constraint for transmission of data is that the channel has to satisfy the Nyquist criterion in order to avoid intersymbol interference. Suppose T_{symb} is symbol period and $f_{symb}=1/T_{symb}$ is symbol rate, the frequency response of the channel must be symmetrical about $f_{symb}/2$. Hence, the prototype filter for the synthesis and analysis filter banks of the FBMC system has to be half-Nyquist, i.e., the square of frequency response of prototype filter has to satisfy the Nyquist criterion.

The filter length dependent multipliers are defined as,

$$\beta_{k,n} = (-1)^{kn} exp\left(-j\frac{2\pi}{M}\left(\frac{L_p-1}{2}\right)\right) \qquad (1)$$

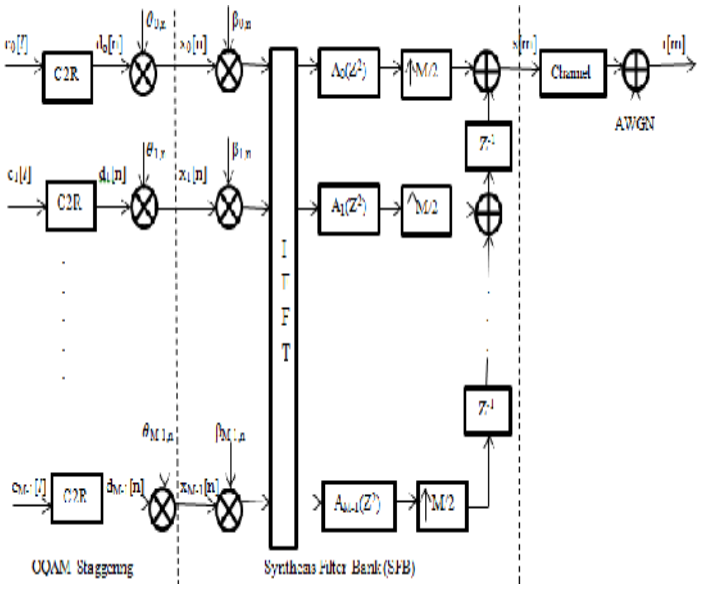

Fig. 1. FBMC/OQAM Transmitter

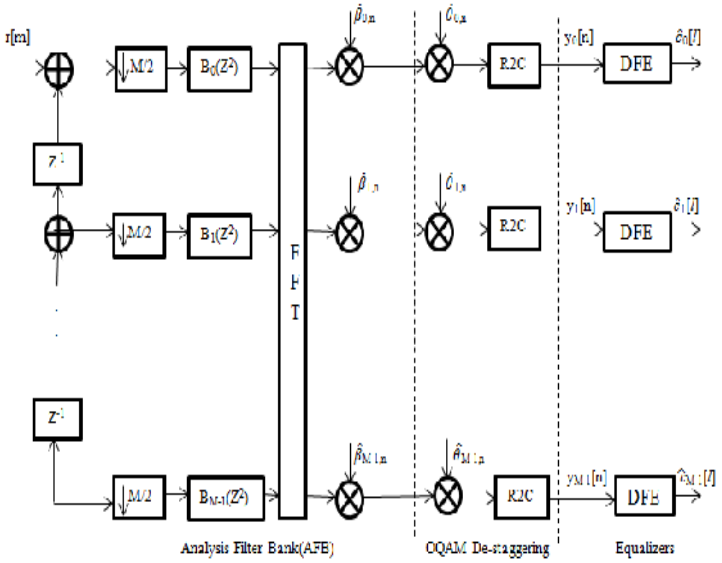

Fig. 2. FBMC/OQAM Receiver

The prototype filter used for the synthesis and analysis filter banks is defined as,

$$a_k[m] = p[k + mM] \qquad (2)$$

$$b_k[m] = p[M - 1 - k + mM] \qquad (3)$$

Where p[m] is the prototype filter of length $L_p = KM$.

The output of an FBMC transmitter based on offset-QAM (OQAM) modulation is the discrete-time baseband signal, which can be expressed as,

$$m - \frac{nM}{2}$$

$$d_{k,n}\theta_{k,n}\beta_{k,n}p(\quad|\quad)e^{-j\frac{k}{M}(L_p-1)\pi} \qquad (4)$$

$$\sum_{n=-\infty}^{\infty}$$

$$s[m] = \sum_{k=M_u}$$

Where $\theta_{k,n} = j^{(k+n)}$

$d_{k,n} = (-1)^{kn}$

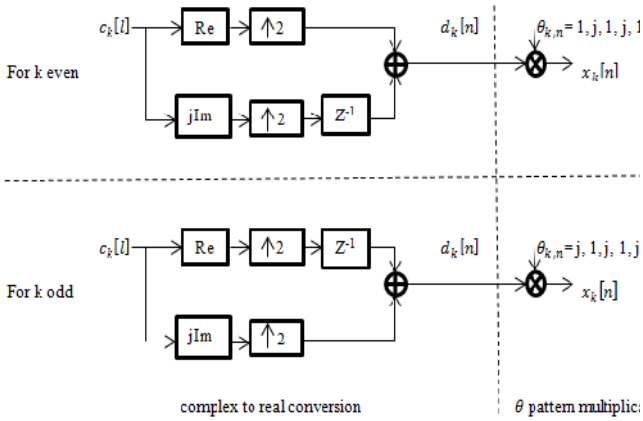

Fig. 3. OQAM Staggering

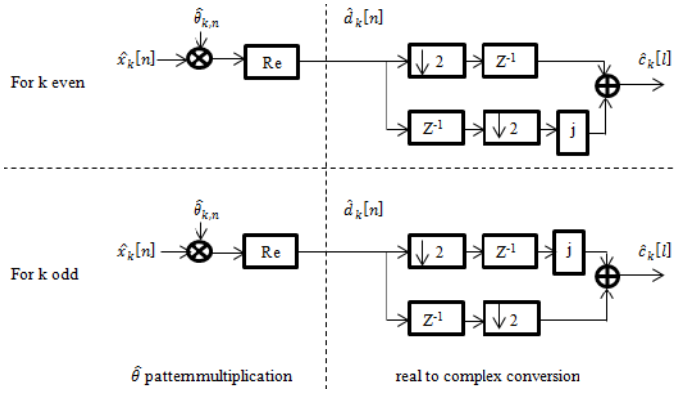

Fig. 4. OQAM De-staggering

M denotes the overall number of subchannels, also equal to IFFT/FFT length, M_u is the number of active subchannels, and $d_{k,n}$ represents the real-valued symbols at the k^{th} subchannel during the n^{th} symbol interval, modulated at rate 2/*T*. The signaling interval is defined as the inverse of the subchannel spacing, i.e., $T = 1/\Delta f$. The symbols $d_{k,n}$ and $d_{k,n+1}$ carry the in-phase and quadrature components of the complex-valued symbol $c_{k,l}$ (of rate1/*T*) from a QAM-alphabet.

III. Adaptive Decision Feedback Equalizer Structure

The per-subchannel Decision feedback equalizer (DFE) based on conventional LMS and RLS algorithms for FBMC system is shown in Fig. 5.

An FBMC/OQAM system where overlap of only immediate adjacent subchannel filters is considered, that means the nonadjacent subchannels interference is negligible. This is true only when polyphase length K ≥ 4 and roll-off factor $\rho \geq 1$, which implies that the prototype filter with high attenuation level in the stop-band.

The RLS algorithm is used initially to set the weights in the first data block, and LMS thereafter, for speed purposes. The weights and weight inputs of the LMS equalizer is set to those of the RLS equalizer for future data blocks. The initial weights of LMS and RLS equalizers are set by using weight settings block.

Equalized output is defined as,

$\hat{c}_k[l]$ = (Updated weights) circular convolution ($y_k[l]$) (5)

Where $y_k[l]$ is the input to the DFE.

The error is calculated as,

$$e_k[l] = d[l] - \hat{c}_k[l-1] \qquad (6)$$

The transmission of training sequence d[l] before the data symbols guarantees the convergence of LMS algorithm, and hence the DFE equalizer operates in the training mode.

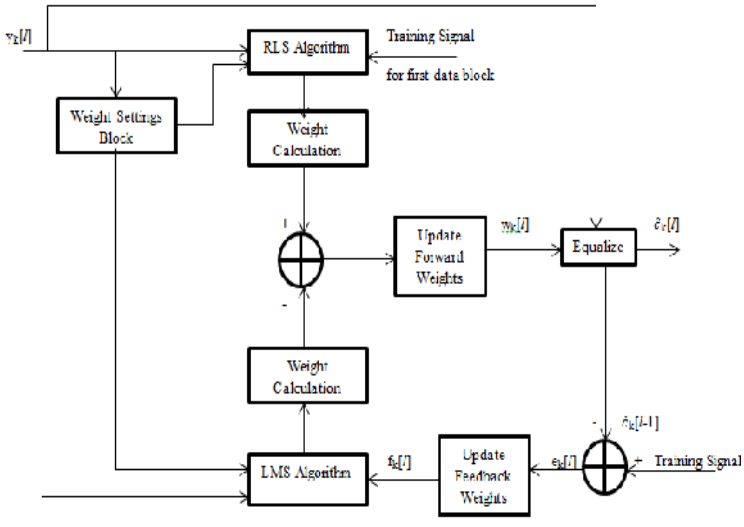

Fig. 5. Per-subchannel adaptive decision feedback equalizer for FBMC/ OQAM system

The weights are updated as follows

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$$w_k[l+1] = w_k[l] + \Delta w_k[l] \quad (7)$$

$$\Delta w_k[l] = w_k[l] \pm \left(\frac{w_k[l]e_k[l]}{\hat{c}_k[l]}\right) \quad (8)$$

$$f_k[l+1] = f_k[l] + \Delta f_k[l] \quad (9)$$

$$\Delta f_k[l] = f_k[l] \pm \left(\frac{f_k[l]e_k[l]}{\hat{c}_k[l-1]}\right) \quad (10)$$

Where $w_k[l]$ and $w_k[l+1]$ are the current and updated weights of feedforward filter respectively. $f_k[l]$ and $f_k[l+1]$ are the current and updated weights of feedback filter respectively.

IV. SIMULATION RESULTS

The simulated bit error rate performance of FBMC/OQAM system with per-subchannel DFE is shown in figure 6. We have considered 1024 and 256 subchannels and 1000 data symbols in each subchannel and rayleigh fading channel is considered.

In this design, we have employed a low pass FIR filter having polyphase length K = 4 and roll-off factor ρ =0.5 as a prototype filter, since this kind of prototype filter is nearly Nyquist (nearly ISI free) and only immediately adjacent subchannels overlap significantly.

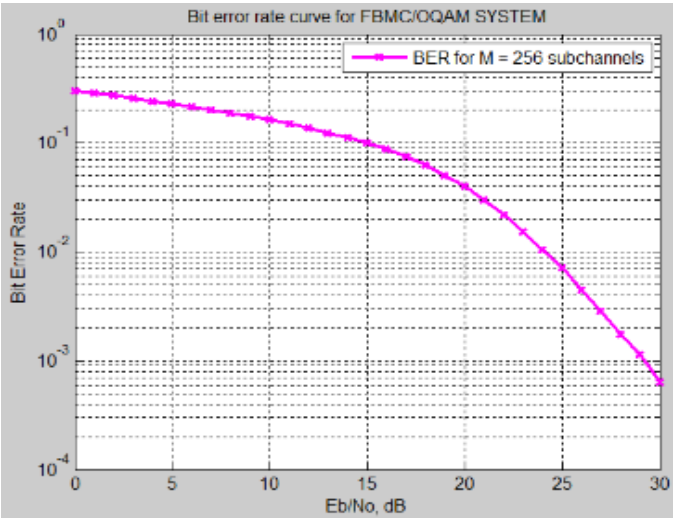

Fig. 6: BER curve for FBMC/OQAM system with M = 256

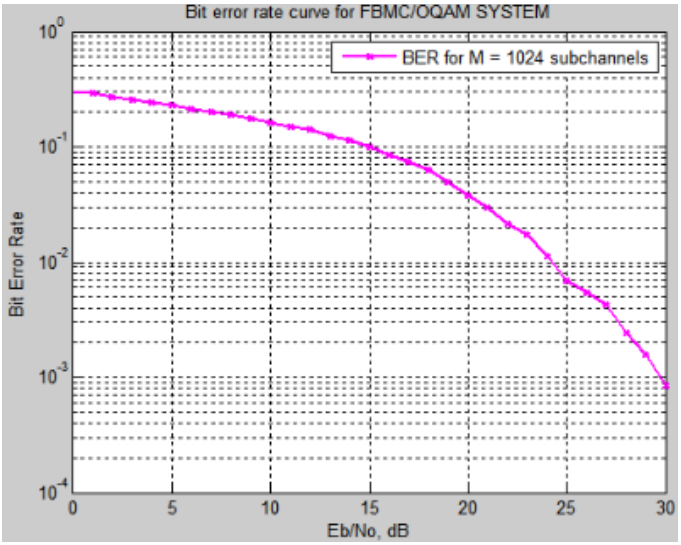

Fig. 7. BER curve for FBMC/OQAM system with M = 1024

CONCLUSION

In this paper we have examined the channel equalization problem in FBMC/OQAM systems. We have presented a decision feedback equalization based on RLS and LMS algorithms, which can be adjusted, depending on the requirements of FBMC/OQAM system. The DFE works as a fractionally spaced (T/2) equalizer in order to compensate ISI and ICI.

From the simulation results it is clear that the FBMC/OQAM system in presence of our proposed DFE operates effectively with large number of subchannels.

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Text detection and extraction from complex video scene

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Abstract- **Text in video provides brief and important content information which is helpful to video scene understanding, annotation and searching. Most of the previous approaches to extracting text from videos are based on low -level features, such as edge, color, and texture information. However, existing methods experience difficulties in handling texts with various contrasts or inserted in a complex background. In this paper, we propose a novel framework to detect and extract the text from the video scene. A morphological binary map is generated by calculating difference between the closing image and the opening image. Then candidate regions are connected by using a morphological dilation operation and the text regions are determined based on the occurrence of text in each candidate. The detected text regions are localized accurately using the projection of text pixels in the morphological binary map and the text extraction is finally conducted. The proposed method is robust to different character size, position, contrast, and color. It is also language independent. Text region update between frames is also employed to reduce the processing time. Experiments are performed on diverse videos to confirm the efficiency of the proposed method.**

I. INTRODUCTION

Images and videos on webs and in databases are increasing. Broadcasters are demonstrating interest in building large digital archives of their assets for reuse of archive materials for TV programs, on -line availability to other companies and the general public. To satisfy this request there is need of systems that are able to provide efficient indexing and retrieval by content of video segments based on the extraction of content level information associated with visual data. While effective content-based retrieval of visual information of images is accomplished by supporting content representation through low-level image features, the same does not apply to content-based retrieval of videos, except for very limited application contexts. Instead, effective retrieval of videos must be based on high-level content descriptors [1].

Most broadcasting videos tend to increase the use of text to convey more direct summary of semantics and deliver better viewing experience. For example, headlines summarize the reports in news videos and subtitles in the documentary drama help viewers understand the content. Sports videos also contain text describing the scores and team or player names [2]. In general, text displayed in the videos can be classified into scene text and overlay text [3]. Scene text occurs naturally in the background as a part of the scene, such as the advertising boards, banners, and so on. In contrast to that, overlay text is superimposed on the video scene and used to help viewers' understanding. Since the overlay text is highly compact and structured, it can be used for video indexing and retrieval [4]. However, text extraction for video optical character recognition (OCR) becomes more challenging, compared to the text extraction for OCR tasks of document images, due to the numerous difficulties resulting from complex background, unknown text color, size and so on.

The rest of this paper is organized as follows. Section II reviews the related work. We generate the morphological binary map and refine the detected text regions in Section III. The text extraction from the refined text regions is explained in Section IV. The experimental results on various videos are shown in Section V, followed by conclusion in Section VI.

II. RELATED WORK

Most of existing video text detection methods have been proposed on the basis of color, edge, and texture-based feature. Color-based approaches assume that the video text is composed of a uniform color. In the approach by Agnihotri and Dimitrova [5] detect and binarizes horizontal white, yellow, and black caption text in video frames. After pre-processing, edge pixels are found using an edge detector with a fixed threshold. Frame regions with very high edge density are considered too noisy for text extraction and are discarded.

Connected component analysis is performed on the edge pixels of remaining regions. Edge components are merged based on spatial heuristics to localize text regions. Binarization is performed by thresholding at the average pixel value of each localized text region. Kim *et al.* [6]

cluster colors based on Euclidean distance in the RGB space and use 64 clustered color channels for text detection. However, it is rarely true that the video text consists of a uniform color due to degradation resulting from compression coding and low contrast between text and background.

Edge-based approaches are also considered useful for video text detection since text regions contain rich edge information. The commonly adopted method is to apply an edge detector to the video frame and then identify regions with high edge density and strength. This method performs well if there is no complex background and it becomes less reliable as the scene contains more edges in the background. Lyu *et al.* [7] use a modified edge map with strength for text region detection and localize the detected text regions using coarse-to-fine projection. They also extract text strings based on local thresholding and inward filling generality. Xi et al. [8] propose an edge based method based on an edge map created by Sobel operator followed by smoothing filters, morphological operations and geometrical constraints.

Texture-based approaches, such as the salient point detection and the wavelet transform, have also been used to detect the text regions. Bertini *et al.* [9] detect corner points from the video scene and then detect the text region using similarity of corner points between frames. Zhong et al.[10] detect text in JPEG/MPEG compressed domain using texture features from DCT coefficients. They first detect blocks of high horizontal spatial intensity variation as text candidates, and then refine these candidates into regions by spatial constraints. The potential caption text regions are verified by the vertical spectrum energy. But its robustness in complex background may not be satisfying for the limitation of spatial domain features.

After the text detection step, the text extraction step should be employed before OCR is applied.The text extraction methods can be classified into color-based [11] and stroke-based methods [12], since color of text is generally different from that of background, text strings can be extracted by thresholding. Otsu [11] is a widely used color-based text extraction method due to its simplicity and efficiency of the algorithm. However, Otsu method is not robust to text extraction with similar color of background due to the use of global thresholding. To solve this problem, the detected text regions are divided into several blocks and then Otsu method is applied locally to each block, such as the adaptive thresholding introduced in [7], where a dam point is defined to extract text strings from background. On the other hand, some filters based on the direction of strokes have also been used to extract text in the stroke- based methods. The four-direction character extraction filters [12] are used to enhance the stroke-like shapes and to suppress others. However, since the stroke filter is language-dependent, some characters without obvious stripe shape can also be suppressed.

In this paper, we propose a new text detection and extraction method using the transition region between the text and background. First, we generate the morphological binary map based on our observation that there exist transient colors between text and its adjacent background. Then the text regions are roughly detected by computing the density of transition pixels and the consistency of texture around the transition pixels. The detected text regions are localized accurately using the projection of morphological binary map with an improved color-based thresholding method [7] to extract text strings correctly.

III. TEXT REGION DETECTION

The proposed method is based on our observations that there exist contrast colors between text and its adjacent background. The relative contrast between texts and their background is an important feature for text region detection. The overall procedure of proposed text detection method is shown in Fig. 1.The text extraction method will be clearly explained in Section IV.

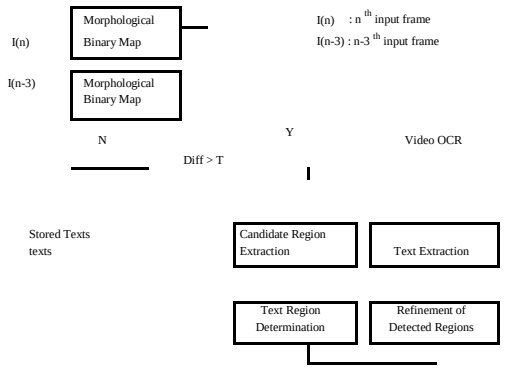

Fig. 1. Overall procedure of the proposed detection method.

A. Morphological Binary Map

In order to detect text regions from complex background a morphology based approach is used to extract high-contrast feature [13].

Let $I(x,y)$ denote a gray-level input image. Let $S_{m,n}$ denote a structuring element with size m×n. where m,n are odds and larger than zero. Besides, let denote a dilation operation, and denote an erosion operation.

Closing Operation:

$$I(x,y) \ Sm,n=(I(x,y) \ Sm,n) \ Sm,n \qquad (1)$$

Opening Operation:

$$I(x,y) \ Sm,n=(I(x,y) \ Sm,n) \ Sm,n \qquad (2)$$

Difference:

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$$D(I_1,I_2)=|I_1(x,y)-I_2(x,y)| \quad (3)$$

Thresholding:

$$T(I(x,y))=\begin{cases} 255, \text{ if } I(x,y) > T \\ 0\ , \textit{otherwise} \end{cases} \quad (4)$$

To obtain the morphological binary map, closing (1) and opening (2) operations are performed using a disk structural element $S_{3,3}$. The difference (3) obtained from subtracting both images are the result of the following step. Then, a threshold procedure (4) is applied followed by a labeling process to extract the text segments. In the threshold procedure a parameter T is defined dynamically according to the background of the image. This parameter is responsible to determine the limit value of the binarization operation

The whole procedure of our morphology-based technique to extract the contrast features is shown in Fig 2

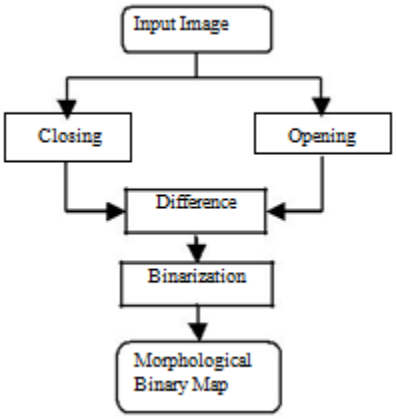

Fig.2. Flowchart of the proposed method to extract contrast features for text region detection.

An example of the result of this process is shown in Fig.3(b).

Fig.3. Generation of morphological binary map (a) Input image (b) morphological binary map

B. Candidate Region Extraction

A morphological dilation operator can easily connect the very close regions together while leaving those whose positions are far away to each other isolated. In our proposed method, we use a morphological dilation operator [14] with a 7× 7 square structuring element to the binary image obtained from the previous step to get joint areas referred to as text blobs. Fig.4 (a) shows the result of feature clustering. If a gap of consecutive pixels between two nonzero points in the same row is shorter than 5% of the image width, they are filled with 1s. If the connected components are smaller than the threshold value, they are removed. The threshold value is empirically selected by observing the minimum size of text region. Then each connected component is reshaped to have smooth boundaries. Since it is reasonable to assume that the text regions are generally in rectangular shapes, a rectangular bounding box is generated by linking four points, which correspond to (min_*x*,min_*y*), (max_*x*,min_*y*), (min_*x*,max_*y*),(max_*x*,max_*y*) taken from the text blobs. The refined candidate regions are shown in Fig. 4(b).

