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Proceeding of the Conference



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Department of MCA

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From Convener Desk

It is our great pleasure to welcome all participants to the Conference on “MCAPGCON-2014”

The conference aims to showcase the dissertation work carried out by the PG students of MCA and give an opportunity for recently admitted students to be acquainted with the project undertaken in various colleges.

The conference is inaugurated at the hands of Hon. Prof. Dr. K. N. Nandurkar, Principal, K K Wagh Institute of Engineering Education & Research, Nashik.

I am thankful to the Chairman, Hon. Shri. Balasaheb Wagh and all the trustees of K. K. Wagh Education Society for their support and guidance.

I personally express my gratitude to all faculty and staff members of the department for their significant contribution towards successful organization of the conference. Special thanks to Prof. A. L. Rane, co-convener, MCAPGCON-2014 and organizing committee for their persistent efforts.

I am thankful to Success Publication Pune, for their support.

I hope you have a pleasant and academically gratifying stay at Nashik.

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De-noising SAR image using filtering techniques

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ABSTRACT:

In image processing, noise reduction and restoration of image is expected to improve the quality of image. Noise can occur during image capture, transmission etc. In general the result of the noise removal have a strong influence on the quality of the image processing technique. In noise reduction several linear, non-linear filtering method have been proposed. In this paper we present result for different filtering technique used to remove the noise. Filters are best for removing noise from the image.

KEYWORDS: Median filter, wiener filter, salt & pepper noise, guassian noise, poisson noise, speckle noise.

1] Introduction

The noise in SAR (Synthetic Aperture Radar) image arises during image acquisition and transmission. de-noising is an vital image processing task i.e. as a process itself as well as a component in other processes. This problem not only provides a good platform to examine natural image models and signal separation algorithms, but also becomes an important part to digital image acquiring systems to enhance image qualities [5]. There are many ways to de-noise an image or a set of data and methods exists [1]. De-noise the original image using median and wiener filter with the help of this they show that the performance of median filter after de-noising for all type of noise is better than weiner filter[1].

In this paper, experimental result present at the wiener and median filter apply on SAR image for adding and removing the salt & pepper, guassian, poisson, speckle noise.

2] FILTERING TECHNIQUES

2.1] Median filter

The Median filter is a non-linear filtering technique, often used to remove noise. Such noise reduction is a typical preprocessing step to improve the results of later processing .A major advantage of the median filter over linear filters is that the median filter can eliminate the effect of input noise values with extremely large magnitudes. The output y of the median filter at the moment t is calculated as the median of the input values corresponding to the moments adjacent to t :

$$y(t) = \text{median}((x(t-T/2), x(t-T/2+1), \dots, x(t), \dots, x(t+T/2))).$$

Where t is the size of the window of the median filter.

2.2] Wiener filter

The purpose of the Wiener filter is to filter out the noise that has corrupted a signal. This filter is based on a statistical approach Here the filter computes the average value of the

corrupted image in a pre-decided area. Then the center pixel intensity value is replaced by that average value.

The Fourier domain of the Wiener filter is

$$G(u, v) = \frac{H^*(u, v)}{|H(u, v)|^2 P_s(u, v) + P_n(u, v)}$$

Where $H^*(u, v)$ = Complex conjugate of degradation function

$P_n(u, v)$ = Power Spectral Density of Noise $P_s(u, v)$ = Power Spectral Density of non-degraded image $H(u, v)$ = Degradation function

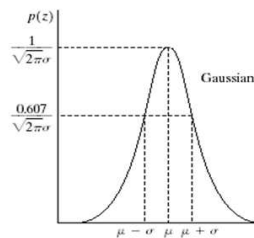
3] TYPES OF NOISE

3.1] Gaussian Noise

This noise has a probability density function of the normal distribution. It is also known as Gaussian distribution. Amplifier noise is a major part of the "read noise" of an image sensor, that is, of the constant noise level in dark areas of the image

Gaussian noise:

$$p(z) = \frac{1}{\sqrt{2\pi}\sigma} e^{-(z-\mu)^2/2\sigma^2}$$



Where: $P(Z)$ is the Gaussian distribution noise in image; μ and σ is the mean and standard deviation respectively. It is a major part of the read noise of an image sensor that is of the constant level of noise in the dark areas of the image.

3.2] Poisson noise

Poisson noise or shot noise is a type of electronic noise that occurs when the finite number of particles that carry energy, such as electrons in an electronic circuit or photons in an optical device, is small enough to give rise to detectable statistical fluctuations in a measurement

3.3] Salt and Pepper Noise (Impulse Noise)

This noise has root mean square value proportional to square root intensity of the image. Different pixels are suffered by independent noise values. At practical grounds the photon noise and other sensor based noise corrupt the signal at different proportions. The term impulse noise is also used for this type of noise. Black and white dots appear in the image as a result of this noise and hence salt and pepper noise. This noise arises in the image because of sharp and sudden changes of image signal.

3.4] Speckle Noise

This noise can be modeled by random value multiplications with pixel values of the image and can be expressed as $J = I + n * I$

Where, J is the speckle noise distribution image, I is the input image and n is the uniform noise image by mean μ and variance σ . This noise deteriorates the quality of active radar and Synthetic aperture radar (SAR) images. Speckle noise is a granular noise that inherently exists in and degrades the quality of the active radar and synthetic aperture radar (SAR) images.