Fig.4. Extraction of candidate regions (a) Connected components through dilation (b) Smoothed candidate regions

C. Text Region Determination

The next step is to determine the real text region among the boundary smoothed candidate regions by some useful clues, such as the aspect ratio of text region. Since most of texts are placed horizontally in the video, the vertically longer candidates can be easily eliminated. Based on the observation that intensity variation around the transition pixel is big due to complex structure of the text, we employ the dominant local binary pattern (DLBP) introduced in [15] to describe the texture around the transition pixel. DLBP effectively capture the dominating patterns in texture images. Unlike the conventional LBP approach, which only exploits the uniform LBP [16], given a texture image, the DLBP approach computes the occurrence frequencies of all rotation invariant patterns defined in the LBP groups. These patterns are then sorted in descending order. The first several most frequently occurring patterns should contain dominating patterns in the image and, therefore, are the dominant patterns.

LBP is a very efficient and simple tool to represent the consistency of texture using only the intensity pattern. LBP forms the binary pattern using current pixel and its all circular neighbor pixels and can be converted into a decimal number as follows:

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$$LBP_{P,R} = \sum_{i=0}^{P-1} s(g_i - g_c)2^i, \text{ where } s(x) = \begin{cases} 1, & x \geq 0 \\ 0, & x<0 \end{cases} \quad (5)$$

Where, P and R denote the user's chosen number of circular neighbor pixels of a specific pixel and the radius of circle, respectively. g_c and g_i denote the intensity of current pixel and circular neighbor pixels, respectively.

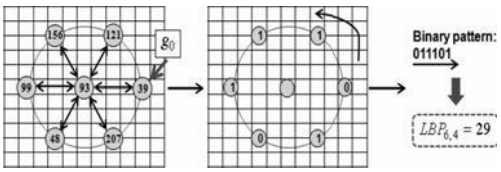

Fig.5. Example of LBP computation

We can obtain the binary pattern as shown in Fig. 5, and the resulting$LBP_{6,4}=29(=2^4+2^3+2^2+2^0)$.
DLBP consider the most frequently occurred patterns in an image. It is shown that the DLBP approach is more reliable to represent the dominating pattern information in the images.
It avoids the aforementioned problems encountered by merely using the uniform LBPs or making use of all the possible patterns, as the DLBPs are defined to be the most frequently occurred patterns.

The pseudo codes on determining the number of dominant patterns of DLBP and extracting DLBP feature vectors are presented in Algorithm 1 and Algorithm 2, respectively.

Algorithm 1 Determining the number of dominant patterns of DLBP
Input: Input image, and the parameters P and R for DLBP
Output: The required number of patterns for 15% pattern occurrences

1. Initialize $K_{temp}=0$.
2. FOR each Candidate region *I* in the image
3. Initialize the pattern histogram, $H[0\ldots(2^m-1)]=0$.
4. FOR each center pixel g_c *I*
5. Compute the pattern label of g_c, $LBP_{P,R}$ (1)
6. Increase the corresponding bin by 1, $H[LBP_{P,R}]$++
7. END FOR
8. Sort the histogram in descending order
9. Find the number of patterns *k* for 15% pattern occurrences in *I.*

$$K = \arg\min_k \frac{\sum_{i=0}^{k-1} H[i]}{\sum_{i=0}^{(2^m-1)} H[i]} \geq 15\ \%$$

10. K_{temp}+=*k*
11. END FOR
12. $K_{15\%}$=Number of different Dominant Patterns having occurences more than 15%.
13. Return $K_{15\%.}$

Algorithm 2 Extracting a DLBP feature vector
Input: Input image, the required number of dominant patterns
$K_{15\%}$, and the parameters P and R for DLBP
Output: The DLBP feature vector corresponding to image *I*

1. Initialize the pattern histogram, $H[0\ldots(2^m-1)]=0$.
2. FOR each center pixel g_c *I*
3. Compute the pattern label of g_c, $LBP_{P,R}$ (1)
4. Increase the corresponding bin by 1, $H[LBP_{P,R}]$++
5. END FOR
6. Sort the histogram in descending order
7. Return $H[0\ldots(K_{15\%}-1)]$ as the feature vector of DLBP.

Now we define the probability of text (POT) using the operator as follows: The LBP operator is first applied to every transition pixel in each candidate region. We use the 8 neighbor pixels to obtain the DLBP value. Then, we compute the number of different DLBPs to consider the intensity variation around the transition pixel by algorithm 1. Thus the total number of potentially different DLBPs is K. Algorithm 2 explains the extraction of DLBP feature vector.

Let w_i denote the density of transition pixels in each candidate region and can be easily obtained from dividing the number of transition pixels by the size of each candidate region. POT is defined as follows:

$$POT_i = w_i \times NOD_i, \quad i=1\ldots\ldots\ldots\ldots N \quad (6)$$

Where N denotes the number of candidate regions as mentioned. NOD_i denotes the number of different DLBPs, which is normalized by the maximum of the number of different DLBPs (i.e.,$K_{15\%}$) in each candidate region. If POT of the candidate region is larger than a predefined value, the corresponding region is finally determined as the text region. The detection result is shown in Fig. 6. The thresholding value in POT is empirically set to 0.05 based on various experimental results.We can see that the text region is well identified from other candidates.

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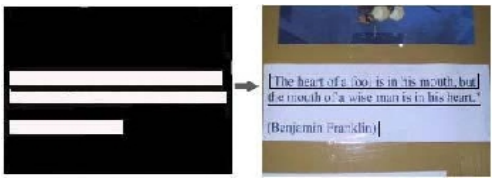

Fig.6.Text Region Determination

D. Section Headings

The text region or the bounding box obtained in the preceding subsection needs to be refined for better accurate text extraction. In this subsection, we use a modified projection of transition pixels [17] in the morphological binary map to perform the text region refinement. First, the horizontal projection is performed to accumulate all the transition pixel counts in each row of the detected text region to form a histogram of the number of transition pixels. Then the null points, which denote the pixel row without transition pixels, are removed and separated regions are re-labeled. The projection is conducted vertically and null points are removed once again. Compared to the coarse-to-fine projection proposed for edge-based scheme in, our projection method is applied to the detected text regions only, making the process simpler. The result of refinement is shown in Fig. 7.

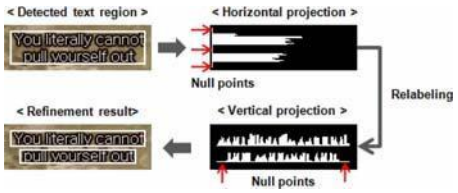

Fig.7.Refinement process of detected text region

E. Text Region Update

Once the text regions are detected in the current frame, it is reasonable to take advantage of continuity of text between consecutive frames for the text region detection of the next frame. If the difference, which can be obtained by XOR of current morphological binary map and previous morphological binary map, is smaller than a predefined value, the text regions of previous frame are directly applied as the detection result without further refinement.

In order to deal with such changes, we compare the current morphological binary map with the morphological binary map obtained 3 frames earlier and the dissimilarity measure between these maps is defined as follows:

$$d(M_n, M_{n-3}) = \sum_{(x,y)\ T} (M_n(x,y) \quad M_{n-3}(x,y))$$

$$\text{if } (d(M_n, M_{n-3}) < T)\ TR_n = TR_{n-3}$$

Otherwise, find new TR_n (7)

Where M_n and M_{n-3} denote the morphological binary map obtained from *n*th frame and the (*n*- 3)th frame, respectively. TR_n and TR_{n-3} denote the detected text regions in the *n*th frame and (*n*-3)th frame, respectively. denotes the XOR operator. If the values on the *n*th frame and the (*n*-3)th frame morphological binary map are same, the result of between two values is set to be 0.Otherwise the result of between two values is set to be 1. The text region update method can reduce the processing time efficiently.

IV. TEXT EXTRACTION

Before applying video OCR application, the refined text regions need to be converted to a binary image, where all pixels belonging to text are highlighted and others suppressed.Since the text color may be either brighter or darker than the background color, an efficient scheme is required to extract the text dealing with complex backgrounds and various text appearances. In this section, we propose a fast and efficient text extraction technique, which is based on Lyu's approach [7].

A. *Color Polarity Computation*

Color based text extraction technique [17] is proposed for text extraction. The goal in this subsection is to check the color polarity and inverse the pixel intensities if needed so that the output text region of the module can always contain bright text compared to its surrounding pixels. We observe that this goal can be simply attained owing to the morphological binary map obtained in the preceding section. First of all, the binary image obtained by thresholding with average intensity value can be effectively utilized. Given the binarized text region, the boundary pixels, which belong to left, right, top, and bottom lines of the text region are searched and the number of white pixels is counted. If the number of white boundary pixels is less than 50% of the number of boundary pixels, the text region is regarded as "bright text on dark background" scenario, which requires no polarity change. In other words, the text is always bright in such scenarios. If the number of white pixels is greater than that of black pixels, we conduct a task to turn on or off the "bright_text_flag" as expressed in (8).

$$\text{Bright\_text\_flag} = \begin{cases} 1, \text{ if } I_B(x_F, y_F) = 1 \\ \quad \text{and } IB(xF+2, yF) = 0 \\ 0, \text{ Otherwise} \end{cases} \quad (8)$$

Where (x_F, y_F) denotes the position of the first encountered transition pixel in each row of the text region and I_B denotes the value on the binary image.

The flag is set to 1 if the first encountered transition pixel belongs to 1, whereas the pixel apart by two pixel distance belongs to 0. If such case happens at least once, the pixel values in the text region is inverted to make the text brighter than the surrounding background. Note that the inversion is simply done by subtracting the pixel value from the maximum pixel value. The process of color polarity

computation is shown in Fig.8.

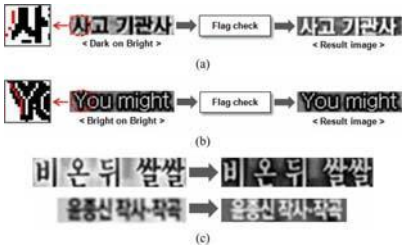

Fig.8. Process of inversing image by the color polarity. (a) Dark text on bright background. (b) Bright text on bright background. (c) Examples of inverted text by "bright_text_flag".

As shown in Fig. 8, the flag is set to 1 for Fig. 8(a) since the first encountered transition pixel belongs to 1, whereas the pixel apart by two pixel distance belongs to 0. The first transition pixels in each row on the binary image are represented by red color in Fig. 8. Examples with "bright_flag_text" are also shown in Fig. 8(c).

CONCLUSION

Text embedded in videos often carries the most important information, such as time, place, name or topics, etc. This information may do great help to video indexing and video content understanding. A novel method for text detection and extraction from complex videos is proposed in this paper. Our detection method is based on the observation that there exist contrast colors between text and its adjacent background. The morphological binary map is first generated by obtaining the difference between closing and opening image. Connected components for each candidate region are generated and then each connected component is reshaped to have smooth boundaries. The dominant local binary pattern is used to find the intensity variation around the transition pixel. The boundaries of the detected text regions are localized accurately using the projection of text pixels in the morphological binary map. Text region update between frames is also exploited to reduce the processing time. Based on the results of text detection, the texts are extracted based on color polarity computation method. To validate the performance of our detection and extraction method, various videos have been tested. The proposed method is very useful for the real -time application. Our future work is to detect and extract the text with different orientations to extend the algorithm for more advanced and intelligent applications.

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HMM technique for gesture/action recognition for video input

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Abstract- **CSMMI: Class Specific Maximization of Mutual Information is the approach which is being discussed in the further proceeding. CSMMI provides different and separate wordbook for each and every category. The specified approach i.e., CSMMI has two main goals. They are: 1.Maximizing the mutual data between wordbook inside an intrinsic structure.2.Minimizing the mutual data between the wordbook of extrinsic structure. The main aim of the project is action and gesture recognition which follows the following four main steps: they are Feature extraction, learning initial wordbook, CSMMI and Classification. In CSMMI we are going to use HMM: Hidden Markov Model. HMM involves evaluation, estimation and decoding processes. In the proposal of CSMMI each and every class will have its own discriminative dictionary which leads better performance when compared to other shared dictionary methods.**

I. INTRODUCTION

CSMMI: Class Specific Maximization of Mutual Information is a new method which is being used to learn a compact and discriminative dictionary for each class is introduced here. CSMMI not only discovers the latent class-specific dictionary items that best discriminates different actions, but also captures unique dictionary items for a specific class. One of the common approaches for dictionary optimization is to use information theory, (e.g. maximization of entropy (ME), maximization of mutual information (MMI)) and it shows promising results for action and gesture recognition. Accordingly, MMI rule is adopted to optimize the class-specific dictionaries. However, the approach varies from the shared dictionary learning methods.

Sparse representation is usually done using a Gaussian Process (GP). This is the model which is used to optimize an objective function. This indeed will maximize the mutual information for appearance information and distribution of class.

CSMMI is majorly used to find out the class-specific dictionary items that best differentiates between different actions. This also identifies very unique items of dictionary for every specific class. There are many approaches for dictionary optimization and one of the common approaches or dictionary optimization is to use information theory. ME: Maximization of entropy, maximization of MMI: mutual information belongs to such information theory and by default it shows best results for recognition of action and gesture.

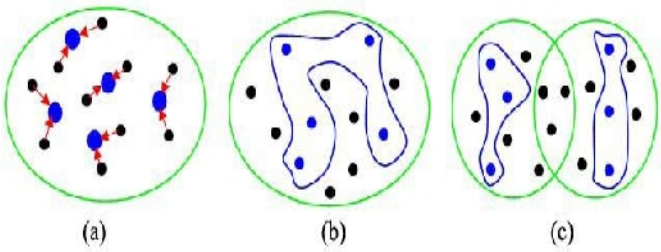

Figure 1: Dictionary item sets

Here, Figure1 (a) represents is LiuShah; Figure1 (b) represents QiuJiang and Figure1 (c) represents CSMMI . Each green circle in the figure represents the region of an initial dictionary. The black points represent the initial dictionary items and the blue points denote the selected dictionary items. In the methods of LiuShah and QiuJiang, the shared dictionary is the one which makes it difficult to distinguish about which dictionary item is important to a specific class. The one can only find the dictionary items that have the minimum loss of MI. In CSMMI, each class has one specific dictionary and some dictionary items shared between classes can be filtered out (Figure1 (c)).

CSMMI considers the global information and also unifies the inter-class and intra-class MI in a single objective function. Inter-class and intra-class information is

more specific and useful than the class distribution used in QiuJiang since CSMMI captures discriminative dictionary items for a specific class. Our experimental results on public action and gesture recognition databases demonstrate that CSMMI compares favorably to the shared dictionary methods and other state-of-the-art approaches.

K-SVD (Scalar vector dictionary) proposed three dictionary learning frameworks: they are: 1. shared dictionary (classes contain only one dictionary), 2. Class-specific dictionary (one dictionary per class) and 3.concatenated dictionary (concatenation of the class-specific dictionaries). However, K-SVD only focuses on minimizing the reconstruction error and it is not clear about how to optimize the learned dictionaries. The learned dictionary obtained via K-SVD may not be compact and discriminative.

II. SYSTEM DESCRIPTION

Description regarding the existing system, disadvantages of existing system and proposed system are discussed below. Existing framework named CSSRC: Class Specific Sparse Representation Classification for action and gesture recognition. CSSRC includes four steps: 1. feature extraction and representation, 2.Learning initial class specific dictionaries, 3. CSMMI and 4. Classification. This work is inspired and only focuses on the shared dictionary. While this work explores the relationship between intra-class and inter-class MI for video-based recognition.

We use four types of features here. The first type is the space-time interest points (STIP) feature. We use STIP features to represent a video, and then histograms of oriented gradients (HOG) and histograms of optic flow (HOF) to describe each interest point. The second type is 3D enhanced motion scale invariant feature transform (EMoSIFT) feature which fuses the RGB data and depth information into the feature descriptors. The third type is Histograms of 3D Joints (HOJ3D) feature computed from skeleton information. The ast type is shape-motion feature, which is used to extract shape and motion features from video sequences. For different datasets, we may use different features based on the experimental result.

A. Disadvantages of Existing System:

CSSRC for action and gesture recognition. CSSRC includes four steps first being Feature extraction and representation, second is Learning initial class specific dictionaries, third is CSMMI and finally its classification. Work here is inspired and only focuses on the shared dictionary. While this work explores the relationship between intra-class and inter-class MI for video-based recognition. Drawbacks are we cannot expect accurate results from CSSRC and also is not compact and discriminative. To overcome the problem of existing system, we planned to propose a in HMM model.

B. Proposed Method:

Markov property is demonstrated by a time-domain process. First Markov process is defined as gif all present and past events are given then the conditional probability of a current event depends only on the most recent event. When considering the positions and orientations of the hands of a gesturer through time then this is a useful assumption to be made. The HMM is a governed by a). An underlying Markov chain with a finite number of states and, b).A set of random functions, each associated with one state.

An observation symbol is generated based on the random function from the current state. Each transition between the states has a pair of probabilities, they are Transition probability, and Output probability. Transition probability is the one which provides the probability for undergoing the transition and output probability is one which defines the conditional probability of emitting an output symbol from a finite alphabet when given a state.

The HMM model is a rich mathematical structure and efficiently deals with spatio-temporal information in a natural way. Only a sequence of observation can only be seen hence it is termed as hidden. It also involves efficient algorithms, such as Baum–Welch and Viterbi for evaluation, learning, and decoding. An HMM is expressed as a). Evaluation process for determining the probability that the observed sequence was generated by the model which uses Forward–Backward algorithm; b).Training or estimation for adjusting the model to maximize the probabilities which will be using Baum–Welch algorithm; c).Decoding to recover the state sequence using Viterbi Algorithm.

III. MAIN DESIGN

The basic architecture of Gesture/Action recognition is as below.

A. Architectural Representation

It first contains user who is responsible in providing the right input. Once the input is given next the process performs frame conversion which is very important for easy recognition of the required data.

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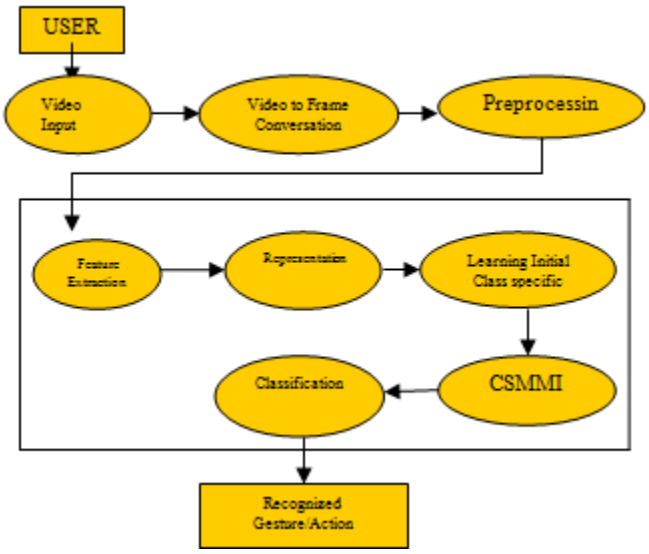

Figure 2: Architecture diagram

Step by step procedure for the proposed model is:

- The input for the project is a video input which contains few set of different gestures and actions.
- Next the concentration will be for conversion of the input video to frames. Based on the frames obtained the detection of the dictionaries is done in third module.
- Obtained dictionaries are further processed for the detection of features and that will be done.
- Moving ahead it is the CSSRC for feature extraction, class specification, and classification process.

CSSRC is one of the process that involves the main CSMMI technology for the purpose of classification of objects. This is used to simplify the task of object classification which will be based on certain criteria. At the end what matters is the recognition of the right action and gesture and its proper presentation. For any given input histogram for every class, specific dictionary will be calculated. The obtained histograms are then tested to find out whether there are any reconstruction errors. The histogram which has a little reconstruction error will be compared with a reference histogram.

In image processing and computer vision the concept of detection of features usually deals with the methods whose main aim is to compute abstractions of the information of the image. Then local or instant decisions are made at every point of the image. The decisions are made about the features of the image of a given type is present at that point or not. The output obtained will be the subsets of the image domain, which will be often in the form of isolated points, continuous curves or connected regions. Learning initial class is to extract the samples from the class. On the basis of similarities observed further classifications will be made. Here we are going to extract the features based on the training given.

CSMMI will be capturing discriminative dictionary items for any specific class. The experimental results on the public action and on gesture recognition databases will reveal that CSMMI compares to the methods on shared dictionary and other approaches such as state-of-the-art. Each class owns a dictionary item classification and is made very easy and also it facilitates parallel execution by increasing speed of execution at each and every step.

IV. FLOW CHART

Flow chart here illustrates the two main phases. They are training phase and the testing phase for gesture recognition.
A. Training phase

In the training phase, training for individual and most occurring shapes will be feeded. Once the image is read, classification is done based on the criteria's and the shape feature is extracted. The obtained feature is thus stored in classification.

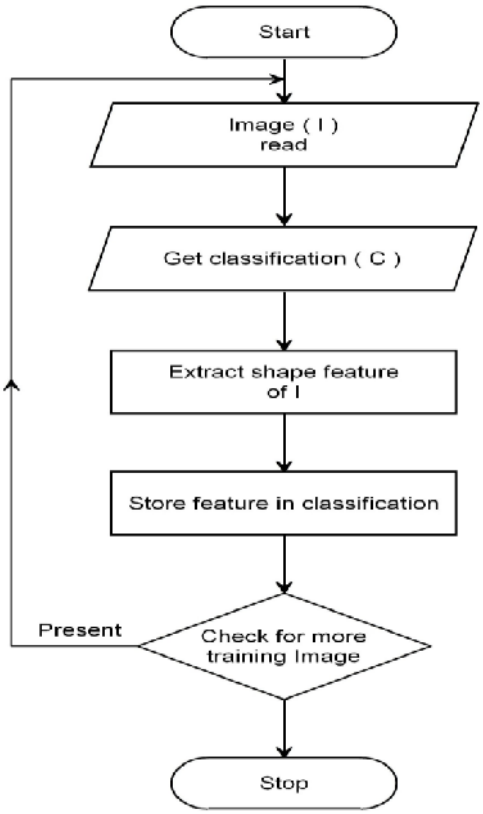

Figure3: Flow chart for training phase

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Similarly maximum number of images will be trained and stored in the form of cluster. Thus, when any sequence is given gestures or shapes or actions can be easily identified.

B. Testing phase for gesture recognition

In this testing phase for gesture recognition, an image is fed as input. From the input the shape feature is extracted. Classification is the one where the trained features are stored. It contains n number of clusters. Cluster is formed based on the similarity of the shapes.

The given input is sequentially checked for the match. The distance between the stored or trained image and the image in the input is calculated. The distance thus calculated is stored. The distance is calculated for every similar image. Then the average of the distance in the classification is found.