4] EXPERIMENTAL RESULTS AND DISCUSSION



Fig 4.1] Original SAR image



Fig 4.2] Median filter used on salt & pepper noise

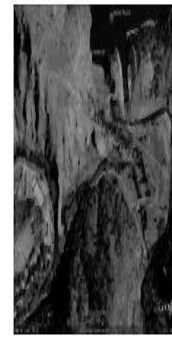


Fig 4.3] Median filter used on Gaussian noise

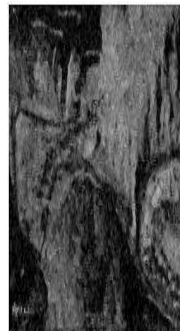


Fig 4.4] Median filter used on poisson noise

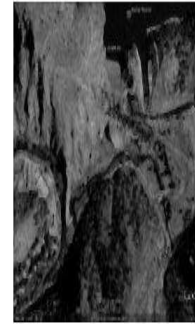


Fig 4.5] Median filter used on speckle noise



Fig 4.6] Wiener filter used on Gaussian noise

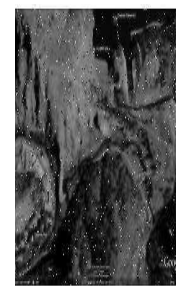




Fig 4.7]Wiener filter used on poisson noise



Fig 4.8]Wiener filter used on salt & pepper noise

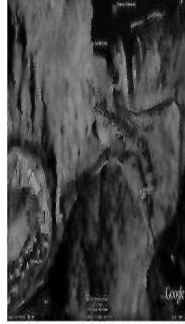


Fig 4.9]Wiener filter used on speckle noise

De-noising images by median filter are shown in figure Fig 4.2] Fig 4.3] Fig 4.4] Fig 4.5] and by wiener filter shown in figure Fig 4.6] Fig 4.7] Fig 4.8] Fig 4.9] but they have different result but median filter is best for salt & pepper noise

5] CONCLUSION

This paper made to attempt to study De-noising SAR image using filtering techniques. An experiment by comparing two filter which are median and wiener for the four type of noise which are salt & pepper , guassian ,Poisson ,speckle noise on SAR images.It was observed from the result median filter is better than the wiener filter for de-noising SAR images.

Acknowledgments

Special thank and recognition go to our advisor, Prof. Janardan Pawar, Vice Principal, ICCS, Sagar Jambhorkar who guided us through this research,inspired and motivated us.

Reference

- [1] Pawan Patidar and Sumit Srivastava and Manoj Gupta and Ashok Kumar Nagawat "Image De-noising by Various Filters for Different Noise"Volume 9– No.4, November 2010.

- [2] Mr. Rohit Verma and Dr. Jahid Ali “A Comparative Study of Various Types of Image Noise and Efficient Noise Removal Techniques” Volume 3, Issue 10, October 2013.
- [3] Manvi and R.Swaminathan and Asif Iqbal “Comparison of Noise Removal Technique for Image Enhancement” Vol. 2 Issue 6, June – 2013.
- [4] Mrs. C. Mythili and Dr. V. Kavitha “Efficient Technique for Color Image Noise Reduction” Vol. II (III).
- [5] Ce Liu and Richard Szeliski and Sing Bing Kang and C. Lawrence Zitnick and William T. Freeman “Automatic Estimation and Removal of Noise from a Single Image” October, 2006.

Various Image Compression Algorithms and their Comparative Study

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ABSTRACT:

Image compression a crucial aspect of image processing essential for applications such as transmission of images over the network and storage in databases. In this paper we study and discuss about the concept of image compression, need of image compression, its principles, and classes of compression and various algorithm of image compression. This paper aims at getting a clue about the comparative strengths and weaknesses of various image compression algorithms and which one best suits for which purpose.

KEYWORDS: Image compression; JPEG; DCT; GIF; PNG; Wavelet;

I) Principles behind image compression

Most of the images exhibit the property that the neighboring pixels have correlation and hence contain redundant information. Hence the first task is to find a representation of the image which contains less correlation. Hence two major arenas of image compression are 'Reduction of Redundancy' and 'Reduction of irrelevant information'.

Redundancy reduction aims at removing duplication from the image. Reduction of irrelevant information omits parts of the signal that will not be noticed by the signal receiver, namely the Human Visual.

In general, there are three types of redundancy:

A. Coding Redundancy

Code means a set of symbols (letters, numbers, bits, and the like) which represents some information or set of events. Each piece of information or events is assigned a sequence of code symbols, called a code word. The number of symbols in each code word is the length of the code word. The 8-bit codes that are used to represent the intensities in the most 2-D intensity arrays contain more bits than are needed to represent the intensities. Hence there occurs a redundancy which has a scope to be reduced by diminishing the extra bits that are present.

B. Spatial Redundancy

The pixels of most 2-D intensity arrays are correlated spatially, hence, information is unnecessarily replicated in the representations of the correlated pixels. This replicated information can be represented with a single representation using less storage.