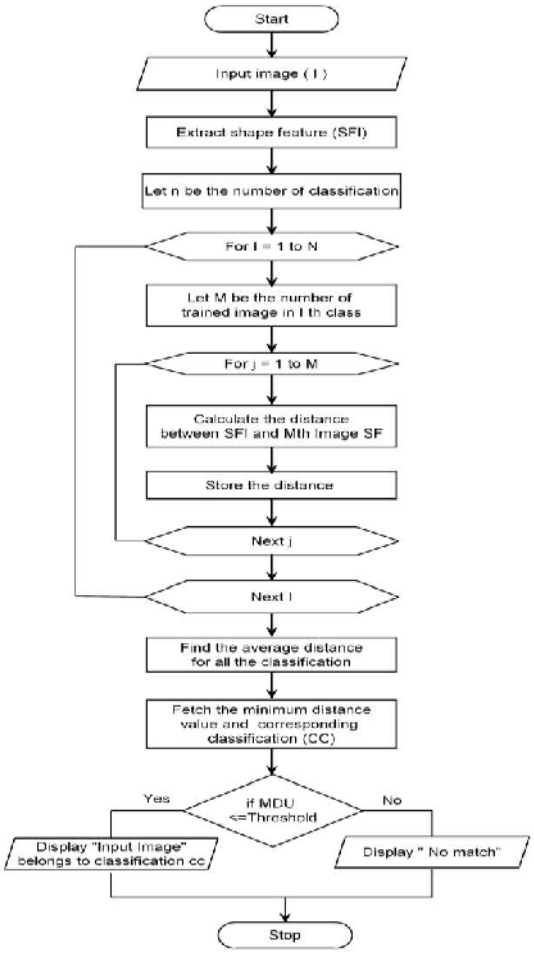

Figure4: Gesture Recognition

The minimum distance is pointed along with the corresponding classification (CC). If the minimum distance value (MDV) is less than or equal to the threshold value then the display would be something like the input image belongs to the classification CC. If the minimum distance value (MDV) is greater than the threshold value then it displays as no match.

C. Discussions

In the proposed model both the public and synthetic datasets are analyzed in a proper manner. Once the video is given as input, frames are formed. Thus from the frames the features are extracted. The features can be shape feature, color feature, size feature, and inclination and so on.

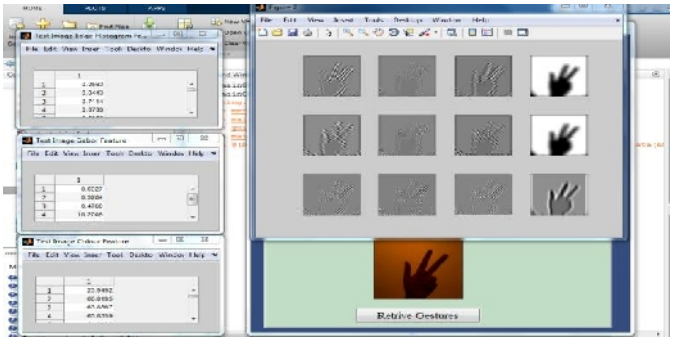

Figure5: Matrix representation of extracted features

The Figure5 shows how the extracted features are stored in the matrix form. All the features will be in the form of some values and thus the matrix form is generated. The input video is compared with the matrix elements and corresponding results are thus printed.

CONCLUSION

An approach called as class specific dictionary learning for gesture and action recognition is done using information theory. CSMMI's goal is to choose items from dictionary that are more related to any specific class and reject the one that is less related. By this method the speed can be boosted and also complexity can be reduced. The trained datasets is major technique used to identify the gestures. Gesture recognition from images are common but this approach recognizes the gestures from the video. This is the main advantage of proposed technique.

In future there is a lot of scope for enhancement. It can also be enhanced to recognize live gestures. The same approach can be used to open an application by giving live gestures in a personal computer. The technique can be used for combined recognition of gestures, actions and face as well. Never the less the approach can prove its accuracy and compactness for gesture and action recognition for a video input.

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The Design of a Wideband Circular Micro strip Patch Antenna for Wireless Applications @ 9 GHz

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Abstract- **In this paper, we propose a design of Circular Micro strip Patch Antenna (CMPA) with a rectangular slot etched ground plane as DGS. The Defected Ground Structure concept is used to improve the bandwidth and impedance matching. The bandwidth is 0.99GHz with respect to center frequency 8.85GHz. The percentage bandwidth of 11.97% and the average gain of 3.06dBi are achieved.**

Index Terms: **CMPA, DGS, CMPA, HIPERLAN/2.**

I. INTRODUCTION

Bandwidth enhancement has some desired techniques followed by designers but most selected generating new structure or perturbations [1] by meandering slots on ground plane and radiating structure. These became famous by named as DMS (Defected Mount Surface) for (Defected Ground Surface) for slots on ground plane. The length of the current flow in ground plane supports the characteristics of antenna [2]. Defected Ground Structure usually makes the variations in the ground plane some of the variations may support the radiation and some may reduce the radiation.

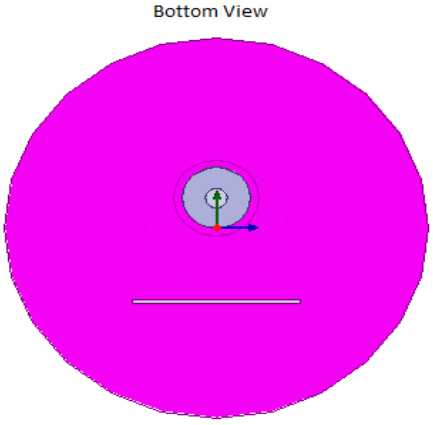
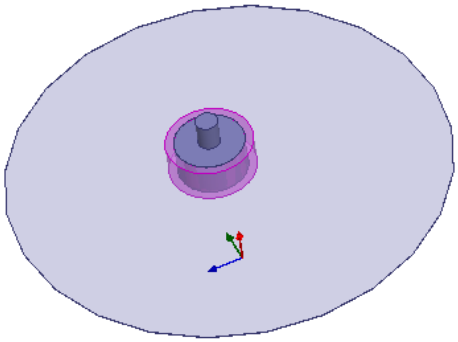


Fig.1. (a) Bottom View of CMPA,



(b) Top view of CMPA (ground plane)

(c) Side view of CMPA

Circular microstrip patch antenna can be designed by embedding suitable slots on the radiating patch and on the ground plane.

II. ANTENNA DESIGN

The antenna is fabricated on substrate of FR4_epoxy with relative permittivity ε_r = 4.4 and the thickness of 1.6mm. The radius of the patch (a) and ground plane are calculated using the formulas given in [1], for the resonant frequency of 9 GHz.

The actual radius of patch as per formula is 4.317mm; we reduced the radius of the patch to 4.2mm so the size of the CMPA is reduced by 16.6%. The ground plane radius is of 12.644mm. The dimensions of the ground plane, patch are tabulated in the table 1 given below. In this design we have used the Co-axial probe feed to feed the antenna as shown in fig 1 (C) and excitation is done by using 50 ohm impedance

III. SIMULATED RESULTS

Simulated s11 can be seen from fig.2 refection co-efficient is very less at resonance return loss of the antenna is less than 10 dB from 8.36GHz to 9.35GHz which is 990MHz. Impedance match of this antenna can be seen in fig.3, this clearly illustrating that the frequency of the interest is very near to point 1. So that we can say that the impedance matching increased, this reduces the loss.

The radiation pattern of the proposed antenna showing the Gain total at frequency 9 GHz is shown in fig. 4. Of about 5.23dBi

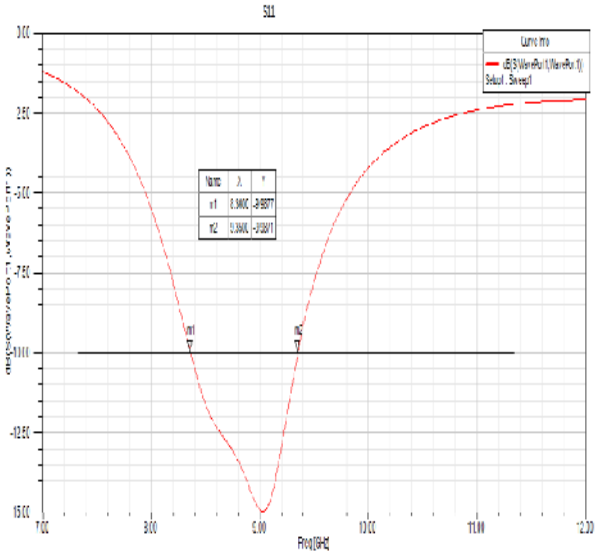
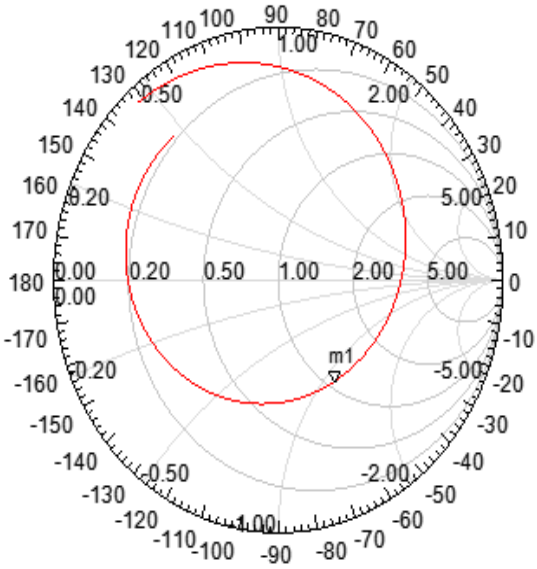
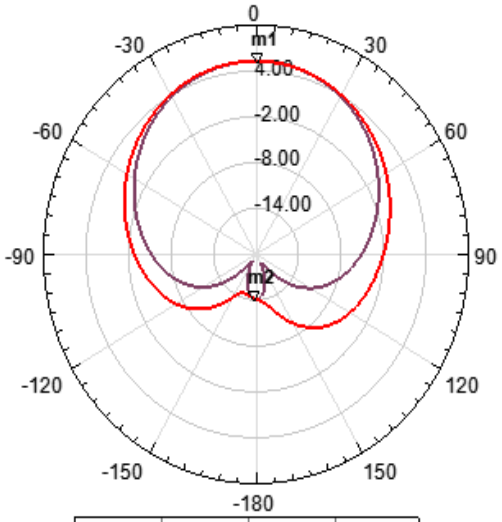


Fig.2 Simulated return loss versus frequency of a CMPA



Name	Freq	Ang	Mag	RX
m1	9.0100	-56.6333	0.4726	1.1040 - 1.1221i

Fig 3: Impedance Matching



Name	Theta	Ang	Mag
m1	1.0000	1.0000	5.2996
m2	180.0000	180.0000	-14.1037

Fig 4: Radiation Pattern

The important property of any antenna is VSWR, in our proposed antenna we have achieved VSWR of about 1.4 over the operating frequency which is less than 2. This can be seen in fig. 5.

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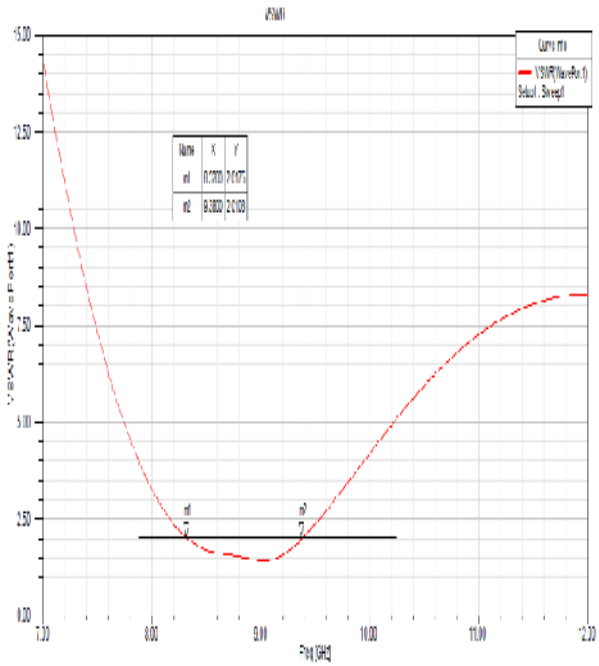

Fig 5: VSWR of proposed antenna

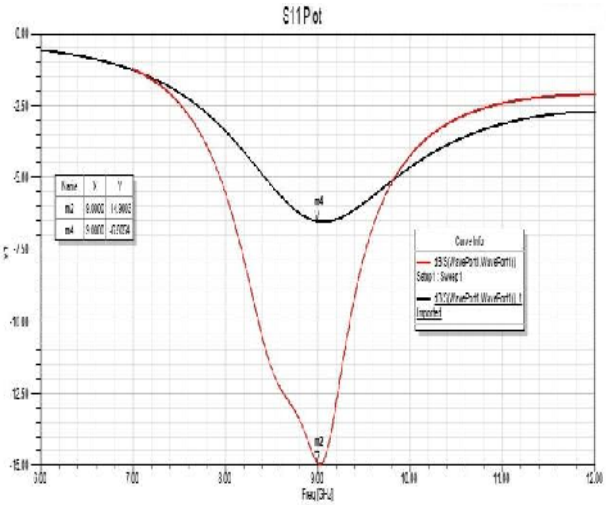

Fig 6: Comparison between S11 with DGS and Without DGS

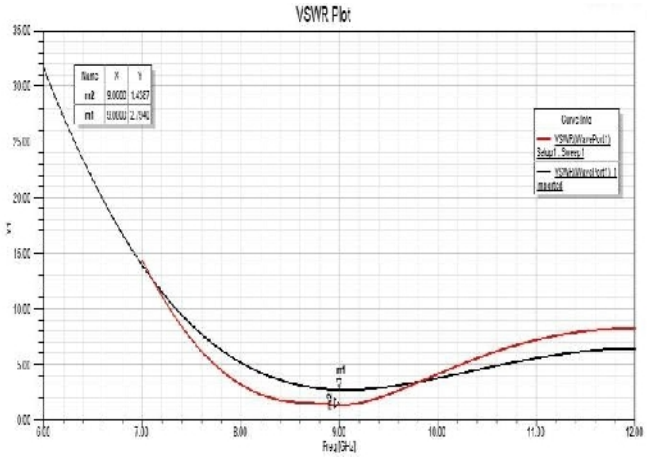

Fig 7: Comparison between VSWR with DGS and Without DGS

CONCLUSION:

In this design we used effectively the design processes of Circular microstrip antenna using Finite Element Design processes, we also achieved the size reduction of 16.6% so we can call this one as compact antenna. It has bandwidth of 990MHz, average gain of 5.26dBi.

The antenna with Defected Ground Structure to enhance Bandwidth and to reduce the reflection co efficient and VSWR is under process. All the parameters and dimensions are tabulated in table.1.

Table 1: Parameters of designed antenna

Parameters and Dimensions of CMPA	
Patch Radius (a)	4.317mm
Ground Plane Radius (gpr)	12.644mm
Height of the substrate	1.6mm
S11	-14.96dBi
BW	260MHz
%BW	4.6%
Average Gain	5.52dBi
Size Reduction	16.6%

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Random Space Perturbation for Confidential and Efficient KNN Query Services in Cloud using R^+ tree

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Abstract- **Secure data intensive computing in cloud is challenge involving a tradeoff between security ,extra cost performance, and cloud economic. Data are sensitive, unless data confidentiality and query privacy are guaranteed the data owner does not want to move to the cloud. Secured query services should provide efficient query processing and reduce the in-house workload to realize the benefits of Big data. The Random Space data perturbation method is proposed to provide secure and efficient query and kNN query services for protected data in the cloud. The proposed method is a combination of kNN query Service algorithm and Two staged query processing with benefit of R-tree family. Keywords—query services in the cloud, privacy, range query, kNN query**

I. INTRODUCTION

One of the emerging trends of scientific research is Big data approach. The wide development in cloud infrastructures, conducting data intensive computing in public cloud has become the top choice for scalable and economical processing. Cloud computing can share a commonality that users need to manipulate the data in the cloud by not simply storing data in the cloud. The data owner loses control over his data once the collections are exported to the cloud. The data owners also have reasonable concerns over data ownership, security, and privacy. The requirements for constructing a practical query service in the cloud as the CPEL criteria: data **C**onfidentiality, query **P**rivacy, **E**fficient query processing, **L**ow in-house processing cost.

Traditional encryption approaches do not protect data utility; hence they cannot be simply applied. Partial homomorphic encryption (PHE) aims to implement the lowest level operations: addition and multiplication on the encrypted data without decrypting the data. Researchers have noticed in the current stage that it is too expensive to be practical, even for a simple application such as keyword search over encrypted database. Few approaches have been developed in the database community focus on performance, which provides very weak security. Example, Crypto-index [3] and order-preserving encryption (OPE) [2] depend on strong assumptions that attackers do not have prior knowledge of the data, which excludes some realistic attacks from investigation. Instead of preserving the utility of low level operations on single dimensions, Chen et al.[1] proposed the RANDOM SPACE perturbation approach to preserve half-space queries for multidimensional data.

II. RELATED WORK

The related works for protecting outsourced data are outlined as follow:

B. Chor et al., 1998 proposed Private information retrieval (PIR) which tries to fully preserve the privacy of access pattern, while the data may not be encrypted. PIR schemes are normally very costly. Focusing on the efficiency side of PIR, Williams et al. use a pyramid hash index to implement efficient privacy preserving data-block operations based on the idea of Oblivious RAM. The demerits are PIR schemes are normally very costly; limited to linear scan**,** no indexing method can be applied. It is different from RANDOM SPACE setting of high throughput range query processing.

R. Agrawal et al., 2004 proposed Order preserving encryption (OPE) which preserves the dimensional value order after encryption. A well-known attack is based on attacker's prior knowledge on the original distributions of the attributes. If the attacker knows the original distributions and manages to identify the mapping between the original attribute and its encrypted counterpart, a bucket- based distribution alignment can be performed to break the encryption for the attribute. There are some applications of OPE in outsourced data processing. Yiu et al uses a hierarchical space division method to encode spatial data points, which preserves the order of dimensional 3values and thus is one kind of OPE. Drawbacks of this method are once the original distribution is known, OPE is broken. It suffers from the distribution-based attack. An OPE scheme maps a set of single-dimensional values to another, while keeping the value order unchanged.

B. Hore et al., Crypto-Index is also based on column-wise bucketization. It assigns a random ID to each bucket; the values in the bucket are replaced with the bucket ID to generate the auxiliary data for indexing. To utilize the index for query processing, a normal range query condition has to be transformed to a set-based query on the bucket IDs. .A bucket-diffusion scheme was proposed to protect the access pattern, which, however, has to sacrifice the precision of query results, and thus increase the client's cost of filtering the query result. The drawback is that it sacrifices the precision of query results, and thus increase the client's cost of filtering the query result.

H. Hu, J. Xu et al., In their paper ―Processing private queries over untrusted data cloud through privacy homomorphism,‖ have talked about privacy in homomorphism**.** The query privacy problem and requires the authorized query users, the data owner, and the cloud to collaboratively process kNN queries. However, most computing tasks are done in the user's local system with heavy interactions with the cloud server. Drawback of this method are the cloud server only aids query processing, which does not meet the principle of moving computing to the cloud. Computing tasks are done in the user's local system, heavy interaction with cloud server.

Disadvantage of existing system:

- The search algorithm is limited to linear scan and no indexing method can be applied.
- The method does not consider data confidentiality.

III. OVERVIEW OF TECHNIQUES

System Architecture

Figure 3.1 The system architecture for Random Space perturbation based query services.

Basic procedures in this framework:

1. R(D) is Random Space perturbation that transforms the original data D to the perturbed data D′

2. Q(q) transforms the original query q to the protected form q′ , which is processed on the perturbed data

3. T(q′,D′) is the query processing algorithm that returns the result R′.

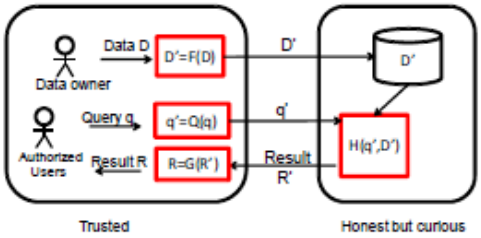

Figure 3.1 System Architecture

IV. PROPOSED SYSTEM

The proposed technique is designed to securely transform the queried ranges into the polyhedra in the perturbed space with the indexing structures. It is a combination of OPE, dimensional expansion which provides strong confidentiality. It lowers the perturbation cost by low in-house processing workload. It preserves the topology of multidimensional range with indexing and efficient query processing.

V. ALGORITHMS

In order to evaluate the confidentiality and efficient query service the two basic algorithm ie., kNN range service and Two-stage query processing is used. Intially the data in the cloud is perturbed with the PHE and double hashing technique for secure query transformation. To minimize the overlapping of location R^+ tree, which is the advanced R-tree can be used.

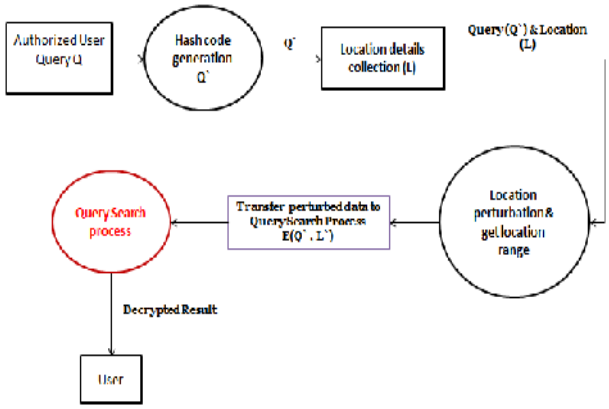

Figure 5.1 Flow of the proposed system

5.1 Location Insertion using R* tree

R*-tree which stores N data rectangle, The maximum value for its height *h* is: $h_{max} = [\log_m N] - 1$

1. For Insertion of each new location perform Linear split

a. Choose two objects as seeds for the two nodes, as far apart as possible.

b. Then consider each remaining object in a random order and assign it to the node requiring the smallest enlargement of its respective MBR. The distance between two region can be got by

$MINDIST(R_1,R_2) = PointDistance(S,P) = \varepsilon_{i=1}^{k} |S_i - P_i|^2$

5.2 kNN Range Service

RANDOM SPACE perturbation does not preserve distances and distance orders, kNN query cannot be directly processed with the RANDOM SPACE perturbed data. kNN-R query processing algorithm is based on range queries ,hence the use of index in range query processing enables fast processing of kNN queries.

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The kNN-R algorithm consists of two rounds of interactions between the client and the server.

- The client will send the initial upper-bound range, which contains more than k points, and the initial lower-bound range, which contains less than k points, to the server.
- The server finds the inner range and returns to the client. The client calculates the outer range based on the inner range and sends it back to the server.
- The server finds the records in the outer range and sends them to the client. The client decrypts the records and find the top k candidates as the final result.

5.3 Two Stage Query Processing

The proxy in the client side finds the MBR of the polyhedron and submit the MBR and a set of secured query conditions {Θ1, . . . , Θm} to the server.

- The server then uses the tree index to find the set of records enclosed by the MBR.
- Find the middle square range S(mid), where mid = (low + high)/2.
- If S(mid) covers no less than k points, the higher bound: S(high) is updated to S(mid); the lower bound S(low) is updated to S(mid), S(low) is set to S(L1) and S(high) is S(Lm).
- This process repeats until N(mid) < k + δ or high − low < E
- At the second stage, the server uses the transformed half-space conditions to filter the initial result.

CONCLUSION

The RANDOM SPACE perturbation approach to hosting query services in the cloud satisfies the CPEL criteria.The critical feature of low in-house workload to fully realize the benefits of cloud computing, and efficient query processing is a key measure of the quality of query services. It preserves the topology of the queried range in the perturbed space, and allows using indices for efficient range query processing. With the topology-preserving features, we are able to develop efficient range query services to achieve time complexity of processing queries. The kNN query service is developed based on the range query service.

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Smart Third Umpire Decision Assisting System using PLC

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Abstract- **Cricket, a world renowned game has several flaws when it comes to the decisions made by a Third Umpire. Especially in crucial decisions regarding Out/Not Out; his decision has to be accurate and quick. But in few cases he fails to deliver it as he is expected to. Therefore it is essential to make use of technology to eliminate this drawback in the game. Hence in this paper we propose a Smart Third Umpire Decision Assisting System (STUDAS) to overcome this flaw using Programmable Logic Controller (PLC) as well as Supervisory Control and Data Acquisition (SCADA). This system primarily aims to implement event detection and decision making algorithm so as to make the game of cricket much fairer and swifter.**

Keywords: **Cricket, PLC, Run Out, SCADA, Third Umpire.**

I. INTRODUCTION

In the sport of cricket, technology has played a crucial role in making it a fair game. Several new technologies in the recent times like *HAWK EYE* for LBW detection as well as *SNICKO METER* to detect edging of the ball with the bat have made this game a fair one. In this regard there are no such advancements in the recent times for the case of Run out, except for usage of cameras with high zooming & slow motion recording capabilities. The existing system where a run out is decided by a third umpire using the video clippings of the event has failed to produce accurate results in many cases as well as the time taken by the Third Umpire to analyze the clipping and come to conclusion has been both a time and accuracy issue. According to the rules of ICC, the time to be taken to decide a run out is 30 seconds. But in most of the cases it takes a lot more time than the time mentioned in the rule. Hence by this system, we are able to overcome this drawback in the game of cricket which is one of the major issues of time constraints as well as accuracy. In the past decades, various systems/models have been proposed to improve the umpiring decisions. Contradictory to the past work on the designs of umpiring algorithms, this is a dynamic smart umpiring algorithmic circuitry that could provide accurate results and minimize delay which saves the precious time. The existing methodology wherein video cameras are used in decision making process is unable to give accurate results since there is a high probability of human error where the umpire may perceive the data/video clipping wrongly. To tackle the latter problem, slow---mo cameras can be put into force. But the main issue with slow-mo cameras is that, they are very expensive. A study on the proposed system is presented, and a series of simulation experiments are conducted to verify the analytic results and to show the capability of the proposed system. The main objective of the system is to propose a dynamic smart accurate umpiring algorithm circuitry to improve the time constraints as well as precision in run out decision making.

Fig. 1: Third Umpire

To achieve this, PLC and SCADA has been made use in the system. The PLC (Programmable Logic Controller) which is widely used in industrial and automation applications does the calculations required for the system whereas the SCADA (Supervisory Control and Data Acquisition) is made use to develop HMI (Human Machine Interface).

Contribution: In this paper, a new approach to assist a third umpire's decision in cricket pertaining to Run Out, using PLC and SCADA is proposed. The approach is simple, based on event detection.

Organization: Section I gives a brief introduction of problem statement behind this system. The existing proposed systems are described in section II. Background of PLC & SCADA is explained in Section III. Section IV describes the proposed system working and Section V speaks about Conclusion & Future Work.

II. RELATED WORK

Shashank Yeole *et al.* has put forth a model [1] in which MATLAB tool is made use to extract frames of video feeds from cameras focusing wickets and crease. The decision is made by monitoring the disturbed frame of wicket camera feed and the corresponding frame of the same time from the crease camera. This system reduced the time taken to decide a run out by 88% when compare to time taken by human eye calculation. Dr. Tariq Mahmood *et al.* in their journal [2] proposes a model similar to the one proposed by Shashank Yeole [1], where it involves extraction of frames from the video feeds and converting them into gray scale image so as to apply certain algorithm and decide a Run out case. But the drawback of this system is that it needs 4 cameras placed at ground level focusing the wicket as well as crease which is quiet impractical. P. Ashok Kumar [3] has put forth a model to detect a run out by using the data acquired from the sensors placed inside batsman/bowler shoes, bat and ball. All the data collected from different sensors are analyzed using certain algorithm to come to a conclusion in a Run out scenario.

Wazir Zada Khan *et al*. have proposed a technique to detect the over step No Ball [4]. The technique is to obtain coordinates of sensors placed near stumps, crease centre and bowlers shoe and then applying a mathematical formula to find out a angle of the triangle made at the point of sensor at crease centre. If the angle at that point is found to be more than 90^{o}, then it is concluded as a No Ball and Vice versa. Nikhil Batra *et al*. have proposed a model [5] to identify over step No Ball, which is much advance and complex than the one proposed by Wazir Zada Khan [4].The top view image of the pitch area is taken at the moment the bowler keeps his leg on the ground during ball delivery. Then the system applies Canny Edge detection and Hough Line Transform algorithm to the captured image. After this, the same technique used in [4] to find the angle is applied and the result is concluded similarly. Hao Tang *et al.* in their paper [6] propose a novel approach for detecting highlights in sports videos using easy-to-extract low-level visual features such as the color histogram (CH) or Histogram of Oriented Gradients (HOG). Xiaolong Li *et al.* have put forth a technology in their journal [7] which makes an effort to make use one of the wireless technologies ZigBee to Programmable logic controller (PLC) so that the remote field devices can be controlled without wiring. This technology can be made use in our system to obtain data from load cell and the contact switches to the PLC placed at a distance wirelessly.

III. BACKGROUND

A. PLC

Fig. 2: Siemens S7-300 PLC

PLCs are a type of digital computers predominantly used in industrial automation. They are most preferred on the factory floors since they are flexible and robust. Usually small PLCs have fixed number of Inputs and Outputs. Few of them are even provided with expansion if they fall short of I/O. Software to program a PLC is installed in PCs and the program is dumped into the PLC using serial cables like Ethernet or MPI cables. In most of the cases, PLCs can be reprogrammed according to the changes required by the user. The PLC model used in our system is Siemens S7-300 which is specially designed for automotive and packaging industries. It hosts a 2DP CPU (315-2AH14-0AB0) that has 128KB RAM. It is equipped with an Analog Input module (AI 331-1KF01-0AB0), Digital Input module (DI 6ES7321-1BH02-0AA0), Analog Output module (AO 322-5HB01-0AB0), Digital Output module (DO 322-1BH01-0AA0) and a Communication Port (CP 343-1-LEAN-343-1CX10-0XE0).

B. SCADA

SCADA-Supervisory Control and Data Acquisition) is a computer application used to monitor and control the systems at supervisory level. It is usually made use to detect and correct problems and measure trends over time in complex industrial processes such as oil and gas refineries,

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water treatment plants, automotive production lane etc. Other tasks of a SCADA system is to create logs and report about systems present and past state from distance [7]. It can also be used to set up alarms in systems to indicate the user when a pre defined condition is met by the system. In general SCADA plays an important role in Human Machine Interface.

C.Load Cell

Fig. 3: Load Cell

The load cells are often used inside weighing devices and are the main functional units in them. Here in STUDAS, CZL 601 Load cell is made use. This Load cell is a Strain gauge load cell where a strain gauge acts as a transducer in converting the mechanical energy i.e. weight into electrical energy. Inside the load cell, 4 strain gauges are placed at certain points in the form of a Wheatstone network. The change in resistance of the strain gauge will be directly proportional to the electrical output of the cell. This output value is used to determine the weight applied on it. Because of its rigidity, they are widely used in industrial applications.

D.Contact Switch

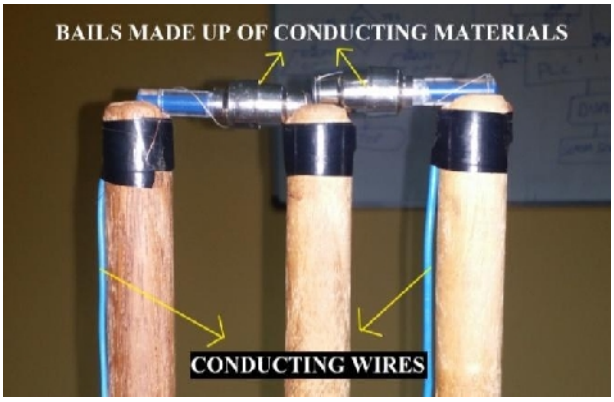

Fig. 4: Contact Switch arrangement in STUDAS

The contact switch arrangement used in STUDAS is shown in Fig.4. This arrangement is made use to detect the detachment of bails from stumps. As show in Fig. 4, two conducting wires have their ends connected to the contact surfaces (a conducting surface) on the top of the rightmost and the leftmost stumps. These two contact surfaces are connected by bails which are made up of conducting materials. And thus forms a closed loop for current to pass through. Whenever the bails go up, the circuit breaks and the moment this happens, PLC notes the time at which the bails went up and further uses it in the decision making algorithm.

V. PROPOSED SYSTEM

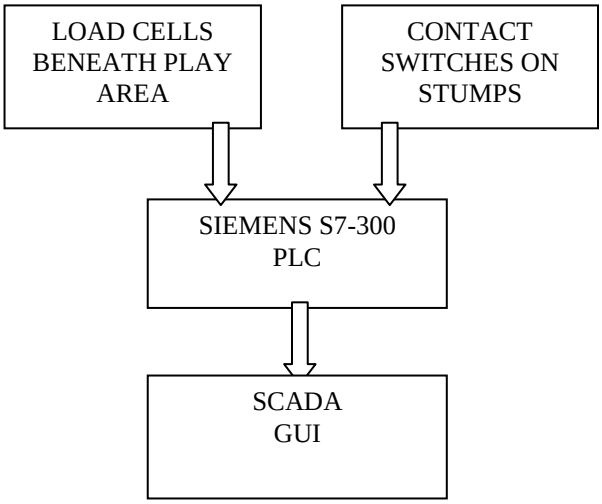

Fig. 5: Basic Block Diagram of Proposed System

The main criteria in decision making inside the system is to find which among the two events occurred first i.e. Bails detachment or Crease touch. Both the load cell and the contact switch arrangement have been given as input to Analog input module and Digital input module of PLC respectively. As soon as a load such as bat or the batsman's leg is on the load cell, it produces a small amount of voltage in terms of mV and it reaches the AI. Similarly when the bails go up, the contact switch arrangement which was a closed circuit becomes an open circuit. This change is noted down by the PLC. Next the ladder logic does the decision based on the time at which these two events have occurred. The load cells (CZL601) placed beneath the play area is of the range 0-10 kg. When a load/weight is applied on these sensors, they produce a voltage up to 500mV which is fed as input to the PLC through the Analog Input module i.e. AI. Bails here, act as a contact switch between the extreme end wickets as they are made up of conducting material. A wire which runs along the length of the two extreme end stumps connects the contacts which are on the top of stumps, to the PLC. So in a whole, a closed circuit is formed and the two ends of the circuit are connected to the Digital input module i.e. DI. This module detects any breakage in circuit i.e. whenever bails get detached, the circuit opens and will be noted by the PLC. The SCADA-

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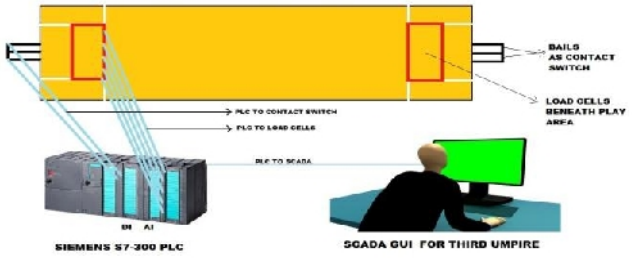

Fig. 6: Graphical Overview of STUDAS

(Supervisory Control and Data Acquisition) screen developed, act as a Human Machine Interface for the Third Umpire. He is first notified with a color change in the play area region in the first window to indicate which side of the pitch the run out has occurred. Next window shows which all sensors have been activated i.e. on which all sensors the weight has been applied. The next window provides an option/button for the umpire to ask the system's decision. The result window is developed such that it shows Red if out and Green if not. The third umpire can also view the trend window i.e. a SCADA screen which graphically shows which event occurred at first place viz. load on the load cell or detachment of bail from stumps. If the load cell graph line has gone high after the bail graph line, then the result would have appeared as Not Out or if the graph line of bails has gone up before the graph line of load cells then the decision would be out. This can be used to cross verify the result. The graphical overview of STUDAS is shown in the Figure 6.

*A. **Ladder Logic***

The ladder logic of this system was simulated and tested on Seimens Simatic S7 Manager v5.5. Among the blocks used in the ladder logic, FC108 is a scaling block which was developed to scale the input from the load cells which is in terms of voltage to a user defined unit, for example 0-100. The output of FC108 block follows the formula mentioned below. Using this formula a user can choose the range of output one desires.

$$SENSOR\_OUT = \frac{PIW\_x \, X \, (HI\_LIM - LOW\_LIM)}{27648} + LOW\_LIM$$

Where HI_LIM = 100 & LOW_LIM = 0 (Here). PIW_x is a register to which the varying sensor output value is stored.

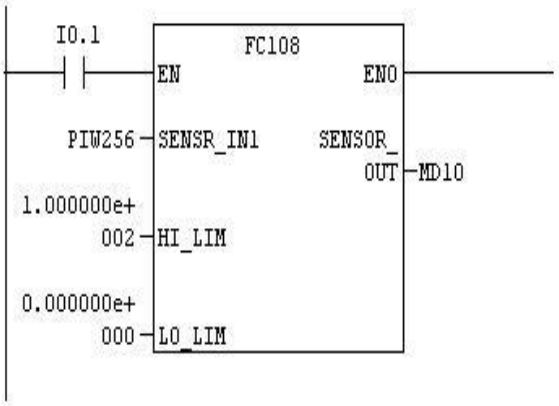

Fig. 7: FC 108 Block

The primary goal in implementing FC108 block as shown in the Fig. 7 is to scale down the output from load cells to any range between HI_LIM and LOW_LIM. The output SENSOR_OUT is directed to a memory location MD10 for further processing. Apart from processing the outputs of load cells, the system also needs to monitor the contact switch outputs. Hence the ladder logic to perform this action consists a On Delay Timer and Move blocks as shown in the Figure 8.

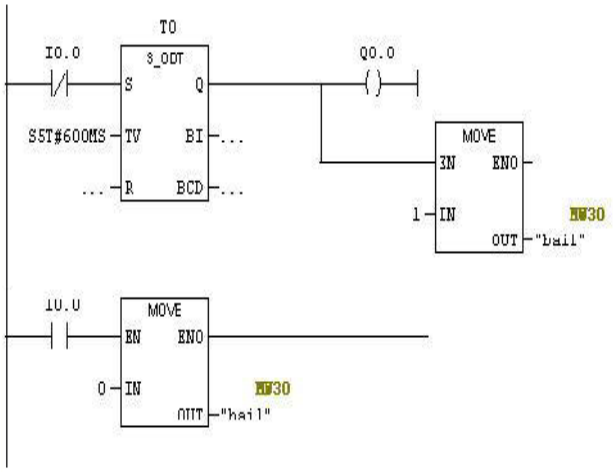

Fig. 8: Contact Switch's Ladder logic

As in the Fig. 8 the On Delay Timer (S_ODT) is used in the ladder logic to nullify the delays in the sytem. Since contact switch arrangements output is always high when bails are intact with the stumps, the output coil Q0.0 wil be generally high. Only when the switch goes off i.e. bails detach from the stumps, the coil Q0.0 goes low. The state of Q0.0 is compared with the load cells output in the decision making algorithm.

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RESULTS & DISCUSSIONS

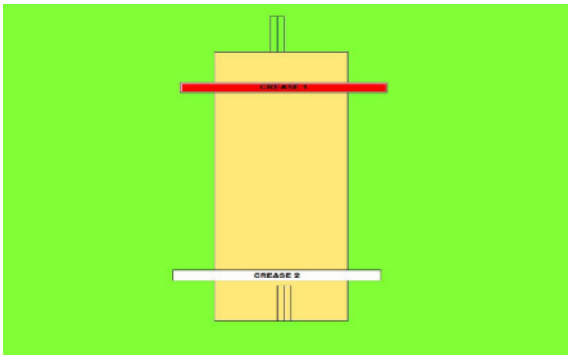

Fig. 9: SCADA Screen 1

The Fig. 9 shown above is the first SCADA screen which will be appearing on the Third umpire's monitor. Soon after a run out scenario in any part of the pitch the third umpire is notified by the color change in the crease button i.e. color change from white to red as shown above. This makes easy for the umpire to know which part of the pitch the run out as occurred so that he chooses to see which all sensors are activated in that play area. The white color crease button changes to red color whenever there is a load more than the threshold defined in the comparator. This screen notifies the third umpire that which load cell among the load cells beneath the play area is activated. This change is shown by the color change in the sensor button as shown. The white color sensor button will be changed to red color as shown in the Fig.10. By clicking the sensor button whose color change has occurred, the umpire will be led to another screen which is the result window where the umpire asks the system for result. In the result window as shown in the Fig. 11 and Fig. 12, the umpire clicks the 'Result' button to know the systems decision. As said before, the system identifies which event occurred first and gives out the result.

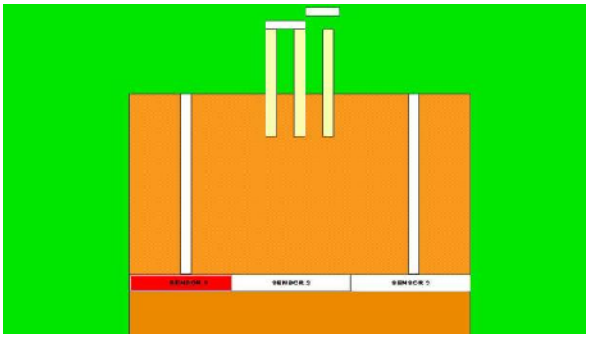

Fig. 10: SCADA Screen 2

The window shown in Fig. 11 appears when the decision given by the system is Not out i.e. the not out button appears in green color, indicating that the batsmen is not out as the load cells have been activated first and then the bails have gone up.

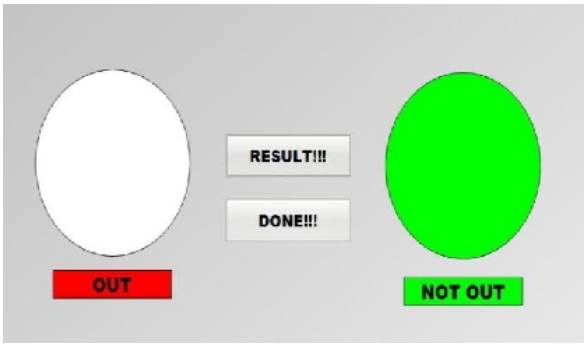

Fig. 11: SCADA Screen 3

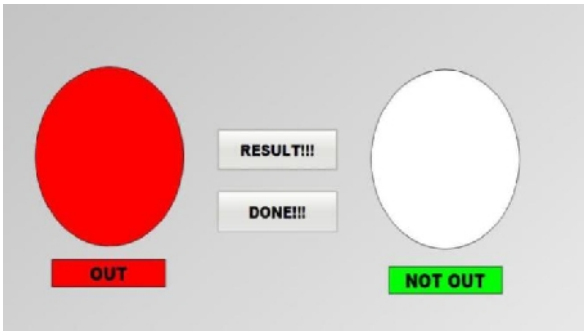

Fig. 12: SCADA Screen 4

The window in Fig.12 appears when the case is out i.e. out button appears in red color, indicating that the batsmen is out as the load cells have been activated after the bails went up. As it can be seen clearly from the SCADA Trend window/graph in Fig. 13, that the black colored graph line which represents bails, has gone high after the red colored graph line representing load sensors, which implies Not Out & vice versa for Out case. This window can be used to cross verify the systems decision.

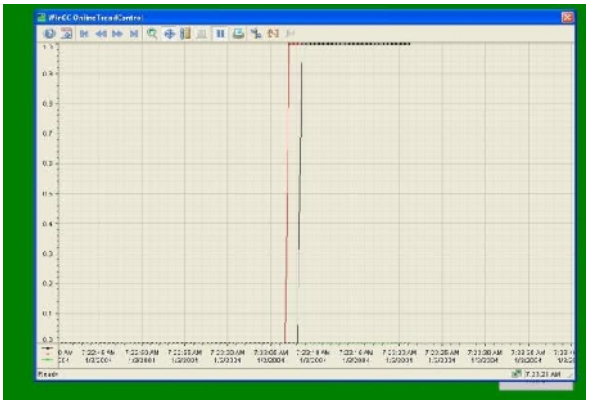

Fig. 13: SCADA Trend Window

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It is evident that the third umpire using the existing video analysis system takes an average of 50-70 seconds to decide a Run out. In few unfortunate cases the umpire has also given unfair decisions even after taking time. When this system was tested it gave out results within 10 seconds with almost cent percent accuracy which easily says the system eliminates the time and accuracy issues present in the existing video analysis system

CONCLUSION & FUTURE WORK

The two parameters i.e. Time & Accuracy, which were our major concern before implementing the system was successfully optimized by making use of PLC as well as SCADA. Hence one among many flaws which the game of cricket has is eliminated by this system. Henceforth, the decision by a Third umpire can be given within the time limit i.e. 30 seconds as per the ICC law. Not only reducing the time to decide has been reduced but also the degree of accuracy has been increased to almost cent percent.

Further, the same load cells can also be used to detect Overstep No ball using similar but less complex algorithm. This can reduce the time taken by the third umpire during checking whether the delivery is legal or not. Also, other decision assisting systems pertaining to Boundaries and Catches, combined with this system together can work as a single unit as Virtual Third Umpire, eliminating the need of human intervention in decision making process.

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Business Transaction Automation for Improving Business Value

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Abstract- **Today's businesses can no longer be successful solely operating within their own four walls. To operate with today's highly distributed business model, it is required of real-time connectivity to the network of trading partners. Without visibility into the locations of inventory, the forecasts of demand, the availability of supply and the status of payments, companies cannot make decisions related to day-to-day operations. This paper discusses about providing better business value through the business transaction automation based upon SaaS engine.**

I. INTRODUCTION

E-business today means E-commerce, E-collaboration, E-governance-procurement, etc. E-business will only work, if the interoperability of the selected independent areas in all its facets and visibility of E-benefits are ensured. This includes common agreements about the rules of the E-business concepts, frameworks and models among the participating partners.