C. Irrelevant Information

2-D intensity arrays often contain information that is not perceived by the human visual system and hence storing that information is of no use regarding that image. It is redundant in the sense that it is not used. Image compression research aims at reducing the number of

bits needed to represent an image by removing the spatial and spectral redundancies as much as possible.

II) Need of image compression

Multimedia Data	Size/ Duration	Bits/Pixel Or Bits/Sample	Uncompressed Size (B for bytes)	Transmission Bandwidth (b for bits)	Transmission Time
A Page of text	11 " * 8.5 "	Varying resolution	4.8 KB	32-64 Kb/page	1.1 – 2.2 sec
Telephone quality speech	10 sec	8 bps	80 KB	64 Kb/sec	22.2 sec
Grayscale Image	512 * 512	8 bpp	262 KB	2.1 Mb/ image	1 min 13 sec
Color image	512 * 512	24 bpp	786 KB	6.29 Mb/ image	3 min 39 sec
Medical image	2048 * 1680	12 bpp	5.16 MB	41.3 Mb/ image	23 min 54 sec
SHD Image	2048 * 2048	24 bpp	12.58 MB	100 Mb/ Image	58 min 15 sec

The examples depicted in Table I very clearly states the strong need for sufficient storage space, large transmission bandwidth, and long transmission time for image, audio, and video data. With the help of current technology, the only solution is to compress multimedia data before its storage and transmission, and decompress it at the receiver for play back. For example, with a compression ratio of 32:1, the space, bandwidth, and transmission time requirements can be reduced by a factor of 32, with acceptable quality.

III) Comparison of Lossless and Lossy compression:

Lossless compression schemes are ones in which the reconstructed image, after compression, is numerically identical to the original image. But lossless compression can only exhibit a minimal amount of compression. An image which is reconstructed using lossy compression techniques contains degradation and loss of visual clearance relative to the original. Often this happens because the compression technique fully cuts off the redundant information. However, lossy image compression methods are able of showing much higher compression rate. And to a normal human eye, the loss of information is practically invisible (Visually Lossless).

IV) Methodologies:

A) JPEG : Discrete Cosine Transform - Based Image Coding Standard

The JPEG/DCT still image compression has become a standard for image compression. JPEG is designed for compressing full-color or grayscale images of natural, real-world scenes.

To exploit this method, an image is first partitioned into non overlapped 8×8 blocks. A discrete Cosine transform (DCT) is applied to each block to convert the gray levels of pixels in the spatial domain into coefficients in the frequency domain.

The coefficients are normalized by different scales according to the quantization table provided by the JPEG standard conducted by some psycho visual evidence. The quantized coefficients are rearranged in a zigzag scan order to be further compressed by an efficient lossless coding strategy such as run length coding, arithmetic coding, or Huffman coding. The decoding is simply the inverse process of encoding. So, the JPEG compression takes about the same time for both encoding and decoding. The encoding decoding algorithms provided by an independent JPEG group are available for testing real-world images. The information loss occurs only in the process of coefficient quantization. The JPEG standard defines a standard 8×8 quantization table for all images which may not be appropriate. To achieve a better decoding quality of various images with the same compression by using the DCT approach, an adaptive quantization table may be used instead of using the standard quantization table.

B) Image Compression by Wavelet Transform

1. What is a Wavelet Transform?

Wavelets are functions defined over a finite interval and having an average value of zero. The basic idea of the wavelet transform is to represent any arbitrary function (t) as a superposition of a set of such wavelets or basis functions. These basis functions or baby wavelets are obtained from a single prototype wavelet called the mother wavelet, by dilations or contractions (scaling) and translations (shifts). The Discrete Wavelet Transform of a finite length signal $x(n)$ having N components, for example, is expressed by an $N \times N$ matrix.

2. Why Wavelet-based Compression?

Despite all the advantages of JPEG compression schemes based on DCT namely simplicity, satisfactory performance, and availability of special purpose hardware for implementation; these are not without their shortcomings. Since the input image needs to be "blocked," correlation across the block boundaries is not eliminated. This results in noticeable and annoying "blocking artifacts" particularly at low bit rates as shown in Fig.1. Lapped Orthogonal Transforms (LOT) attempt to solve this problem by using smoothly overlapping blocks. Although blocking effects are reduced in LOT compressed images, increased computational complexity of such algorithms do not justify wide replacement of DCT by LOT.



Fig.1: (a) Original Lena Image, and (b) Reconstructed Lena with DC component only, to show blocking artifacts.

PNG (Portable Network Graphics)

The *Portable Network Graphic* (PNG), pronounced *ping*, format was designed to be a better, legally patent-free replacement for GIF. PNG is a lossless compression format for transmitting a single bitmap image over computer networks. PNG matches all of GIF's features except animation. PNG has better compression and interlacing than GIF and adds new features of its own, such as gamma storage, full alpha channel, true color support, and error detection. PNG supports two methods of transparency, one-color masking and the other alpha channel. PNG's full alpha channel makes it possible to create beautiful glows and drop shadows which layer over different-colored backgrounds perfectly.