In E-business, different types of business partners come into picture. Such as Business organisation (B), Consumers (C) and government agencies (G). And the relationships between these entities are typically denoted as B2B, B2C, C2C, B2G, etc… B2B transactions are a growing segment of the e-commerce market.

With the rise of internet, the utility of services given and taken from online has Increased many folds. Along with this the people expected quick and efficient solutions for their E-business applications. Real time, profitable and well working solutions can be found on market, but there is still there is a gap between generally well working interoperability solutions and the ICT infrastructures and tools, and for general solutions to guarantee security and trust in E-business.

Rather than buying selling via internet, there is a lot more to E-business. And its results extend beyond simple process automation. When the processes are switched from a paper based paradigm to an electronic paradigm, the unknown opportunities with the necessity of re-engineering major processes and structures within an organisation are combined. E-business can be thought of as a new altered business relationships and networked cooperation between customers and suppliers. Customers and suppliers can not only get into contact more directly with each other, but also new types of organisations can come into existence offering E-catalogues.

Standardised efforts have paved the way in which the adoption of software as a service (SaaS) and cloud computing environments are mainstreamed. Currently, different organisational entities have undertaken several initiatives to provide useful standards for cloud computing. Earlier it was argued that no standard had existed. But now the opinion has changed.

Best opportunities to improve e-business, would come from automating manual B2B processes, improving compliance of small companies, and better training in B2B practices among trading partners. For the same reason, the industry will need a lot more soliddata about the value of automating E-Business transactions before adoption will accelerate.

The vision for E-business and E-Commerce was simple and clear. A seamless world of automated communications and transactions flowing among the business buyers and sellers, based on a shared technology standards and networks. The goal was frictionless commerce that would reduce the costs, improve margins and increase customer satisfaction by eliminating paper, faxes and other manual processes. In other words, eliminating any form of manual or human intervention.

II. RELATED WORK

Business-to-Business (B2B) electronic commerce solutions were adopted by companies asearly as the late 1980s due to a growing need for more efficient inter-company informationexchange and communication coordination. Early B2B solutions were usually implementedand maintained by in-house IT teams. However, the expansion of business networks, andthe increasing complexity of managing them, led a growing number of companies to outsourcesome B2B operations to external service providers.

Over the last decade, the business environment has become more demanding, and supplychains have become increasingly distributed and more complex. Electronically connectingand collaborating with trading partners is vital to thriving in this environment. Consequently,a growing number of companies have taken steps to improve their electronic communicationcapabilities and B2B collaboration. Some of the resulting benefits of such B2B integrationprograms include improved operational efficiencies, reduced costs, and increasedcustomer satisfaction. With new forms of technological innovations and an increasing needby many organizations to automate and improve more of their B2B processes, demand forB2B solutions is expected to further increase in the coming years.

A survey conductedby non-profit trade associationComputing Technology IndustryAssociation1 (CompTIA) and theElectronics Industry Data ExchangeGroup (EIDX), and released at theOctober 2007 EIDX meeting, found thateven in the high-tech industry, e-businessstandards are not yet universally adopted.Indeed, although the value of e-commerceis clearly apparent to high-techcompanies, they remain mired in aswamp of nonstandard technologies.
A key area of investment and futureopportunity is the use of Web portalsas a conduit for exchanging transactionalinformation with trading partners.

A recent survey of high-tech and electronicscompanies indicated that simplifyingandreducing the costs ofbusiness-to-business (B2B) e-commercefor midsize and small tradingpartners was one of the greatestareas of opportunity for B2B operationalimprovement. The global sourcingapproach taken by most high-techand electronics companies has exacerbatedthis challenge. The Microsoft® Office System 2007,with pervasive tools such as Excel® toextensively support XML and Webservices standards, allows costeffectiveintegration and collaborationfrom the very largest to the smallest trading partners in the value chain.

Streamlined intercompany transactions and integration: For any company with multiple business units or subsidiaries, intercompany transactions and integration create operational complexity. Minimizing this complexity is critical when you need to consolidate financials across all operations for reporting,provide visibility into the sales performance of eachbusiness entity, or streamline intercompany procurement transactions.Without automating and streamlining inter-company transactions and integration, such activities require painful manual reconciliation and aggregation.Businesses would want to reduce the time and effort associated with processing intercompany transactions and comply with regulations. The business data should be synchronized between the systems so that the business entities share a common language when transacting with each other. Accurate and timely B2B processes are critical for ensuring satisfied customers and maximum efficiency of the B2B business process.

On Demand, Software as a Service (SaaS) model
On-demand, Software-as-a-Service (SaaS) applications are based on a recurring subscription fee and typically are a pay as you go model. The cost may increase as the usage of the application increases.

A typical SaaS deployment does not require any hardware and can run over the existing Internet access infrastructure. Sometimes, changes to firewall rules and settings may be required to allow the SaaS application to run smoothly. A SaaS application can be configured using APIs but multi-tenant SaaS applications cannot be completely customized.

The SaaS service model is designed to deliver business applications anywhere, anytime which in turn requires the SaaS vendor to employ dedicated support teams and staff that make themselves available to customers on short notice. Along with the personnel comes reserve capacity to handle any spikes in usage, outages or network mishaps and to do this continuously, globally and securely. Architecturally, the preferred SaaS model is multi-tenant.This means that the physical backend hardware infrastructure is shared among many different customers but logically is unique for each customer. A good description of the multi-tenant architecture design is: “When a user at one company accesses customer information by using a SaaS CRM application, the application instance that the user connects to may be accommodating users from dozens, or even hundreds, of other companies -- all completely unbeknownst to any of the users. This requires an architecture that maximizes the sharing of resources across tenants, but that is still able to securely differentiate data belonging to different customers.”

A SaaS based engine that monitors the B2B transactions in real time as theyflow through the network to ensure that they are accurate and that they comply with the business rules.
The service alerts, when the transactions are not accurate or donot comply with the business rules, providing the critical visibility that we need for efficientand effective B2B operations.
Also, it provides you with the B2B intelligence requiredto proactively address issues before they pollute the ERP system and/or become crises.

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III. KEY FEATURES

- Data quality filter—Real-time data quality checks are performed on all inbound documents to ensure that each one complies with the standard format rules.
- Cross-document matching—Cross-document comparisons ensure that data that is common across documents is accurate and complete—e.g., ensuring that data in the paymentstatus file matches data in the approved payments file.
- Quarantine for duplicate documents, documents with errors—In-flight transactions that fail data or business-rules validation can be suspended for special exception handling or automatically rejected. This prevents the negative consequences of allowing bad data to pollute your back-office systems. For example, by preventing duplicate invoices from flowing through, we can avoid duplicate payments, the inevitable follow-up phone calls with the business partners and costly data clean-up activities.
- Real-time email alerts for document arrival or rejected, missing or late documents. When exceptions occur, email alerts can be directed in real time to the appropriate personnel for action. Such event-based notification and remediation enables you to concentrate on only those situations that need attention, thus minimizing disruptive workdaysand constant crisis management mode.
- Business rules tailored to the process—we define the rules to govern the flow ofour transactions according to our company's specific needs. We may choose from a set of commonly used rules, or we can configure rules to suit your specific process. For example, if our back-office system must process documents in a specific order, Active Intelligence can ensure the proper sequence prior to delivery.
- Self-service portal for research, reporting and action—Instead of constantly directing requests for action or status information to our IT staff, a business user-friendly,self-service portal enables your line-of-business personnel to take action, obtain status and obtain reports themselves online. Nobody needs to search through EDI files for the required data. For example, if Treasury needs a list of unmatched invoices, they can fulfil their own requests for data and reports. Otherwise, IT personnel would have to manually track down the data to service these requests, wasting your company's time and resources. Usage is controlled based on configurable, role-based access.

IV. BENEFITS

- Satisfied customers—because we are notified about compliance and/or data quality issues in real time, we can resolve them immediately and ensure timely delivery of goods to our customers.
- Collaborative business partner relationships—by ensuring accurate, timely exchange of business documents that are in compliance with requirements, we avoid disputes andprevent delays that can impact order delivery and/or payments.
- Reduced costs—Automated matching across documents, coupled with automated workflow, real-time alerts, and self-service portal capabilities for IT and business users reduces our administrative costs associated with error-prone manual processing and phone calls. We can eliminate delays while reducing resource requirements.

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Security Based Pattern Classifiers

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Abstract- **Security is usually defined as opposing oneself from harmful attacks. Security is a part of everyone's life. People wants to be safe and secure all the time but one never knows when his/her system can be attacked by malicious intruders. However upgrading ones security at the highest level possible is a necessary task. Pattern classification systems are commonly used in adversarial applications, such as biometric authentication, network intrusion detection, and spam filtering. It is to be noted that in these three areas data can be purposely manipulated or modified by humans to undermine their operation. These scenarios are not considered by classical design methods. Pattern classification systems may exhibit vulnerabilities, and when exploited may severely affect performance. Extension of pattern classification theory and design methods to real time applications is thus a very relevant research direction which has not yet been pursued in a systematic way and proper way. This paper introduces one of the main open issues: establishing a security system as a real time application which can be used in several organisations such as hospitals, banking system, libraries etc. Reports shows that security evaluation can provide a more complete understanding of the classifier's behaviour and lead to better design choices.**

Keywords: **Pattern classification, adversarial classification, security evaluation, robustness evaluation**

I. INTRODUCTION

Pattern classification systems that are based on machine learning algorithms are widely used in security-related applications such as biometric authentication, network intrusion detection, and spam filtering, to differentiate between a "legal/legitimate" and a "malicious" pattern class ex: legitimate and spam mails. Contrary to existing approach, these applications have an intrinsic adversarial nature since the input data can be purposely manipulated by an intelligent and adaptive adversary to undermine classifier operation. Well known examples of attacks against pattern classifiers are: submission of a fake biometric trait to a biometric authentication system. This is popularly known as spoofing attacks; modifying or altering the network packets that belongs to intrusive traffic to escape intrusion detection systems (IDSs); modifying the file contents of the spam emails to getthem past the spam filters. This is achieved by misspelling common words that belongs under the category of spam to avoid their detection. A malicious web user may manipulate with the search engine ratings so as to artificially promote their webpages/websites.

Furthermore it is observed that the existing systems based on classical approach and design techniques exhibit vulnerabilities to different attacks posed by the intruders, which in turn affects the performance of the system resulting in the degrading the functionalities of the pattern classification systems. Thus, the system becomes less effective and more prone to attacks. A more systematic approach is needed to make the existing system more effective and trust worthy thereby providing a higher level of security, preventing the system from malicious attacks. Hence the user data is secured and safe in the system. There are two main open issues that can be identified: (i) analysing the existing classical algorithms of the previous work, and the related attacks on it; (ii) developing new methods to enhance the classifier security against these attacks, which is not possible using classical performance evaluation methods.

Besides introducing these concepts to the research community, the issues that are addressed are (i) and (ii) above by implementing the concepts in the real time applications.

II. RELATED WORK

This section deals with the background and previous work which lead to the making of the current system.

The attack against pattern classification systems was proposed in the paper, and further extended in paper. The classification is based on two key features: the kind of influence of attacks on the system, and the kind of security violation they cause in the system. The causative attacks can influence the training data as well as the testing data

respectively. The security violation can lead to integrity violation if it is able to access the resources protected by the user and a privacy violation takes place when it allows the adversary to access the resources or files that are confidential for the existing user. Integrity violations result in misclassified malicious samples as legitimate, while availability violations can also cause legitimate samples to be misclassified as malicious, however one feature of the taxonomy of the classification system is the specificity of an attack that ranges from targeted to indiscriminate, depending on whether the attack focuses on a single sample or few specific samples (e.g., a specific spam email misclassified as legitimate), or on a wider set of samples.

System designer should predict the adversary classified system by simulating a "proactive" arms race to (i) identify the most relevant threats and attacks on the system, and (ii) propose a proper countermeasures, before modifying the existing classification systems. Furthermore, this improves security as it requires the adversary to spend a greater effort i.e. to spend more time, put more skills and resources to find, modify and exploit vulnerabilities. Hence system security is guaranteed for a muchlonger time, with less frequent supervision or human intervention on the system.

The goal of security evaluation of the classification system is to address issue (i) above, i.e., to simulate a number of realistic attack scenarios that may be incurred during operation, and to assess the impact of the corresponding attacks on the targeted classifier to highlight the most critical vulnerabilities. Although security evaluation of the pattern classification system may also suggest specific countermeasures i.e. the design of secure classifiers.

Many authors implicitly performed security evaluation as a what-if analysis, based on empirical simulation methods; however, they mainly focused on a specific application, classifier and attack, and devised ad hoc security evaluation procedures based on the exploitation of problem knowledge and heuristic techniques. Their goal was either to point out a previously unknown vulnerability, or to evaluate security against a known attack. In some cases, specific countermeasures were also proposed, according to a proactive/security-by-design approach. Attacks were simulated by manipulating training and testing samples according to application-specific criteria only, without reference to more general guidelines; consequently, such techniques cannot be directly exploited by a system designer in more general cases.

BUILDING ON THE PREVIOUS WORK

We summarize here the three main concepts more or less explicitly emerged from previous work that will be exploited in our framework for security evaluation.

1. Arms race and security by design: since it is not possible to predict how many and which kinds of attacks a classifier will incur during operation, classifier security should be proactively evaluated using a what-if analysis, by simulating potential attack scenarios.

2. Adversary modelling: effective simulation of attack scenarios requires a formal model of the adversary.

3. Data distribution under attack: the distribution of testing data may differ from that of training data, when the classifier is under attack.

Our main goal is to provide a quantitative and general-purpose basis for the application of the what-if analysis to classifier security evaluation, based on the definition of potential attack scenarios. To this end, we propose: (i) a model of the adversary, that allows us to define any attack scenario;(ii) a corresponding model of the data distribution; and (iii) a method for generating training and testing sets that are representative of the data distribution, and are used for empirical evaluation.

III. APPLICATION EXAMPLES

While previous work focused on a single application, we consider here three different applicationexamples: spam filtering, biometric authentication, and network intrusion detection. Our aim is to show how the designer of a pattern classifier can use our framework, and what kind of additional information he can obtain from security evaluation. We will show that a trade-off between classifier accuracy and security emerges sometimes, and that this information can be exploited for several purposes; e.g., to improve the model selection phase by considering both classification accuracy and security.

3.1 Spam Filtering

Assume that a classifier has to discriminate between legitimate and spam emails on the basis of their textual content, and that the bag-of-words feature representation has been chosen, with binary features denoting the occurrence of a given set of words. This kind of classifier has been considered by several authors, and it is included in several real spam filters.7

Attack scenario. Goal. The adversary aims at maximizing the percentage of spam emails misclassified as legitimate, which is an indiscriminate integrity violation.

The adversary in (i) is assumed to have perfect knowledge of the classifier, i.e.,: (ii) the feature set, (iii) the kind of decision function, and (iv) its parameters (the weight assigned to each feature, and the decision threshold). Assumptions on the knowledge of (v) the training data and (vi) feedback from the classifier are not relevant in this case, as they do not provide any additional information.

3.2 Biometric Authentication

Multimodal biometric systems for personal identity recognition have received great interest in the past few years. It has been shown that combining information coming from different biometric traits can overcome the limits and the weaknesses inherent in every individual biometric, resulting in a higher accuracy. Moreover, it is commonly believed that multimodal systems also improve security against spoofing attacks, which consist of claiming a false

identity and submitting at least one fake biometric trait to the system (e.g., a "gummy" fingerprint or a photograph of a user's face). The reason is that, to evade a multimodal system, one expects that the adversary should spoof all the corresponding biometric traits. In this application example, we show how the designer of a multimodal system can verify if this hypothesis holds, before deploying the system, by simulating spoofing attacks against each of the matchers. To this end, we partially exploit the analysis in.

The design phase includes the enrolment of authorized users (clients): reference templates of their biometric traits are stored into a database, together with the corresponding identities. During operation, each user provides the requested biometric traits to the sensors, and claims the identity of a client. Then, each matcher compares the submitted trait with the template of the claimed identity, and provides a real-valued matching score: the higher the score, the higher the similarity. We denote the score of the fingerprint and the face matcher respectively as xfing and xface. Finally, the matching scores are combined through a proper fusion rule to decidewhether the claimed identity is the user's identity (genuine user) or not (impostor).

1) Attack scenario. Goal. In this case, each malicious user (impostor) aims at being accepted as a legitimate (genuine) one. This corresponds to a targeted integrity violation, where the adversary's goal is to maximize the matching score.

Knowledge. As in [1], we assume that each impostor knows: (i) the identity of the targeted client; and (ii) the biometric traits used by the system. No knowledge of (iii) the decision function and (iv) its parameters is assumed, and (v) no feedback is available from the classifier.

3.3 Network Intrusion Detection

Intrusion detection systems analyze network traffic to prevent and detect malicious activities like intrusion attempts, port scans, and denial-of-service attacks.11 When suspected malicious traffic is detected, an alarm is raised by the IDS and subsequently handled by the system administrator. Two main kinds of IDSs exist: misuse detectors and anomaly-based ones. Misuse detectors match the analyzed network traffic against a database of signatures of known malicious activities (e.g., Snort).12 The main drawback is that they are not able to detect never-before-seen malicious activities, or even variants of known ones. To overcome this issue, anomaly-based detectors have been proposed. They build a statistical model of the normal traffic using machine learning techniques, usually one-class classifiers (e.g., PAYL), and raise an alarm when anomalous traffic is detected. Their training set is constructed, and periodically updated to follow the changes of normal traffic, by collecting unsupervised network traffic during operation, assuming that it is normal (it can be filtered by a misuse detector, and should be discarded if some system malfunctioning occurs during its collection). This kind of IDS is vulnerable to causative attacks, since an attacker may inject carefully designed malicious traffic during the collection of training samples to force the IDS to learn a wrong model of the normal traffic.

Attack scenario. Goal. This attack aims to cause an indiscriminate integrity violation by maximizing the fraction of malicious testing samples misclassified as legitimate.

Knowledge. The adversary is assumed to know: (ii) the feature set; and (iii) that a one-class classifier is used. No knowledge of (i) the training data and (iv) the classifiers' parameters is available to the adversary, as well as (v) any feedback from the classifier.

Capability. The attack consists of injecting malicious samples into the training set. Accordingly, we assume that: (i) the adversary can inject malicious samples into the training data, without manipulating testing data (causative attack); (ii) she can modify the class priors by injecting a maximum fraction pmax of malicious samples into the training data; (iii) all the injected malicious samples can be manipulated; and (iv) the adversary is able to completely control the feature values of the malicious attack samples. Repeat the security evaluation for pmax 2 ½0;0:5, since it is unrealistic that the adversary can control the majority of the training data.

IV. SYSTEM DESIGN

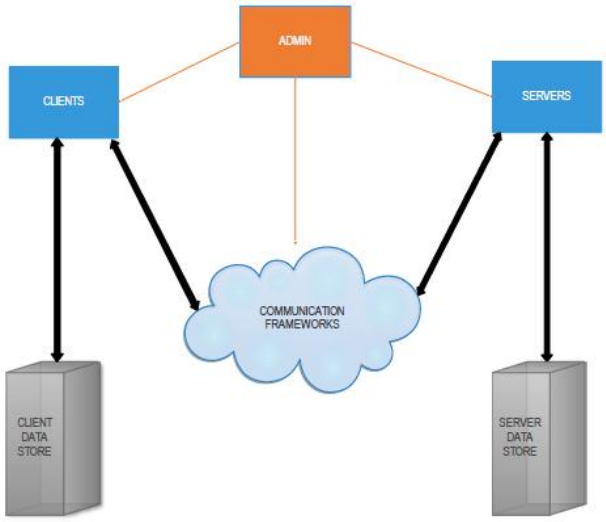

Figure 1: System Design

The above figure shows the system design of the system based classifiers where the interaction between each components are viewed.

There are six main components involved namely clients, client data store, servers, server data store, admin and communication frameworks.

i. The client's module involves the list of users which are registered into the system. The clients consists of the properties such as name, gender, email id, phone no., city, etc.

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ii. Client's data store consists of the data set of each clients. The client's data store is used to retrieve and fetch information as and when required by the user or client.

iii. Servers are capable of accepting requests from the client and then

responding to the request made by the clients.

iv. Server data store is used to store the databases of the client's so as to provide a backup of the files and resources of the client as well as to provide online storage facility to the files.

v. Admin takes notice of both the client and server. The admin is able to see the user details where the admin can delete the user if the user does not exist in the system or when the user is involved in some illegal activities. The admin keeps the updated table of the biometric reports of the user i.e. the log in and log out status of the client and also whether the log in was a fail or success.

vi. The communication frameworks consists of the webpages and programming languages involved for the effective communication between the client and server.

V. SYSTEM IMPLEMENTATION AND MODULE DESCRIPTION

1. Attack scenario and model of the adversary
2. A model of the data distribution
3. Training and testing set generation
4. Performance evaluation

ATTACK SCENARIO AND MODEL OF THE ADVERSARY

Although the definition of attack scenarios is ultimately an application-specific issue, it is possible

CLIENTSSERVERSCLIENTDATASTORECOMMUNICATION FRAMEWORKSSERVERDATASTOREADMIN

to give general guidelines that can help the designer of a pattern recognition system. Here we propose to specify the attack scenario in terms of a conceptual model of the adversary that encompasses, unifies, and extends different ideas from previous work. Our model is based on the assumption that the adversary acts rationally to attain a given goal, according to her knowledge of the classifier, and her capability of manipulating data. This allows one to derive the corresponding optimal attack strategy.

Adversary's goal: It is formulated as the optimization of an objective function. We propose to define this function based on the desired security violation (integrity, availability, or privacy), and on the attack specificity (from targeted to indiscriminate), according to the taxonomy. For instance, the goal of an indiscriminate integrity violation may be to maximize the fraction of misclassified malicious samples; the goal of a targeted privacy violation may be to obtain some specific, confidential information from the classifier (e.g., the biometric trait of a given user enrolled in a biometric system) by exploiting the class labels assigned to some "query" samples, while minimizing the number of query samples that the adversary has to issue to violate privacy.

Adversary's knowledge: Assumptions on the adversary's knowledge have only been qualitatively discussed in previous work, mainly depending on the application at hand. Here we propose a more systematic scheme for their definition, with respect to the knowledge of the single components of a pattern classifier: (i) the training data; (ii) the feature set; (iii) the learning algorithm and the kind of decision function (e.g., a linear SVM); (iv) the classifier's decision function and its parameters (e.g., the feature weights of a linear classifier); (v) the feedback available from the classifier, if any (e.g., the class labels assigned to some "query" samples that the adversary issues to get feedback). It is worth noting that realistic and minimal assumptions about what can be kept fully secret from the adversary should be done.

Adversary's capability: It refers to the control that the adversary has on training and testing data. We propose to define it in terms of: (i) the attack influence (either causative or exploratory), as defined; (ii) whether and to what extent the attack affects the class priors; (iii) how many and which training and testing samples can be controlled by the adversary in each class; (iv) which features can be manipulated, and to what extent, taking into account application-specific constraints (e.g., correlated features cannot be modified independently, and the functionality of malicious samples cannot be compromised).

Attack strategy: One can finally define the optimal attack strategy, namely, how training and testing data should be quantitatively modified to optimize the objective function characterizing the adversary's goal. Such modifications are defined in terms of: (i) how the class priors are modified; (ii) what fraction of samples of each class is affected by the attack; and (iii) how features are manipulated by the attack. Once the attack scenario is defined in terms of the adversary model and the resulting attack strategy, our framework proceeds with the definition of the corresponding data distribution that is used to construct training and testing sets for security evaluation.

VI. CONTRIBUTIONS, LIMITATIONS AND OPEN ISSUES

In this paper we focused on empirical security evaluation of pattern classifiers that have to be deployed in adversarial environments, and proposed how to revise the classical performance evaluation design step, which is not suitable for this purpose.

Our main contribution is a framework for empirical security evaluation that formalizes and generalizes ideas from previous work, and can be applied to different classifiers, learning algorithms, and classification tasks. It is grounded on a formal model of the adversary, and on a model of data

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distribution that can represent all the attacks considered in previous work; provides a systematic method for the generation of training and testing sets that enables security evaluation; and can accommodate application-specific techniques for attack simulation. This is a clear advancement with respect to previous work, since without a general framework most of the proposed techniques (often tailored to a given classifier model, attack, and application) could not be directly applied to other problems.

An intrinsic limitation of our work is that security evaluation is carried out empirically, and it is thus data dependent; on the other hand, model-driven analyses require a full analytical model of the problem and of the adversary's behaviour that may be very difficult to develop for real-world applications. Another intrinsic limitation is due to fact that our method is not application-specific, and, therefore, provides only high-level guidelines for simulating attacks. Indeed, detailed guidelines require one to take into account application-specific constraints and adversary models. Our future work will be devoted to develop techniques for simulating attacks for different applications.

Although the design of secure classifiers is a distinct problem than security evaluation, our framework could be also exploited to this end. For instance, simulated attack samples can be included into the training data to improve security of discriminative classifiers (e.g., SVMs), while the proposed data model can be exploited to design more secure generative classifiers. We obtained encouraging preliminary results on this topic.

VII. CONCLUSION AND FUTURE ENHANCEMENT

In this paper we focused on empirical security evaluation of pattern classifiers that have to be deployed in adversarial environments, and proposed how to revise the classical performance evaluation design step, which is not suitable for this purpose. Our main contribution is a framework for empirical security evaluation that formalizes and generalizes ideas from previous work, and can be applied to different classifiers, learning algorithms, and classification tasks. It is grounded on a formal model of the adversary, and on a model of data distribution that can represent all the attacks considered in previous work; provides a systematicmethod for the generation of training and testing sets that enables security evaluation; and can accommodate application-specific techniques for attack simulation. This is a clear advancement with respect to previous work, since without a general framework most of the proposed techniques (often tailored to a given classifier model, attack, and application) could not be directly applied to other problems.

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Feature Based Classification and Early Detection of Breast Cancer in Mammogram Image

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Abstract- **Breast cancer is second major causes of death among women. Early detection is a key factor to reduce the cause of deaths. Doctors analyse the size of a tumor where tumor size is the important input for deciding the malignancy level / stage of the cancer. X-ray mammography is one of the most common procedures for diagnosing breast cancer due to its portability, simplicity and cost effectiveness. Mass detection using Computer Aided Diagnosis (CAD) schemes was an active field of research in the past few years, and these CAD systems serve as a second decision tool to radiologists for discovering masses in the mammograms. This paper aims to determine the stage of breast cancer based on the size of the cancerous tumor. Steps of the research consist of Image Pre-processing using CLAHE and Adaptive Median Filter, determining the ROI using Watershed segmentation, measuring the area of suspected cancer and determining the stage classification of the size on mammogram image using Artificial neural network method. The algorithm is implemented using MATLAB environment. The program accepts a digital mammographic image taken from the Mammographic Image Analysis Society (MIAS) database.**

Keywords: **adaptive median filtering, CLAHE, Mammography, Watershed Segmentation.**

I. INTRODUCTION

Cancer is a class of diseases characterized by abnormal cells that grow and invade healthy cells in the body. Breast cancer is one of the most common type of cancer in women worldwide and 10% of women are confronted with the breast cancer in their lives. It can be described as the uncontrolled growth of abnormal cells in the breast that can then spread (metastasis) to other areas of the body. Breast cancer spreads in three important ways: by creating more damaged cells and tumor growth, Lymph and blood vessels can carry the cancer to others areas of the body and lastly body's hormones and chemicals can accelerate the growth of some tumors.

Breast cancer accounts for more than 1.6% of deaths worldwide and the fatality rates are highest in low-resource countries. Breast cancer is one the most common of all cancers and is the second most common cancer among Indian women with cervical cancer being most common cancer. A recent study of breast cancer risk in India revealed that 1 in 28 women develop breast cancer during her lifetime. This is higher in urban areas being 1 in 22 in a lifetime compared to rural areas where this risk is relatively much lower being 1 in 60 women developing breast cancer in their lifetime. In India the average age of the high risk group in India is 43-46 years unlike in the west where women aged 53-57 years are more prone to breast cancer. People over the age of 50 accounts for 76% of breast cancer cases and while only 5% of breast cancer diagnosis are in people under the age of 40 and 18% in their 40's. Less than 1% of all breast cancer cases develop in men, and only one in a thousand men will ever be diagnosed with breast cancer.

Breast Cancer is the most common form of the disease that usually starts in cells that line the milk ducts (ductal cancer) or the milk producing lobes and lobules (lobular cancer). A tumor will remain in the duct as carcinoma in situ in the early stage of its growth where it is initially a local/regional disease. This early stage is also referred to as intra-ductal carcinoma which forms circumscribed mass. As the cancer cells grow larger than 1cm, it will eventually invade into the lymph vessels which will lead to underarm lymph nodes. The breast cancer cells will continue to grow at its new site and often cause swelling of the lymph nodes in the underarm area. When the breast cancer cells have mutate in the underarm lymph nodes, they are prone to

spread to other organs of the body and as well leading to a systematic disease. Thus, an early detection of the breast cancer disease can avoid disfiguring surgeries and greatly contributing to the patient's long-time survival.

Mammography is the effective imaging modality used by radiologist for the screening of breast cancer. There is still challenging problem in mammography to find robust, efficient and accurate breast segmentation. In order to increase the accuracy in the interpretation of mammograms, Computer aided diagnosis(CAD) is used to distinguish between the benign and malignant in early detection. CAD tool has direct impact on the analysis of early breast cancer and its early treatment. The CAD system take three stages like detection of region of interest in mammogram image, segmenting the ROI and classification. CAD system is used to identify region with high suspicious of malignancy. CAD tool goal is to indicate locations with great accuracy and reliability. Thus it provides positive impact on the early detection of cancer detection. Sometimes identification of tumor will lead to false positive and false negative detection. False-positive results occur when radiologists decide mammograms are abnormal but no cancer is actually present. False-negative results occur when mammograms appear normal even though breast cancer is present. Overall, screening mammograms miss about 20 percent of breast cancers that are present at the time of screening.

This paper is organized as followed. Section II gives a survey on various methods used for early detection. Section III describes the proposed method. In Section IV are shown experimental results of described techniques. In the next section the conclusion and future work are given.

II. Literature Review

Several work have been formulated for detecting the breast tumor and classify them as benign and malignancy level / stage of tumor. Bommeswari Barathi [1] proposed filtering methods inorder to remove the noise, label, artifacts. Mean filter helps in smoothing the image and Median filter used to remove the noise. R. Ramani [2] et al, Described a weiner filter which used to minimize the mean square error and it has the capability of handling noise. Areman Sahakyan [3] et al, proposed an algorithm that uses morphological preprocessing algorithm in order to remove digitization noises and separate background region from the breast profile region for further edge detection and regions segmentation. Zaheeruddin [4] proposed an automatically finding the seed pixel, optimal threshold value and thus makes the segmentation process very fast and accurate. Prakash Bethapudi [5] proposed on removing the noise and the background information, applying thresholding and retrieving the largest region of interest (ROI), performing the morphological operations and extracting the ROI and identifying the malignant mass from the screened images of the breast. M Delwar Hossain [6] proposed that the speculated tumor always produce higher singular values than the smooth oval tumors. S Pitchumani Ngayankanni [7] proposed a system mainly used for automatic segmentation of mammogram images and classifies them as benign, malignant or normal based on dession tree algoritrhm. P.Spandana [8] et al, described novel algorithm for early detection of breast cancer using enhancement technique to identify masses in order to identify benign or malignant patients for early detection of breast cancer. Spandana paramkushman [9] et al, describe for the early detection of breast cancer using image processing technique for extracting mass and classifying based on extracted features.

III. PROPOSED METHOD

Breast cancer detection can be carried out using various techniques. For the successful treatment of breast cancer has to be detected in the early stage. For the breast cancer detection, mammogram image will be collected in the first stage and after the image acquisition stage, preprocessing will take place. Next, Segemntation is performed to extract the feature of the segmented tumor from the breast region. Finally classifies the tumor as normal, benign and malignant levels. Malignant tumor is further classified as different stage in order to identify the early stage of the tumor.

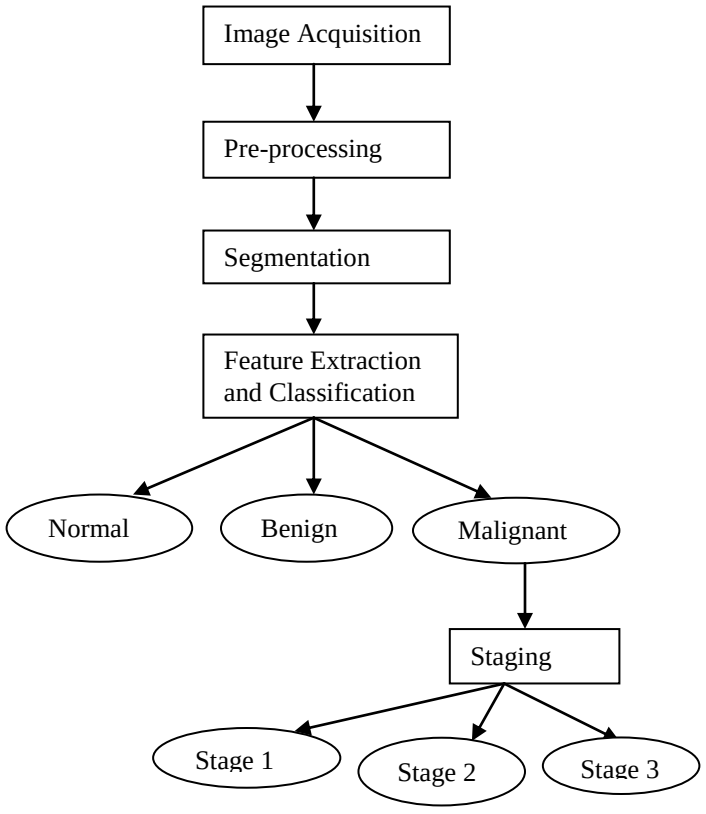

Fig 1: Flow Chart of Proposed Method

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A. Image Acquisition

The first step is the image acquisition, get the data in the form of digital mammogram images were acquired from the mini-MIAS database. Images acquired consist of left and right breast images of fatty-glandular, fatty and dense-glandular breasts. The acquired mammogram images are classified into three major cases like malignant, benign and normal, all of which are subdivided into five categories as Circumscribed masses, Speculated masses, Ill-defined masses, Architecturally distorted masses and Asymmetrical masses. The images are digitized at 200 micron pixel edge and padded in order to obtain all images with a size of 1024 × 1024 pixels. MIAS database consist of 322 Images which is classified as Normal(209), Benign(62) and Malignant(52). Images are in the format of PGM (Portable GrayMap) which is a lossless type image format and the details of the image will not lost at the time of data compression.

B. Image Pre-processing

Second step is to preprocess the input image, in order to improve the quality by removing the label, noise and pectoral muscle. The connected component technique is used to remove the label present in a mammogram image. The largest region is the breast region and all the other smaller regions are eliminated. The mammogram is preprocessed using median filter. The Adaptive Median filter[10] method is used to remove the noise, label and pectoral muscle present in the mammogram image. In adaptive median filter works on rectangular region Sxy. It change the size of Sxy during filtering operation based on,

Zmin = Minimum pixel value in Sxy

Zmax = Maximum pixel value in Sxy

Zmed = Median pixel value in Sxy

Zxy = Pixel value at coordinates (x,y)

Smax = Maximum allowed size of Sxy

The step of adaptive median filter shown below:

Level A:
A1 = Zmed - Zmin
A2 = Zmed - Zmax
If A1 > 0 AND A2 < 0, go to level B
else increase the window size
if window size < Smax, repeat level A
else output Zxy

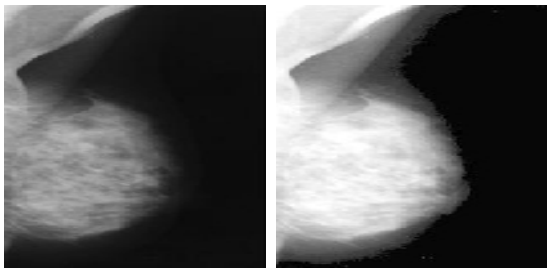
Level B:
B1 = Zxy - Zmin
B2 = Zxy – Zmax
if B1 > 0 AND B2 < 0, output Zxy
else output Zmed

The algorithm has three main purposes:

- To remove ‘Salt and Pepper’ noise
- To smoothen any non impulsive noise.
- To reduce excessive distortions such as too much thinning or thickening of object boundaries

The mammogram presented in Fig. 2(a) has a highly non-uniform background and very little contrast in the area above the core breast tissue region. So the image enhancement is required before segmentation. As enhancement technique contrast-limited adaptive histogram equalization (CLAHE) was selected. CLAHE[10] is a well-known technique of adaptive contrast enhancement. The normal and adaptive histogram equalization may over-enhance the noises and sharp regions in images due to the integration operation. It yields large values in the enhanced image for high peaks in the histogram of the nearly uniform regions in the original image. To solve this problem, the CLAHE uses a clip level to limit the local histogram in order to limit the amount of contrast enhancement for each pixel. This clip level is a maximum value of the local histogram specified by users. An interactive binary search process is used to redistribute the pixels which are beyond the clip level. The CLAHE algorithm has following steps:

- Divide the original image into contextual regions
- Obtain a local histogram for each pixel
- Clip this histogram based on the clip level
- Redistribute the histogram using binary searc
- Obtain the enhanced pixel value by histogram integration. The result of CLAHE technique is shown in Fig. 1(b).



(a) (b)

Fig.2. (a) Original image (b) Enhanced using CLAHE

C. Image Segentation

Segmentation partitions an image into distinct region containing each pixels with similar attributes. Main goal in image segmentation is to extract the region of interest from the processed image. Watershed Segmentation technique is

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used to extract the tumour part from the breast region. Watershed segmentation classifies pixels into regions using gradient descent on image features and analysis of weak points along region boundaries. The image feature space is treated, using a suitable mapping, as a topological surface where higher values indicate the presence of boundaries in the original image data. It uses analogy with water that gradually fills the low lying landscape basins. The size of the basins grows with increasing amounts of water until they spill into one another. Small basins (regions) gradually merge together into larger basins. Regions are formed by using local geometric structure to associate the image domain features with local extremes measurement. Watershed techniques produce a hierarchy of segmentations, thus the resulting segmentation has to be selected using some prior knowledge or manually. These methods are well suited for different measurements fusion and they are less sensitive to user defined thresholds. Below Fig. 3 shows the result of the watershed segmentation for the pre-processed images which follows the step of watershed algorithm.

The steps of watershed algorithm shown below:

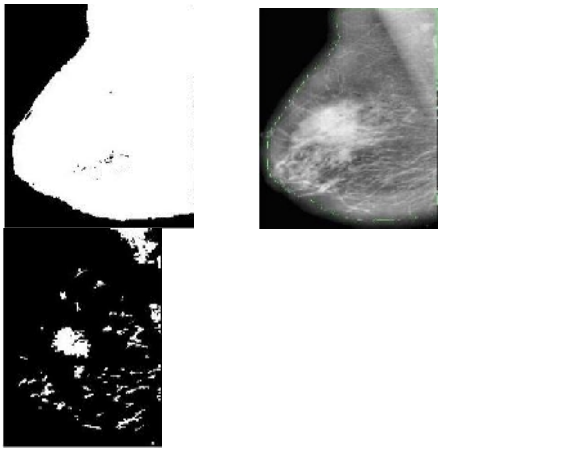
(1) Firstly, pre-process the input image using appropriate filtering and image enhancement techniques.

(2) Convert the grey scale into binary image.

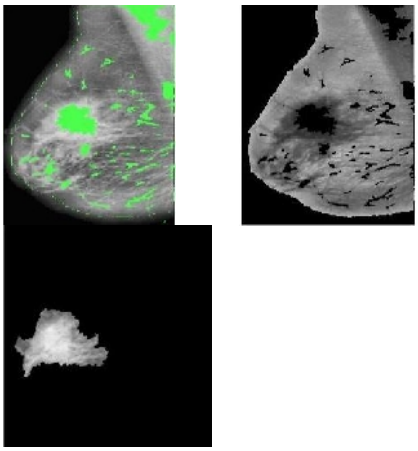
(3) Perform morphological operation of opening and closing to get better accuracy in segmenting the image.

(4) Compute the internal and external marker in order to identify all those regional minima's which have higher values than a specified threshold.

(5) Segment the region having higher thresholding value.



(a) (b) (c)



(d) (e) (f)

Fig 3: (a) Binary image (b)-(d) Morphological operations
(e) computing external and internal markers
(f) Segmented region

D. Feature Extraction and Classification

Feature extraction is a special form of dimensionality reduction. When the input data to an algorithm is too large to be processed and it is suspected to be notoriously redundant (much data, but not much information) then the input data will be transformed into a reduced representation set of features (also named features vector). Transforming the input data into the set of features is called feature extraction. If the features extracted are carefully chosen it is expected that the features set will extract the relevant information from the input data in order to perform the desired task using this reduced representation instead of the full size input. Feature extraction involves simplifying the amount of resources required to describe a large set of data accurately. When performing analysis of complex data of the major problems stems from the number of variables involved. Analysis with a large number of variables generally requires a large amount of memory and computation power or a classification algorithm which over fits the training sample and generalizes poorly to new samples. Feature extraction is a general term for methods of constructing combinations of the variables to get around these problems while still describing the data with sufficient accuracy.

Texture analysis of mammograms helps to identify texture feature information about the spatial distribution of tonal variations and describes the pattern of variation in gray level values in a neighborhood. Gray Level co-occurrence Matrix (GLCM) is used to extract texture information from images. The GLCM characterizes the spatial distribution of gray levels in an image. The features that are used for classification are:

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- *Mean* : The mean, m of the pixel values in the defined window, estimates the value in the image in which central clustering occurs.
- *Standard Deviation* : The Standard Deviation, σ is the estimate of the mean square deviation of grey pixel value p (i,j) from its mean value.
- *Variance* : Variance is the square root of standard deviation. The Variance is a measure of how far a set of numbers is spread out. It is one of several descriptors of a probability distribution, describing how far the numbers lie from the mean (expected value). In particular, the variance is one of the moments of a distribution. In that context, it forms part of a systematic approach to distinguishing between probability distributions. While other such approaches have been developed, those based on moments are advantageous in terms of mathematical and computational simplicity.
- *Covariance* : Covariance is a measure of how much two random variables change together. If the greater values of one variable mainly correspond with the greater values of the other variable, and the same holds for the smaller values, i.e. the variables tend to show similar behavior, the covariance is a positive number. In the opposite case, when the greater values of one variable mainly correspond to the smaller values of the other, i.e. the variables tend to show opposite behavior, the covariance is negative. The sign of the covariance therefore shows the tendency in the linear relationship between the variables.
- *Entropy* : Entropy is a statistical measure of randomness that can be used to characterize the texture of the input image. E = entropy(I) returns E, a scalar value representing the entropy of grayscale image I. Entropy is a statistical measure of randomness that can be used to characterize the texture of the input image.
- *Energy* : Energy returns the sum of squared elements in the Grey Level Co-Occurrence Matrix (GLCM). Energy is also known as uniformity. The range of energy is [0 1]. Energy is 1 for a constant image. Energy is also known as uniformity of ASM (angular second moment) which is the sum of squared elements from the GLCM.
- *Area* : The area is a measure of the size of the foreground of the image. The area is the number of pixels in the image. Area is a quantity that expresses the extent of a two-dimensional surface or shape in the plane. Area can be understood as the amount of material with a given thickness that would be necessary to fashion a model of the shape, or the amount of paint necessary to cover the surface with a single coat. It is the two-dimensional analog of the length of a curve (a one-dimensional concept) or the volume of a solid (a three-dimensional concept).The area of a shape can be measured by comparing the shape to squares of a fixed size.

Classification is considered an instance of supervised learning, i.e. learning where a training set of correctly-identified observations is available. The corresponding unsupervised procedure is known as clustering (or cluster analysis), and involves grouping data into categories based on some measure of inherent similarity (e.g. the distance between instances), considered as vectors in a multi-dimensional space in feature classification steps are classified as normal or benign or malignant using the selected features. various methods have been used for classifications of mass tumor some of the most popular techniques are artificial neural networks. The values of the extracted features is show in Table 1.

Table 1: Shows the value of all features for particular image taken by MIAS dataset

Image No.	**Mean**	**Standard Deviation**	**Variance**	**Co-Variance**	**Size**
mdb114	5.867	25.0249	937.3197	91.4424	38090
mdb193	9.399	29.0211	1.6111	344.5762	56560
mdb253	28.29	42.5880	4.6603	1.7228	15629

An Artificial Neural Network (ANN) is an information processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information. The key element of this paradigm is the novel structure of the information processing system. It is composed of a large number of highly interconnected processing elements (neurons) working in unison to solve specific problems. An ANN is configured for a specific application, such as pattern recognition or data classification, through a learning process. Learning in biological systems involves adjustments to the synaptic connections that exist between the neurons.

E. Staging

As the last step is the mammogram image classification. This step aims to classify the mammogram image , whether the image is suspect of breast cancer stage I, II or III. In this research, the classification method used is based on the

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results of the mammogram image segmentation of few samples with watershed segmentation method. Segmentation results from this method produce an area suspected of cancer. The area size is calculated in units of pixels. The measures are grouped into 3 major groups i.e. stage I, II, and III. Each group size has a lower limit and upper limit that are used as a reference to determine the stage of cancer in which the application is made.