Gamma is a measure display device brightness. The problem facing web designers is that gamma values for different platforms and different monitors vary. Macs have a gamma of about 1.8, and PCs a gamma of 2.2. Since there is no "gamma standard" on the Web, graphics that look great on a Macintosh may look dark on a PC. GIFs and JPEGs have no built-in gamma storage, so averaging these two gammas (setting gamma to 2.0) in Photoshop is one way of dealing with the problem. PNG avoids the problem by allowing designers to store the gamma of the creation device. When displayed, PNGs automatically adjust to the host monitor's gamma.

Not all browsers can display PNG's multilevel transparency. Support for PNG by older Web browsers is mainly through plug-ins.

Because PNG uses the same LZW compression method used in the popular *pkzip* file archiving utility, you can't zip PNG files because they are, in effect, already zipped.

GIF

The *Graphics Interchange Format* (GIF, pronounced *jiff*, though most people say *giff*) is the oldest graphic file format on the Web, and all browsers except Lynx support it. GIFs are 8-bit images, which limits them to a maximum of only 256 colors.

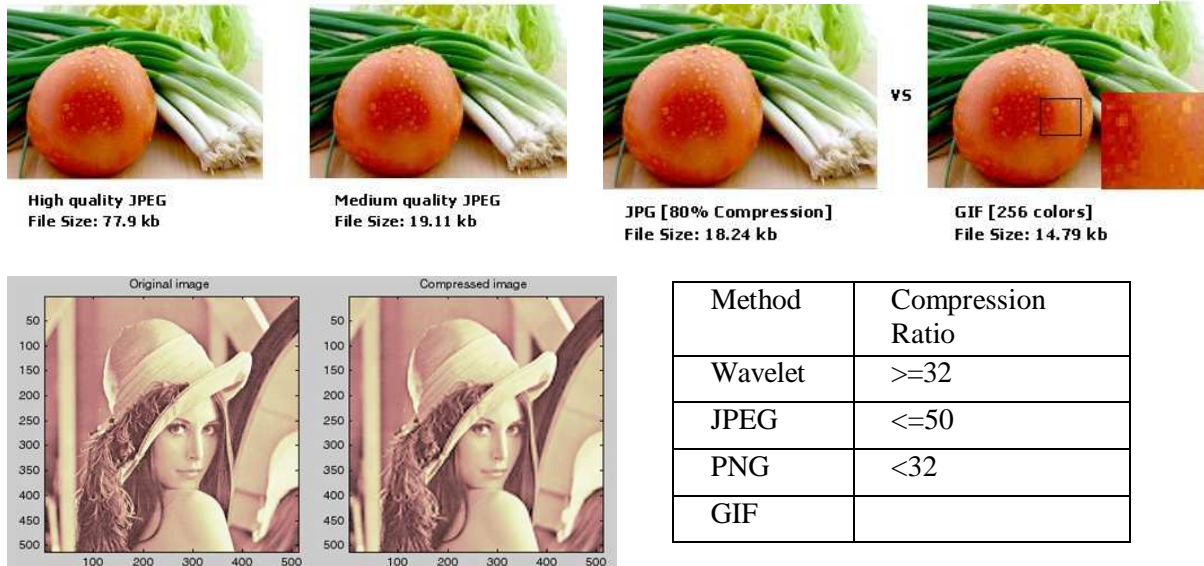
GIFs use a lossless compression algorithm and support transparency, animation (display of multiple images within a single GIF file) as well as interlacing.

When you save an image as an interlaced GIF (by checking the **Interlaced** option box in Photoshop) and display it inside a web page, visitors to your site will see a low-resolution image quickly, which gradually comes into focus. Non-interlaced GIFs, on the other hand, appear as an empty box with a red "X" until the image downloads fully to your web visitor's computer. The only drawback to interlacing is that it usually increases the file size slightly.

The LZW compression algorithm used in the GIF format is owned by Unisys, and companies that *make* products that exploit the algorithm (including the GIF format) need to license its use from Unisys. As for *users* of GIF images, however, Unisys does not require a license, although their licensing statement indicates that it is a requirement. Unisys says that getting a license from them does not necessarily involve a fee.

Although the LZW compression algorithm used by GIFs is one of the better general purpose compression algorithms, it wasn't designed specifically for graphics. As a result, it doesn't work well with bi-level (black and white) or true color images.

GIFs are best suited to flat-color sharp-edged art or text. GIFs retain edge and sharpness information if there is no dithering. Humans are especially sensitive to edge sharpness, so GIFs generally appear sharper than JPEGs.



Conclusion:

We have reviewed and summarized the characteristics of image compression, need of compression, principles behind compression, different classes of compression techniques and various image compression algorithms based on Wavelet, JPEG/DCT.

GIFs are best suited to flat-color sharp-edged art or text. GIFs retain edge and sharpness information if there is no dithering. Humans are especially sensitive to edge sharpness, so GIFs generally appear sharper than JPEGs.

JPEGs are best suited for continuous tone images like photographs or natural artwork; not so well on sharp-edged or flat-color art like lettering, simple cartoons, or line drawings. JPEGs support 24-bits of color depth or 16.7 million colors.

PNG's behave similarly to GIFs only better; they work best with flat-color, sharp-edged art. PNGs compress both horizontally and vertically, so solid blocks of color generally compress best.