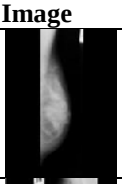
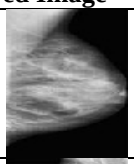
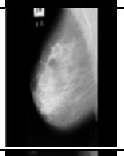
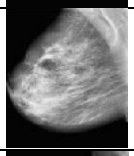
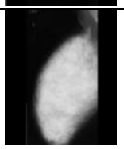
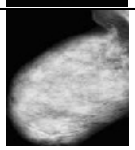
- *Stage I:* Stage I describes invasive breast cancer (cancer cells are breaking through to or invading normal surrounding breast tissue). Stage I describes invasive breast cancer in which the tumor measures up to 2 centimeters and the cancer has not spread outside the breast.
- *Stage II:* Stage II describes invasive breast cancer in which the tumor is larger than 2 centimeters but no larger than 5 centimeters and cancer has spread to 1 to 3 axillary lymph nodes or to lymph nodes near the breastbone (found during a sentinel node biopsy).
- *Stage III:* Stage III describes invasive breast cancer in which the tumor may be any size and has spread to the chest wall and/or skin of the breast and caused swelling or an ulcer and may have spread to up to 9 axillary lymph nodes or may have spread to lymph nodes near the breastbone.

Based on the area/size as parameter, classify the different stages of malignancy tumor. The pixel size varies the stage I, II, III. The segmented region size is calculated using the features mentioned above where we consider only entropy and area as parameter for classifying the size. After the process of segmentation, object area suspected breast cancer malignant from each group malignant mammogram will be obtained. Based on parameter, it is used to classify the object area suspected breast cancer into 3 stages. Stage 1 has size of the area between 3000 to 50000 pixel. Stage 2 has size of the area between 50000 to 100000 pixel. Stage 3 has size of the area between 100000 to 250000 pixel. Table 1 show the result of determining cancer from mammogram image.

RESULT

In mammograms, masses are assumed to be distinctive regions that are relatively brighter than their surrounding tissues. Hence the morphological operation removes the small spots and thereby produce better segmented result. Feature like Standard deviation, mean, area, variance and so on is calculated from the segmented image as shown in Table 1. The Table 2 shows the result of the images taken from the MAIS dataset.

Table 2:The Results Of Determining Cancer From Mammogram Image.

Image No.	Original Image	Preprocessed Image	Semented Image	Classification
mdb114				NORMAL
mdb193				BENIGN
mdb253				MALIGNANT

CONCLUSION

Breast cancer is one of the major causes of death among women. The paper presented Artificial neural network method for determining the stage of breast cancer malignancy based on cancer size on mammogram image basis. Previously done the process of determining ROI with watershed method. The method is tested on mammograms in 3 groups of malignant in MIAS database. The result, system can determine the stage of breast cancer based on the size of the area of the suspected object. The further work may be develop stage of breast cancer based on pattern of malignant.

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Flexibility Analysis of a Bare Pipe Line Used for CRYO Application

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Abstract- **The cryogenic piping circuit is designed for the handling of Liquid hydrogen. It consists of piping elements like expansion joints/loops with optimal placement of supports. Cryogenic fluid servicing pipelines are tend to develop thermal stress due to contraction/ expansion of piping material during chilling/ warming from ambient to cryogenic temperature or vice versa. This paper mainly discusses about the Thermal stresses induced in the piping circuits when liquid hydrogen flows through it and how these stresses can be reduced by incorporating various expansion loops. The present project is to design, analysis of cryogenic piping using Finite Element Method (FEM) tool and detailed engineering. Flexibility analysis results were determined through structural analysis by altering the bend angles respectively.**

I. INTRODUCTION

Subscale Engine Test facility (SET) is one of the cryogenic ground testing facility located at ISRO Propulsion Complex (IPRC), Mahendragiri, Tirunelveli District, Tamilnadu, India. This ground testing facility is used to test various sub-systems of cryogenic rocket engines such as Steering Engine, Fuel booster turbopump, LOX pressure regulator, etc at Cryogenic conditions. The core of my project is to study the flexibility of cryogenic circuits involved for the testing of Fuel booster turbopump. The above said circuits such as booster pump outlet circuit, bearing coolant disposal circuit & turbine outlet circuit are modelled using Finite element analysis software and the results are plotted and discussed in this paper.

II. CRYOGENICS

Cryogenics is defined as that branch of physics which deals with the production of very low temperatures[1]. In a more optional way, it is also defined as the science and Technology of temperatures below 123K. A formulation which addresses both aspects of attaining low temperatures which do not naturally occur on Earth, and of using them for the study of nature or the human industry. The densification by condensation, and separation by distillation of gases was historically – and remains today - the main driving force for the cryogenic industry, exemplified not only by liquid oxygen and nitrogen used in chemical and metallurgical processes, but also by the cryogenic liquid propellants of rocket engines and the proposed use of hydrogen as a "clean" energy vector in transportation [2].

Table.1. Cryogenic fluids

Cryogen	Triple point, K	Normal boiling point, K	Critical point, K
Methane	90.7	111.6	190.5
Oxygen	54.4	90.2	154.6
Argon	83.8	87.3	150.9
Nitrogen	63.1	77.3	126.2
Neon	24.6	27.1	44.4
Hydrogen	13.8	20.4	33.2
Helium	2.2	4.2	5.2

III. CRYOGENIC FLUIDS

The simplest way of cooling equipment with a cryogenic fluid is to make use of its latent heat of vaporization, e.g. by immersion in a bath of boiling liquid. As a consequence, the useful temperature range of cryogenic fluids is that in which there exists latent heat of vaporization, i.e. between the triple point and the critical point, with a particular interest in the normal boiling point, i.e. the saturation temperature at atmospheric pressure. To develop a feeling about properties of these cryogenic fluids, it is instructive to compare them with those of water. As the critical temperature of cryogenic fluid is less than ambient

temperature, it cannot be Liquified by the application of pressure alone at or above ambient Temperature.In Table.1 Cryogenic fluids are listed as Helium, Hydrogen, Neon, Nitrogen, Fluorine, Argon, Oxygen, Methane and Krypton.

Table.2.Properties of cryo fluids

Property	Helium	Nitrogen	Water
Normal boiling point [K]	4.2	77	373
Critical temperature [K]	5.2	126	647
Critical pressure [bar]	2.3	34	221
Liquid density* [kg/m3]	125	808	960
Liquid/vapor density ratio*	7.4	175	1600
Heat of vaporization* [kJ/kg]	20.4	199	2260
Liquid viscosity* [µPi]	3.3	152	278

IV. Turbo Pump

Turbo pump is rotating machinery used to pump the liquid propellants in a rocket engine, and driven by a turbine. The pressure in the liquid at the retreating surface of the vane is reduced, and it can be low enough to allow local boiling to take place. Bubbles of vapour are produced, and they then collapse when they enter a region of normal pressure. The tiny shock waves produced damage the surface of a vane. Severe cavitations can produce significant quantities of vapour at the inlet of the turbo pump.

In Table.2 clearly shows the properties of cryo fluids. In-order to validate the performance of Fuel Booster turbopump before integrating with rocket engine, it is mandatory to do ground level acceptance test. From Fig.1 it clearly shows the main functions of turbopump.During testing, the fluid circuits are subject to low temperatures which in-turn produces thermal induced stresses. Therefore, these circuits are to be suitably designed to have minimum thermal stresses.

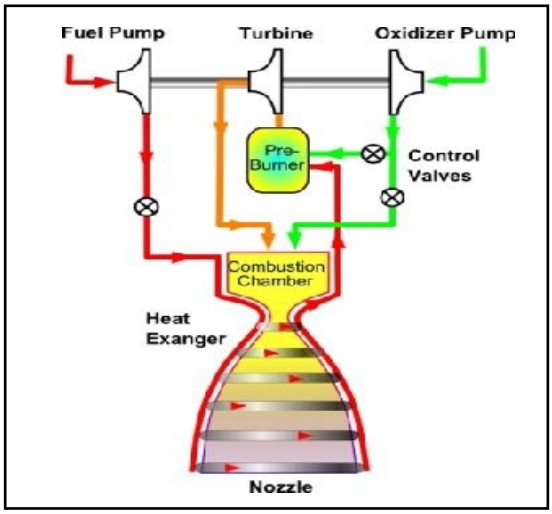

Fig. 1. Schematic diagram of cryo engine and its circuits

V. Flexibility Analysis:

Flexibility is another important factor that needs to be addressed in design of the cryogenic piping circuits. This is achieved by incorporating flexibility metallic bellows or expansion loops. In case of complex fluid circuits involving number of branches, bends and associated flow components and piping stresses involves greater analytical computations. By using the hand calculations it may not be accurate and clear, so bringing it into the Finite element analysis for the clear accuracy.

VI. Methodology:

Fuel Booster Turbo Pump:

Fuel booster turbo pump involves three circuits. They are as follows,

- Booster pump outlet circuit.
- Turbine outlet circuit.
- Bearing coolant disposal circuit.

The dimensions of the pipe line is chosen as follows

Booster pump outlet circuit:

Fig.2 clealy shows the Fuel booster pump outlet circuit was drawn in Auto-cad software package, which carries the cryogenic fuel throughout the line. This circuit carries two elbows with seven socket joints and seven butt joints, here flow rate is measured in the middle. From Table.3 gives the exact

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dimension.

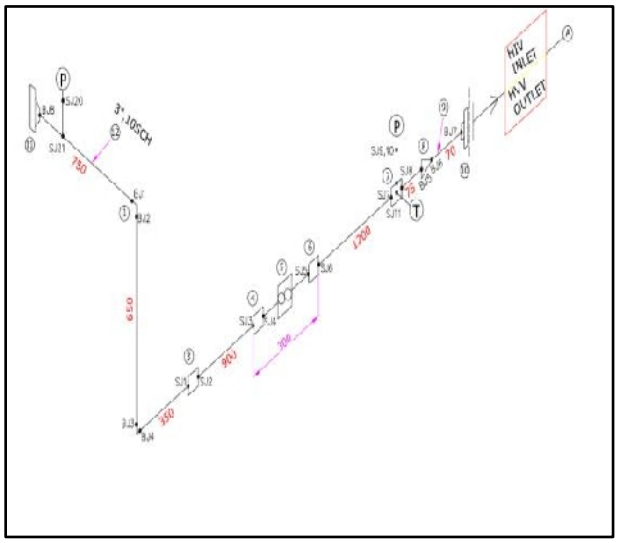

Fig. 2. Booster pump outlet circuit:

Table.3. Dimension:

Parameters	Outer diameter (mm)	Thickness (mm)	Inner diameter (mm)
80 NB, 10 SCH	88.9	3.05	82.8

Turbine outlet circuit:

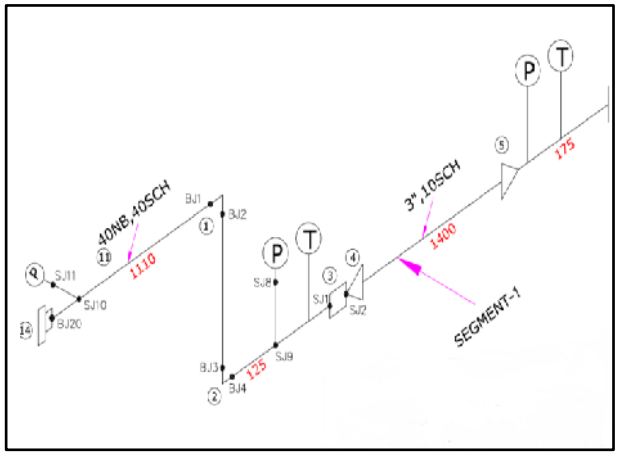

Fig. 3. Turbine outlet circuit

Fig.3 clearly shows the Turbine outlet circuit was drawn in Auto-cad software package, its main function is to let out the cryo fluid from the turbine through the outlet circuit.. This circuit carries two elbows with two socket joints and four butt joints, here expander and reducer plays a vital role and its functions are measured in the Segment-1. Generally the turbine drives the pump. From Table.4 gives the exact dimension.

Table.4. Dimensions.

Pipe size	Outer diameter (mm)	Thickness (mm)	Inner diameter (mm)
40NB, 40 SCH	48.3	3.68	40.94
80 NB, 10 SCH	88.9	3.05	82.8

Bearing coolant disposal circuit:

From Fig.4 clearly shows the Bearing Coolant Disposable Circuit was drawn in Auto-cad software package. Its main function is to cool down the fuel turbo pump which runs at 40,000 rpm. This circuit carries five elbows with eight socket joints and twelve butt joints. From Table.5 gives the exact dimension.

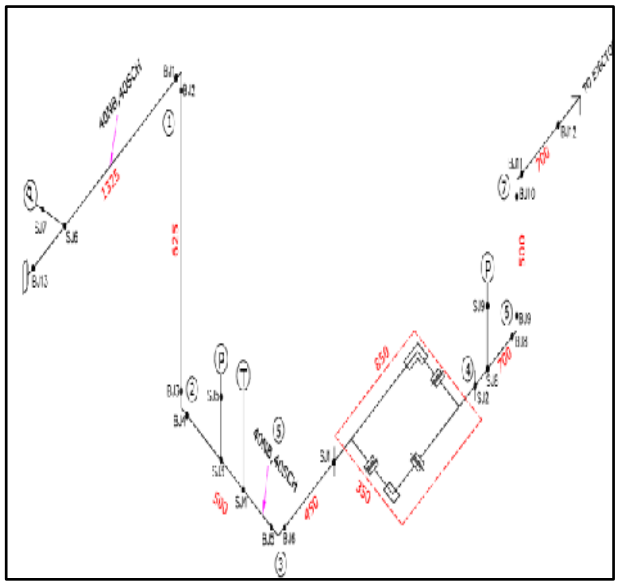

Fig.4.Bearing coolant disposal circuit.

Table.5. Dimensions

Parameters	Outer diameter (mm)	Thickness (mm)	Inner diameter (mm)
40NB, 40SCH	48.3	3.68	40.94

Tool for validation:

The vacuum insulated line may be used with any cryogenic fluid from liquid oxygen to liquid helium to attain low loss transfer. Vacuum jacketed lines are usually designed according to ASA code for Piping Pressure. The Thermal contraction problem can be solved in cryogenic transfer line design through the use of expansions bellows and U-bends. It is a good practice to locate the expansion bellows only in the outer line and to achieve the Flexibility of the inner line through the use of U- bends. If the bellows are used for inner line then the pressure thrust absorbed will be fairly heavy [2]

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Flexibility of the inner line may be achieved through the use of a U- Bends Elastic energy theory is applied to determine the maximum stress induced by thermal contraction. The maximum thermal stress is given by :

1. For α = W/L > ½:

$$\frac{\sigma_{\max\ L}}{E\ e_t D_0} = \frac{\alpha+\beta}{B}\{1 + \frac{(1+2\beta)D_0}{4(\alpha+\beta)H}\}$$

2. For α < ½:

$$\frac{\sigma_{\max\ L}}{E\ e_t D_0} = \frac{1-\alpha+\beta}{B}\{1 + \frac{(1+2\beta)D_0}{4(1-\alpha+\beta)H}\}$$

Where B = $2/3\,\beta[\beta(2 + \beta] + 3\,\alpha(1 - \alpha) + 3/8(1 + 2\beta)(D_0/H)^2]$.

α = W/L.

β = H/L.

$e_t = \int_{T_c}^{T_h} \lambda_t\, dt$ = unit thermal strain.

D_0 = Outside diameter of the line.

E = Young's modulus.

Theoretical calculation for an assumed pipelines with prescribed dimensions,

Outside diameter D_0 = 168.3mm.

L = 12250 mm, W = 6125mm, H = 3500 mm.

Young's modulus E = 207E3.

Poissons ratio μ = 0.28.

From Fig.5 shows the Maximum thermal stress for the given dimensions is calculated as **37.719 MPa** using the formulas which are stated above.

S. no	Temperature (K)	Young's Modulus (GPa)	Linear Coefficient of Thermal Expansion, x E-6 (K^{-1})
1	20	199	0.5
2	75	190	7
3	240	170	15
4	260	165	15.5
5	300	161	16.1

Fig. 5. U- Bend

Cryogenic pipeline.

FINITE ELEMENT ANALYSIS:

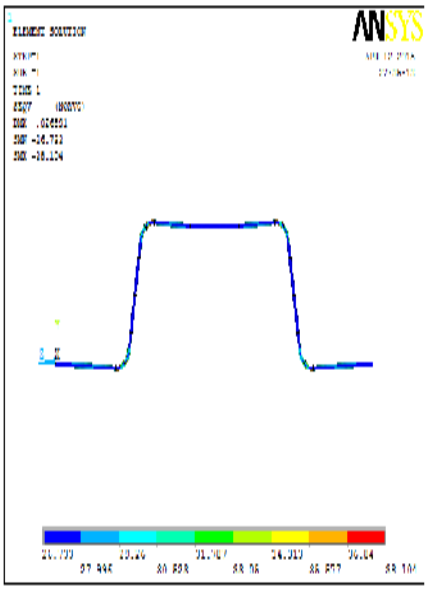

Fig. 6. Elemental solution of Von mises stress

Here the von mises stress value is **38.104 MPa**.

From Fig.6 it clearly shows the calculated thermal stress and it is is very much comparable with FE result. Therefore similar procedure is followed for validating the three circuits.

VII. RESULTS AND DISCUSSIONS:

Booster pump outlet circuit:

The input available datas for simulation,

Table.6

Actual Stress calculation:

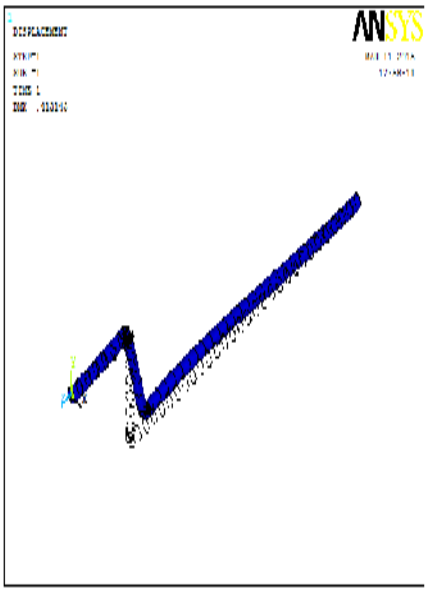

Fig.7.Displacement

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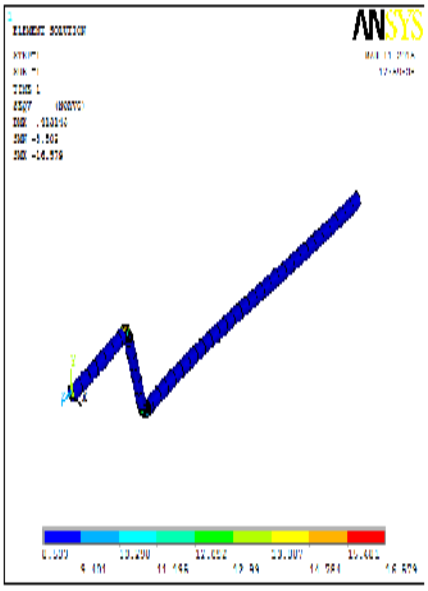

Fig.8.Von Mises stress

Table.7

	DMX	SMN	SMX
SEQV	**0.43143**	**8.503**	**16.579**

Turbine outlet circuit

The input available datas for simulation,

Table.8

S.no	TEMP (K)	YOUNG'S MODULUS (GPa)	THERMAL EXPANSION x E -6 (K^{-1})
1	240	170	15
2	250	168	15.1
3	260	165	15.5
4	290	163	16
5	300	161	16.1

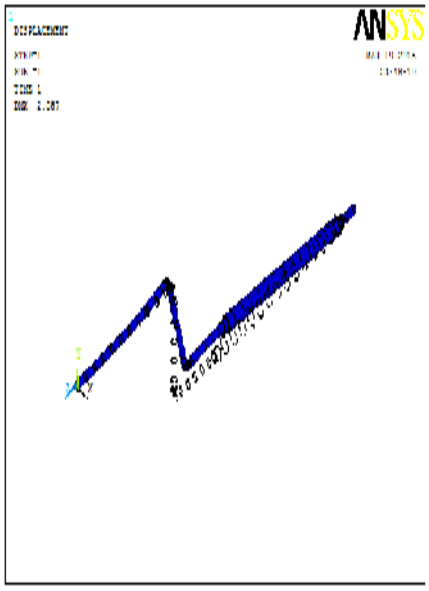

Fig.9.Displacement

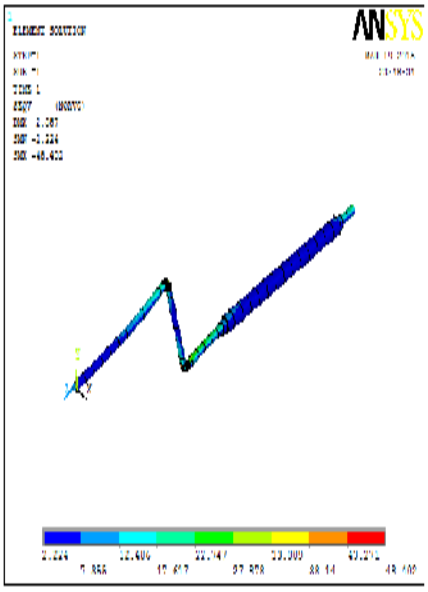

Fig.10.Von Mises stress

Table.9

TOC	DMX	SMN	SMX
SEQV	2.357	2.224	48.402

Bearing coolant disposal circuit:

The input datas available for simulation.

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Table.10

S. No	TEMP (K)	YOUNG'S MODULUS (GPa)	THERMAL EXPANSION x E -6 (K^{-1})
1	33	197	1
2	75	190	7
3	240	170	15
4	260	165	15.5
5	300	161	16.1

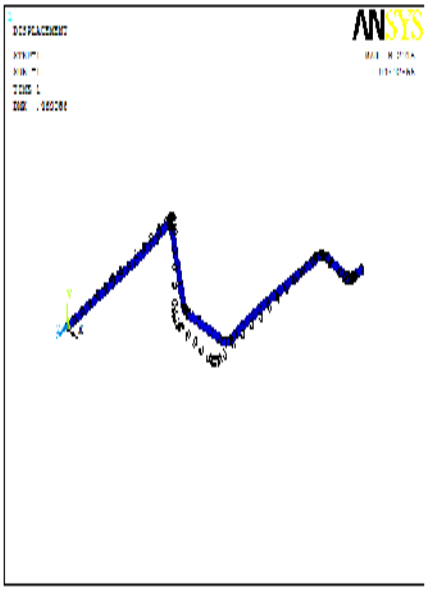

Fig.11.Displacement

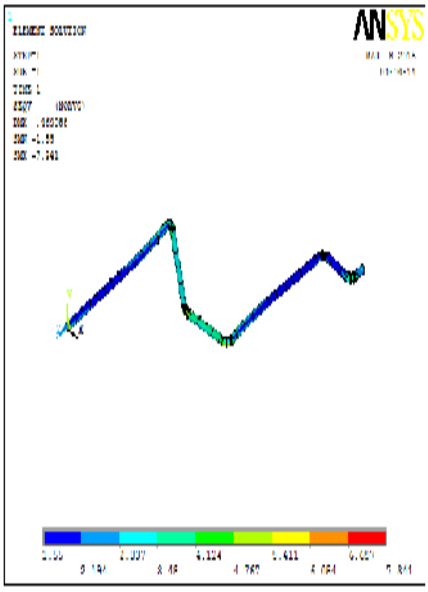

Fig..12.Von Mises stress

Table.11

BCDC	DMX	SMN	SMX
SEQV	0.4690	1.55	7.341

Graphical results:

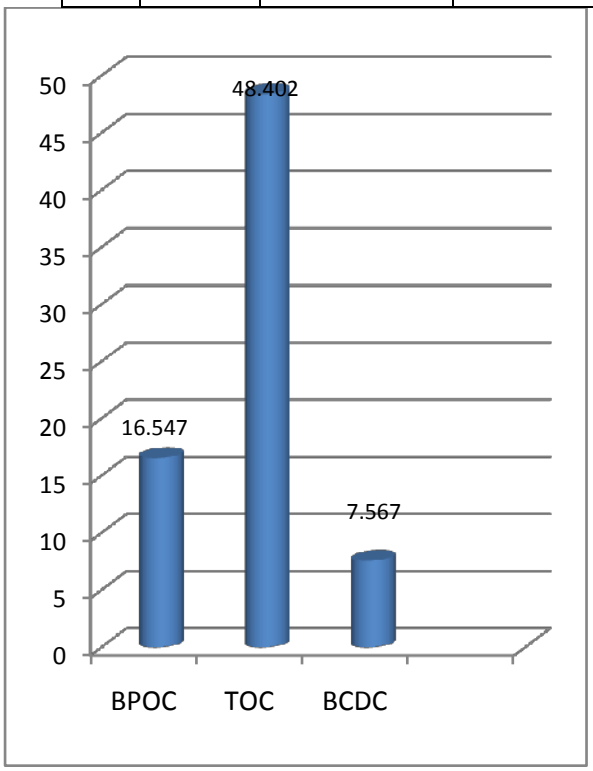

Fig.13. Graphical comparison

Structural Analysis: I

From Fig.14-Fig.19 clearly shows Structural Analysis I were discussed here, three circuits are brought into structural consideration, in the previous analysis, the circuits containing Elbows whose degree is 90 but here in this analysis, these elbows are replaced by Elbow 45^0. It includes much more number of Elbows than the Previous Analysis. The main reason for this structural analysis I is just to fetch the improved results from the previous analysis, (i.e.) max thermal stress expected in this analysis has to be a meager sum. Table.12-14 gives their respective dimensions.

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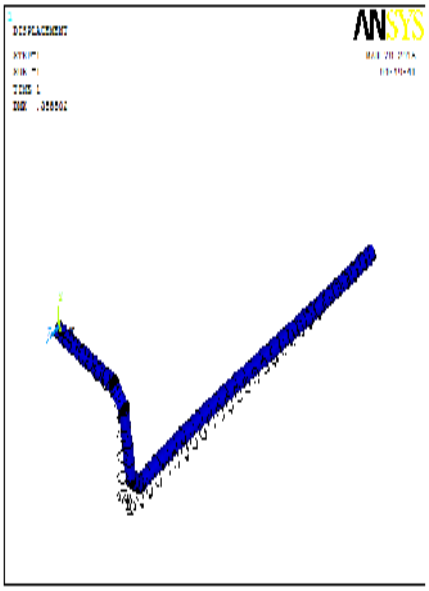
.Booster pump outlet



circuit:

Fig.14.Displacement

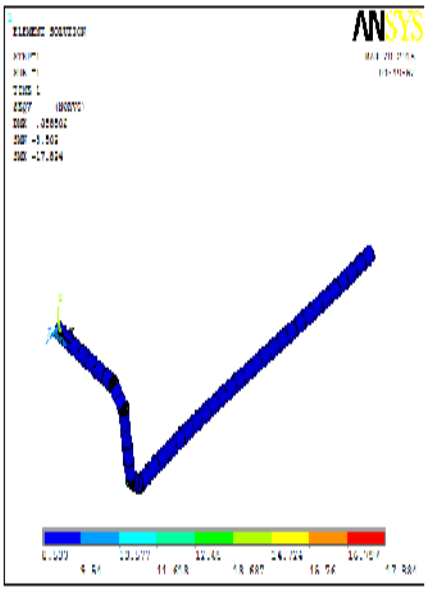
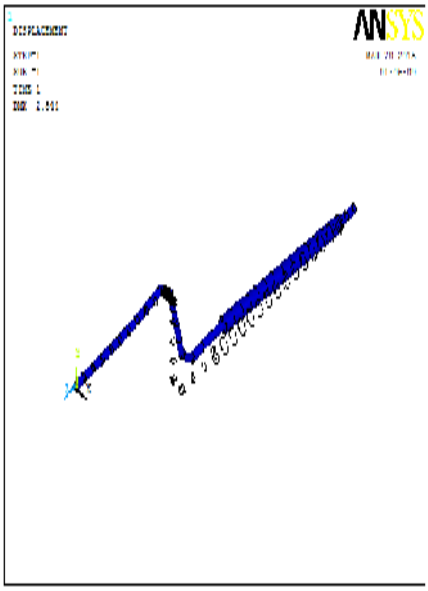


Fig.15.Von Mises stress

Table.12

BPOC	DMX	SMN	SMX
SEQV	0.388502	8.503	17.834

Turbine Outlet



Circuit:

Fig.16.Displacement

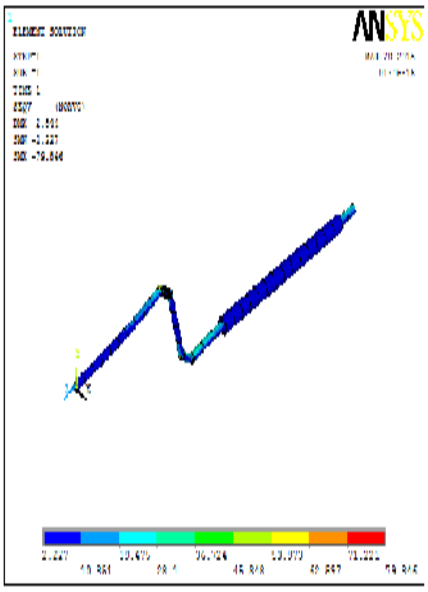


Fig.17.Von Mises stress

Table.13

TOC	DMX	SMN	SMX
SEQV	2.544	2.227	79.846

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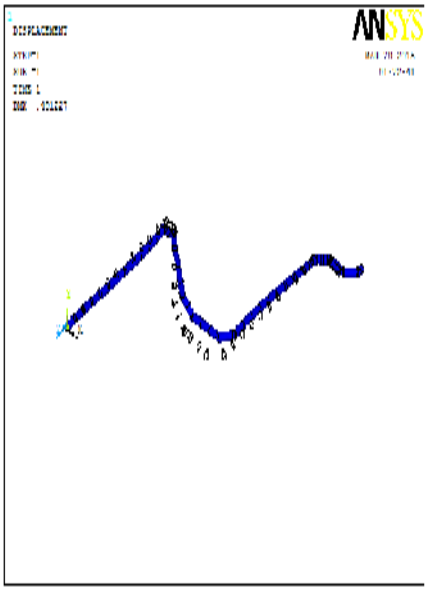
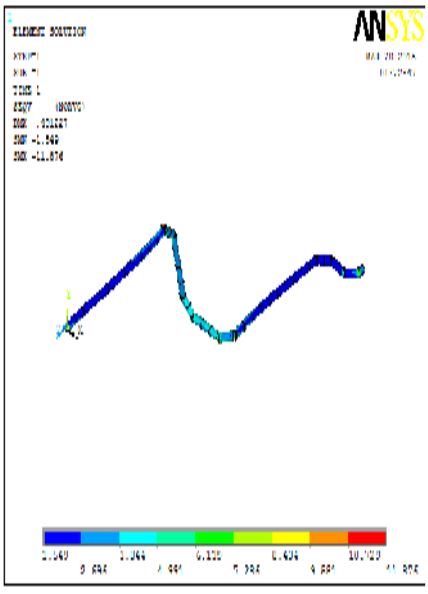
Bearing coolant disposal



circuit:

Fig.18.Displacement



8

Fig.19.Von Mises stress

Table.14

BCDC	DMX	SMN	SMX
SEQV	0.491227	1.549	11.876

Graphical results:

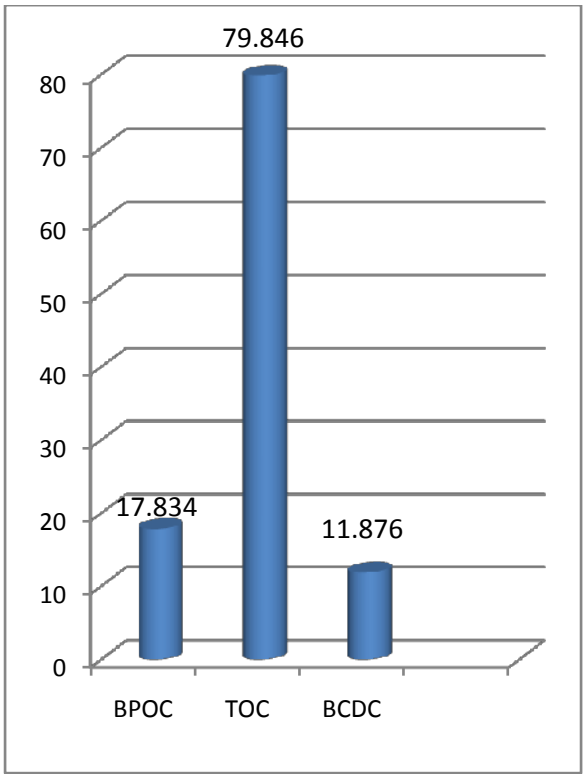


Fig.20.Von mises stress comparison

From Fi.20 Von mises stress comparison chart it clearly states that the von mises stress values or the structures elbow 45^0 fetches much more negative results than the elbow 90^0 structures.

Structural Analysis: II

From the previous analyses, it is clearly understood that there is no improved results. In order to get the improved results, structural analysis II comes into act to get a minimu thermal stress value for all the three circuits respectively

Here from Fig.21-26 cleraly shows the analysis results, elbow 45^0 are replaced by curvature contours. The bend radius involved here in this analysis are 270, 300, 330. From Table.15-17 clearly shows the respective dimensions.

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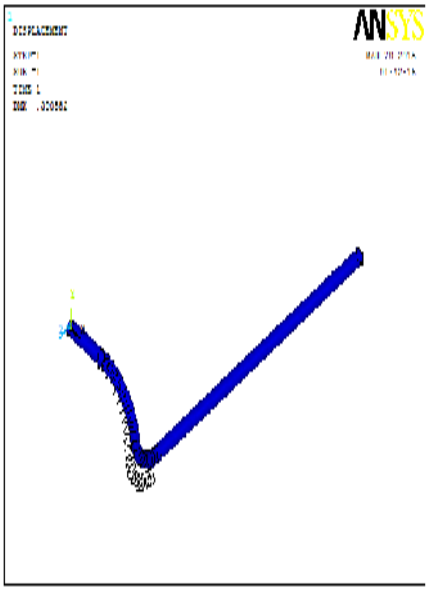
Booster pump outlet



circuit:

Fig.21.Displacement

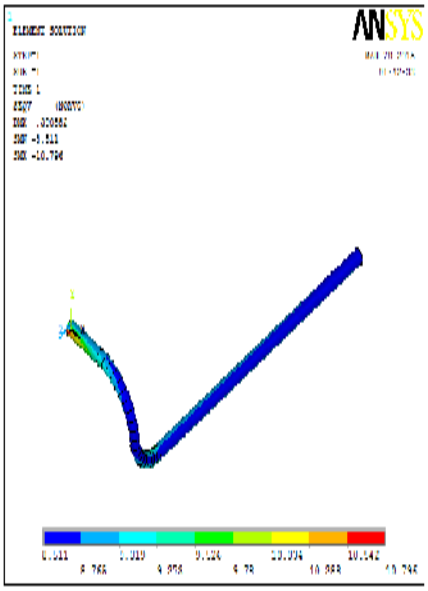
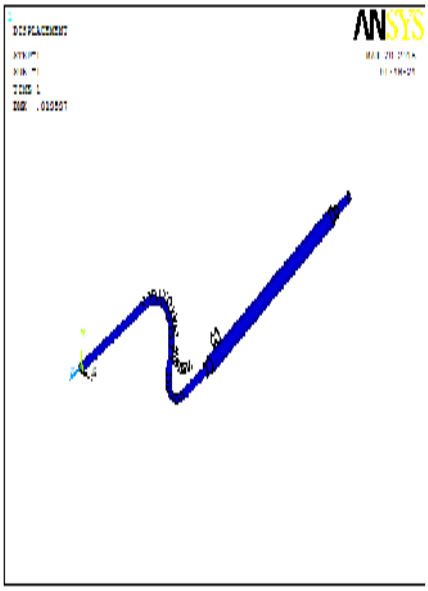


Fig.22.Von Mises stress

Table.15

BPOC	DMX	SMN	SMX
SEQV	0.390582	8.511	10.796

Turbine outlet



circuit :

Fig.23.Displacement

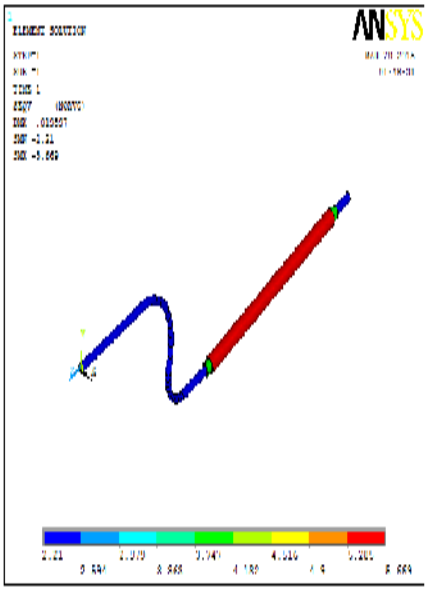


Fig.24.Von Mises stress

Table.16

TOC	DMX	SMN	SMX
SEQV	0.019597	2.21	5.669

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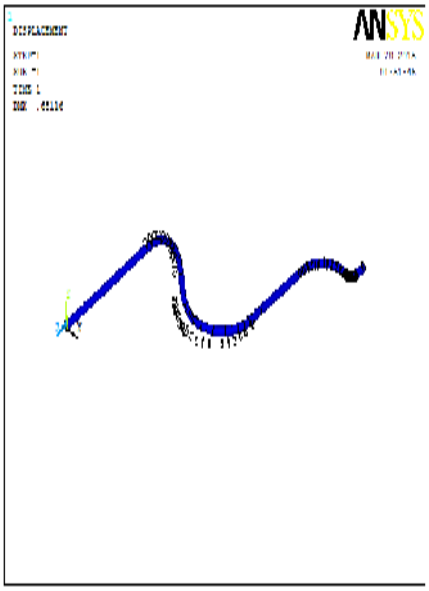
Bearing coolant Disposal



circuit: **Fig.25.Dis placement**

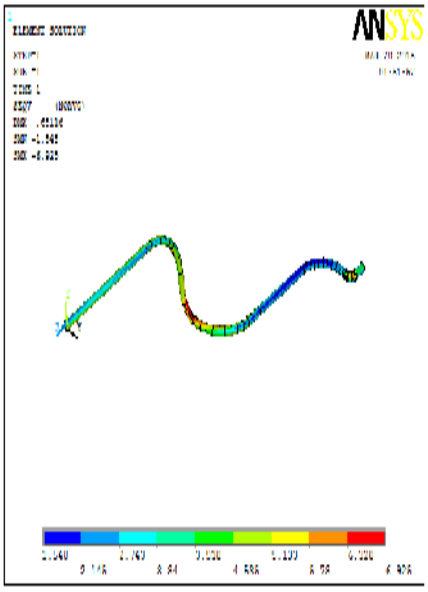


Fig.26.Von Mises stress

Table.17

BCDC	DMX	SMN	SMX
SEQV	0.68116	1.548	6.925

Graphical results:

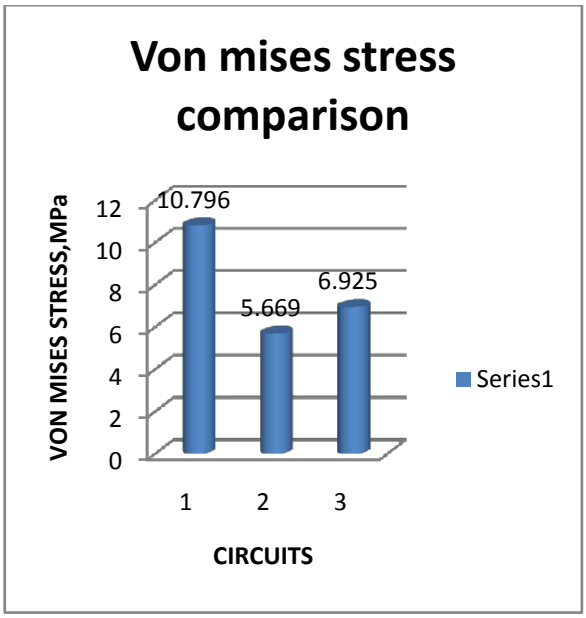


Fig.27.Von mises stress comparison

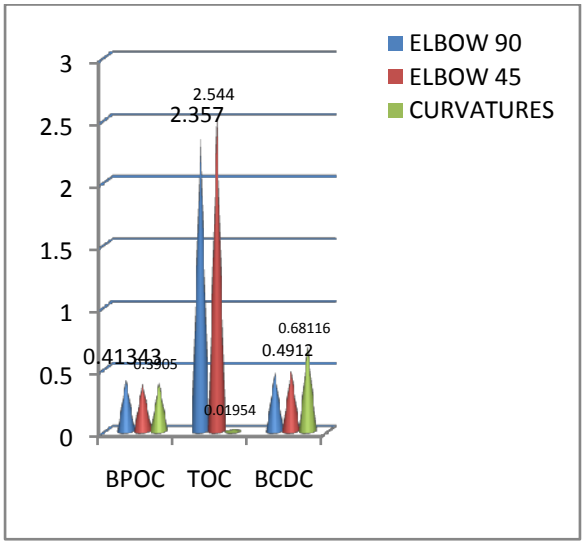


Fig.28.Comparison Between The Structural Displacements,mm

From the Fig.27,28 charts, it is clearly understood that the thermal stresses induced over there contour structures are much lower than the previous elbow used structures.

Booster Pump Outlet Circuit:

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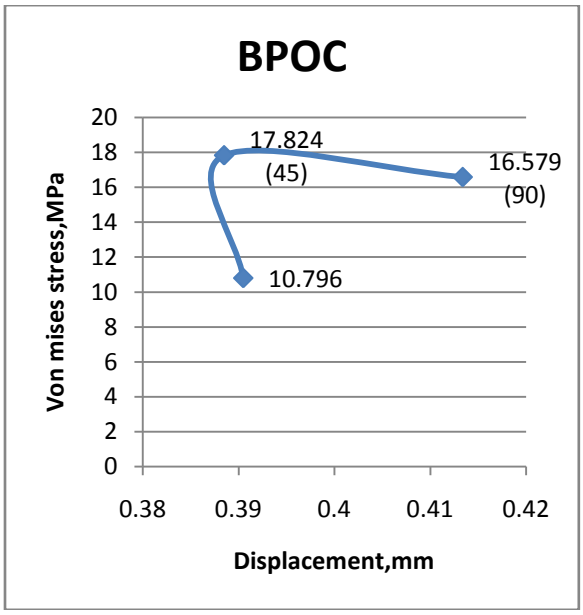

Fig.29.Von mises stress Relationship

From Fig.29 , it is clearly defines that ,the structures of BPOC with contours has lower thermal stress value than the other two,(i.e.) the thermal stresses induced in this contour structures are low when compared with the two.

Turbine Outlet Circuit:

DISP- Von mises Relationship:

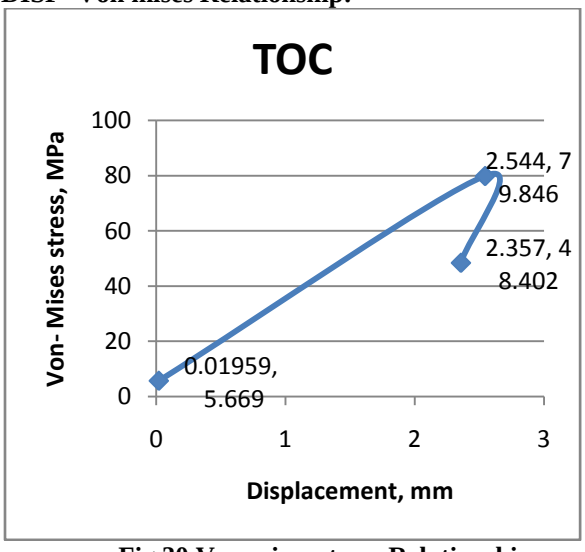

Fig.30.Von mises stress Relationship

From Fig.30, it is clearly defines that ,the structures of TOC with contours has lower thermal stress value than the other two,(i.e.) the thermal stresses induced in this contour structures are low when compared with the two

Bearing Coolant Disposal Circuit:

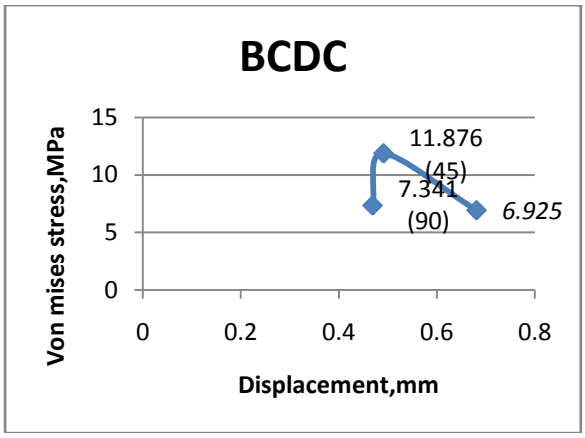

Fig.31.Von mises stress Relationship

From Fig.31, it is clearly defines that the structures of BCDC with contours has lower thermal stress value than the other two,(i.e.) the thermal stresses induced in this contour structures are low when compared with the other two.

CONCLUSION:

Flexibility analysis was carried out for 3 types of configurations and graphical results are as follows. From the graphical results, it is clearly stated that the best suited structure among the three analysis. From the three pipelines with goose neck design gives the lowest stress value when compared with others.

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13. Nomenclature:

Symbol	Name	Units
E	Young's modulus	N/m^2
σ_{max}	Max stress	MPa
μ	Poisson's ratio	No units
D_0	Outer diameter	mm
t	thickness	mm
p	Inside pressure	MPa
σ_i	Inner stress	MPa

14.

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