References:

- [1] Chan, Y. T., "Wavelet Basics", Kluwer Academic Publishers, Norwell, MA, 1995.
- [2] Wallace, G. K. "The JPEG Still Picture Compression Standard", Comm. ACM, vol. 34, no. 4, April 1991, pp. 30- 44.
- [3] http://videocodecs.blogspot.in/2007/05/image-coding-fundamentals_08.html

Vehicle Number Plate Enhancement for Tampered Image Recognition

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ABSTRACT:

This paper represents vehicle number plate enhancement techniques. Number plate identification has many applications like highway e-toll collection, border security, traffic violation etc [5]. If the images are captured in different illuminations, deep shadow and different rotations, major problem arises when number plate is tampered i.e. rusted or dusty. To overcome these problems this paper introduces novel technique for enhancement of number plate so that recognition of number plate becomes more efficient.

KEYWORDS: Vehicle number plate, Erosion, Dilation.

1. Introduction:

Automatic Number Plate Recognition is an advanced machine vision technology used to identify vehicles by their number plates without human interaction. In recent years, the number of vehicles has increase drastically, with this increase it is difficult to keep the track of each vehicle for purpose of law enforcement and traffic problems, highway toll collection, premises security and many other place [6]. Since every vehicle carriers a unique license plate, no external cards tags or transmtion need to be recognizable, only license plate. The number plate detection performs well for less noisy images and having well printed characters over the license plate[3]. The presence of noise, blurring in images, uneven illumination, dimlight and foggy condition make the task even more difficult. Detection of tampered number plate becomes even more difficult. In this paper we propose a detailed and novel method for vehicle number plate enhancement for tampered number plate recognition [4].

2. Erosion:

Erosion operation is a morphological operation for reducing the foreground area. The effect of this operation is shrunk foreground. The foreground is reduced from its outer edge to inside its area. If there is a hole inside the foreground area, the hole enlarges. It uses a structuring element and it is done with a convolution operation between the image and the structuring element. This operation is for binary images. The erosion process will set the foreground pixel to be background if there is part of the structuring element that reaches the background while the center of the structuring element reach the foreground edge. Figure 1 gives an illustration of erosion process with the example of 3 x 3 structuring element.

As an example of binary erosion, suppose that the structuring element is a 3×3 square, with the origin at its center as shown in Figure 1. Note that in this and subsequent diagrams, foreground pixels are represented by 1's and background pixels by 0's.

1	1	1
1	1	1
1	1	1

Set of coordinate points =

{ (1, 1), (0, 1), (1, 1),
 (-1, 0), (0, 0), (1, 0),
 (-1, 1), (0, 1), (1, 1) }

Figure 1 A 3×3 square structuring element

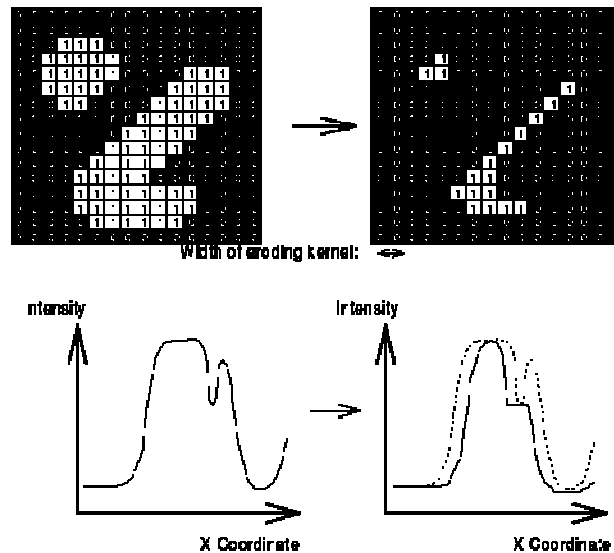


Figure 2 Effect of erosion using a 3×3 square structuring element

Properties

- The erosion is **translation invariant**.
- It is **increasing**, that is, if $A \subseteq C$, then $A \ominus B \subseteq C \ominus B$.
- If the origin of E belongs to the structuring element B , then the erosion is *anti-extensive*, i.e., $A \ominus B \subseteq A$.
- The erosion satisfies $(A \ominus B) \ominus C = A \ominus (B \oplus C)$, where \oplus denotes the **morphological dilation**.
- The erosion is **distributive** over **set intersection**

3. Dilation:

Dilation operation is the reverse operation of erosion. While erosion is for reducing the foreground, dilation is for enlarging it. The foreground is stretched from its outer boundary. If

there is a hole inside the foreground, the hole shrinks. Same like erosion, dilation operation are using structural element. The structural element is used in convolution with the image. International Journal of Advanced Science and Technology.

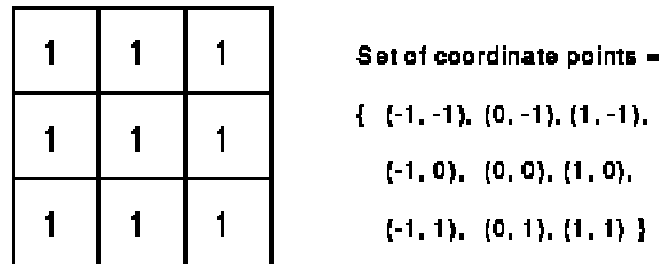


Figure 1 A 3×3 square structuring element

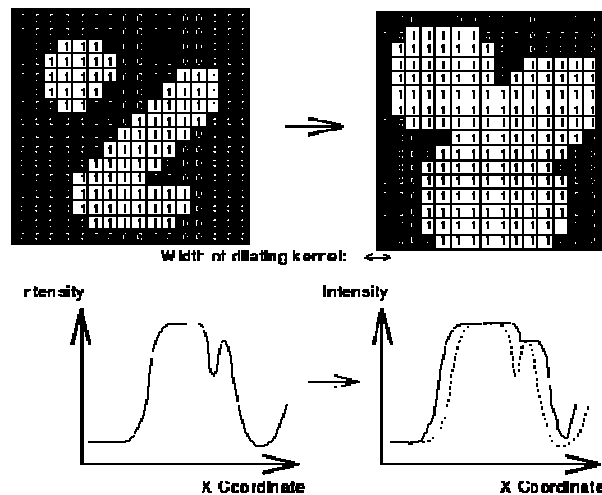


Figure 2 Effect of dilation using a 3×3 square structuring element **Figure 3** Graylevel dilation using a disk shaped structuring element.

The graphs show a vertical cross-section through a [graylevel image](#).

Properties of binary dilation

Here are some properties of the binary dilation operator:

- It is [translation invariant](#).
- It is [increasing](#), that is, if $A \subseteq C$, then $A \oplus B \subseteq C \oplus B$.
- It is [commutative](#).
- If the origin of E belongs to the structuring element B , then it is [extensive](#), i.e., $A \subseteq A \oplus B$.
- It is [associative](#), i.e., $(A \oplus B) \oplus C = A \oplus (B \oplus C)$.
- It is [distributive](#) over [set union](#)

4. Methodology:

The data in this research are images collected from parking in different illuminations. The images collected are tampered, dusty and noisy. At first we converted the images to gray scale form. Then we applied erosion and dilation separately on images. We also performed erosion and dilation together so as to get the combined result.

5. Result



According to the experiment results we can see that erosion is best the dusty number plate, whereas dilation suits the best for tampered numbered plate i.e, where numbers are not displayed correctly.

Combination of both erosion and dilation are not so effective.
But only using erosion and dilation is not enough for number plate character recognition.

5. Conclusion:

Here we used morphological operations erosion and dilation for correcting tampered vehicle number plate. We found that for dusty number plate we can use erosion and for the number plates having issue with the presentation of number where characters cannot be recognized there we can use dilation. But using erosion and dilation together doesn't give any impressive result.

6. References:

1. Naser Jawar and Nanik Sucaiti “ Image Inpainting using Erosion and Dilation Operation” International Journal Of Advanced Science And Technology, Vol 51, Feb 2013.
2. K. Sreedhar and B. Panlal “ Enhancement Of Images Using Morphological Transformations” International Journal Of Computer Science And Information Technology (IJCSIT) Vol4, No1, Feb 2012.
3. Satal Saha , Subhadip Basu , Mita Nasipuri, Dipak Kumar Basu “License Plate Localization From Vehicle Images : An Edge Based Multi-Stage Approach” International Journal Of Recent Trends In Engineering, Vol1, No1, May 2009.
4. P. Anishya, Prof. S Mary Joans “Number Plate Recognition For Indian Cars Using Morphological Dilation And Erosion With Aid Of Ocrs”. 2011 International Conference on Information And Network Technology. IPCSIT Vol4 (2011).
5. M M Shirode, S P Narote “Number Plate Recognition For Indian Vehicle” IJCSNS, International Journal Computer Science And Network Security, Vol 11 No2, Feb 2011.
6. Kumar Parasuraman, *Member, IEEE* and P.Vasanth Kumar “An Efficient Method for Indian Vehicle License Plate Extraction and Character Segmentation” 2010 IEEE International Conference on Computational Intelligence and Computing Research
7. Ashwini Dama, Prof. Todmal S.R “Number Plate Recognition Using Improved Segmentation” , International Journal Of Innovative Research And Studies, ISSN 2319-975.

Image Segmentation and Binarization Technique for Manuscript

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ABSTRACT:

To do segmentation from badly degraded document images is very tough and challenging tasks. It is due to the high inter/intravariation between the document background and the foreground text of different document images. we proposed document image binarization technique that focuses on these issues by using adaptive image contrast. It Combine local image contrast and the local image gradient for construct adaptive contrast map that is tolerant to text and background variation caused by different types of document degradations. In the proposed technique, we first constructed adaptive contrast map for an input degraded document image. And then image segmentation algorithm is used to identify the text stroke edge pixels. The document text is further segmented by a local threshold that is estimated based on the intensities of detected text stroke edge pixels within a local window. The proposed method is simple, robust and involves minimum parameter tuning. This system was tested on three public datasets that were used in the recent. Those datasets are Document Image Binarization Contest (DIBCO) 2009 & 2011 and Handwritten Document Image Binarization Contest (H-DIBCO) 2010 and thus come up with an accuracies of 93.5%, 87.8% and 92.03%, respectively that are significantly higher than or close to that of the best-performing methods reported in the three contests.

KEYWORDS: Adaptive Image Contrast, Document Analysis, Document Image Processing, Degraded Document Image Binarization, Pixel Classification.

1. INTRODUCTION

Image Binarization is a common first step to document image analysis, converts the gray values of document images into two level representations for text and non-stroke regions. The handwritten text within the degraded documents often shows a certain amount of variation in terms of the stroke width, stroke brightness, stroke connection, and document background. Historical documents are often degraded by the bleed-through where the ink of the other side seeps through to the front.

For a given document image, different binarization methods may create different corresponding binary image. Some binarization methods perform superior on certain kinds of document image, while others create better results for other kinds of document images. By combining different binarization techniques, better performance can be achieved with carefully analysis. Document binarization is technique for removing noise from document background and

extracts the foreground text. Using Document image Binarization technique, improves degraded document which contains uneven lighting bleed.

This method is simple, robust and capable of handling different types of degraded document images with minimum parameter tuning. It makes use of the adaptive image contrast that combines the local image contrast and the local image gradient adaptively and therefore is tolerant to the text and background variation caused by different types of document degradations.

2. LITERATURE REVIEW

There are many thresholding techniques developed for document image binarization. Many degraded documents do not have a clear bimodal pattern, so global thresholding is not a suitable approach for the degraded document binarization. Therefore adaptive thresholding which estimates a local threshold for each document image pixel is a better approach to deal with degraded document images. For example, the early window-based adaptive thresholding techniques use mean and the standard deviation to estimate the local threshold of image pixels which is a better approach to deal with different variations within degraded document images.

The main drawback of these window-based thresholding techniques is that the thresholding performance totally depends on the window size and the character stroke width. Other approaches for window-based thresholding are: 1. Background subtraction [6],[7] this approach presents a document binarization technique that makes use of the document background surface and the text stroke edge information. 2. Texture analysis [8], a locally adaptive approach for the binarization and enhancement of degraded documents. 3. Recursive method [9], [10], 4. Decomposition method [11], this approach is a local adaptive analysis method, which uses local feature vectors to find the best approach for thresholding a local area. 5. Contour completion [12]–[13], 6. Markov Random Field [14][15], a new approach to the binarization of document images based on the energy minimization. For energy minimization, formulate the energy using MAP-MRF approach and perform the optimization via graph cut. 7. Matched wavelet [16], a technique for locating the text part based on textural attributes using GMWs. 8. Cross Section Sequence Graph Analysis [17], ICSSG, an algorithm for handwritten character segmentation that tracks the characters' growth at equally spaced thresholds. The iterative thresholding reduces the effect of information loss associated with image binarization. 9. Self-learning [18], 10. Laplacian energy [19], 11. User assistance [20][21], a comprehensive approach for converting scanned documents to black and white. 12. Combination of binarization techniques [22], [23]. These methods combine different types of image information and domain knowledge and are often complex.

3. METHODOLOGY

To demonstrate the system given degraded document images are taken from dataset (Document Image Binarization contest (DIBCO) 2009 & 2011 and handwritten-DIBCO 2010). To get the resultant binary images we have to apply following methodology:

1. Contrast Image Construction:

To extract only stroke edges from the degraded document images, the image gradient needs to be normalized to compensate the image variation within the document background. In this method, we combine local image contrast and local image gradient to construct adaptive local image contrast as follows:

$$Ca(i, j) = \alpha C(i, j) + (1 - \alpha)(Imax(i, j) - Imin(i, j))$$

Where, $C(i, j)$ denotes the local contrast, $(Imax(i, j) - Imin(i, j))$ refers to the local image gradient. The local windows size is set to 3. α is the weight between local contrast and local gradient. We model the mapping from document image intensity variation to α by a power function as follows:

$$\alpha = (Std/128)^\gamma$$

where Std denotes the document image intensity standard deviation, and γ is a pre-defined parameter. The local image gradient will play the major role when γ is large and the local image contrast will play the major role when γ is small.

2. Image Segmentation Algorithm

In this algorithm, each pixel in an image has its own threshold, which is estimated by calculating the mean of the grayscale values of its neighbor pixels, and the square variance of the grayscale values of the neighbor pixels are also calculated as an additional judge condition, so that the result of the proposed algorithm is the edge of the image.

Results of this algorithm show that it is apparent to obtain better results by the proposed algorithm than by Canny operator. The proposed algorithm has an obvious advantage in noise restraining, which is a good edge detecting and image segmentation algorithm with wide applicability.

3. Edge Width Estimation Algorithm:

Once the high contrast stroke edge pixels are detected properly the text can then be extracted from the document background pixels. Characteristics can be observed from different kinds of document images are :

- It will detect text pixels which are close to the text stroke edge pixels.
- There is a distinct intensity difference between the high contrast stroke edge pixels and the surrounding background pixels.

The neighborhood window should be at least larger than the stroke width in order to contain stroke edge pixels. So the size of the neighborhood window W can be set based on the stroke width of the document image under study, EW , which can be estimated from the detected stroke edges as stated in Algorithm.

Algorithm: Edge Width Estimation

Require: The Input Document Image I and Corresponding Binary Text Stroke Edge Image Edg

Ensure: The Estimated Text Stroke Edge Width EW

- 1: Get the width and height of I
- 2: for Each Row $i = 1$ to height in Edg do
- 3: Scan from left to right to find edge pixels that meet the following criteria:
 - Its label is 0(background)
 - The next pixel is labeled as 1(edge).
- 4: Examine the intensities in I of those pixels selected in Step 3, and remove those pixels that have a lower intensity than the following pixel next to it in the same row of I .
- 5: Match the remaining adjacent pixels in the same row into pairs, and calculate the distance between the two pixels in pair.

- 6: end for
- 7: Construct a histogram of those calculated distances.
- 8: Use the most frequently occurring distance as the estimated stroke edge width EW .
Since we do not need a precise stroke width, we just calculate the most frequently distance between two adjacent edge pixels in horizontal direction and use it as the estimated stroke width.

4. Post Processing Algorithm

Once we get the initial binarization result from local threshold estimation, the previous result can be further improved by Post-Processing Procedure algorithm. First, the filtered out foreground pixels those are not connect with other foreground pixels to make the edge pixel set precisely. Second, if the neighborhood pixel pair that lies on symmetric sides of a text stroke edge pixel then they belong to different classes. If both of two pixels belong to the same classes then the one pixel of the pixel pair is labeled to the other category. Finally, by using several logical operators filtered out single-pixel artifacts along the text stroke boundaries.

Algorithm Post-Processing Procedure

Require: The Input Document Image I , Initial Binary Result B and Corresponding Binary Text Stroke Edge Image Edg

Ensure: The Final Binary Result Bf

- 1: Find out all the connect components of the stroke edge pixels in Edg .
- 2: Remove those pixels that do not connect with other pixels.
- 3: for Each remaining edge pixels (i, j) : do
- 4: Get its neighborhood pairs: $(i - 1, j)$ and $(i + 1, j)$; $(i, j - 1)$ and $(i, j + 1)$
- 5: if The pixels in the same pairs belong to the same class then
- 6: Assign the pixel with lower intensity to foreground and the other to background.
- 7: end if
- 8: end for
- 9: Remove single-pixel artifacts along the text stroke boundaries after the document thresholding
- 10: Store the new binary result to Bf .

4. EXPERIMENTAL RESULTS

The proposed method has been tested over the handwritten images of the dataset that is used in the recent Document Image Binarization contest (DIBCO) 2009 & 2011 and handwritten-DIBCO 2010.

The DIBCO 2009 dataset contains ten testing images that consist of five degraded handwritten documents and five degraded printed documents. The H-DIBCO 2010 dataset consists of ten degraded handwritten documents. The DIBCO 2011 dataset contains eight degraded handwritten documents and eight degraded printed documents. In total, we have 36 degraded document images with ground truth

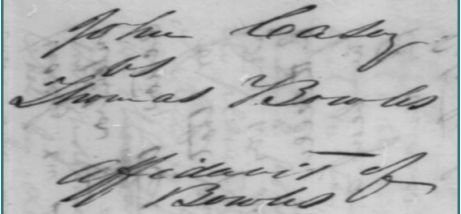


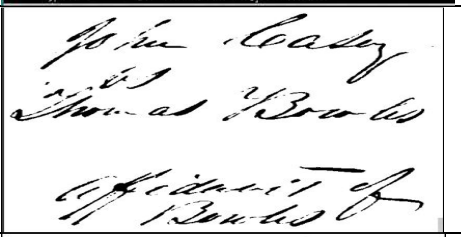
Input Image		
Contrast Image Construction		
Text Stroke Edge pixel Detection		
Edge Width Estimation		
Binarized Result		

TABLE: shows Binarization results of the degraded document image

5. CONCLUSION

This paper presents an adaptive image contrast based document image binarization technique that is tolerant to different types of document degradation such as uneven illumination and document smear. The proposed technique is simple and robust, only few parameters are involved. Moreover, it works for different kinds of degraded document images. The proposed technique

makes use of the local image contrast that is evaluated based on the local maximum and minimum. A new Image segmentation algorithm is proposed that each pixel in the image has its own threshold by calculating the statistical information of the grayscale values of its neighborhood pixels. An additional judge condition is given that it is possible to get the edge of the image as the result of the algorithm. The Image Segmentation algorithm also has an obvious advantage in noise restraining. The proposed method has been tested on the various datasets.

REFERENCES

- [1] S. Zhu, X. Xia, Q. Zhang, K. Belloulata, "An Image Segmentation Algorithm in Image Processing Based on Threshold Segmentation," in Proc. Int. IEEE Conf. on Signal- Image technologies and Internet-Based Sys.
- [2] B. Su, S. Lu, and C. L. Tan, "Binarization of historical handwritten document images using local maximum and minimum filter," in Proc. Int. Workshop Document Anal. yst., Jun. 2010, pp. 159–166
- [3] B. Gatos, K. Ntirogiannis, and I. Pratikakis, "ICDAR 2009 document image binarization contest (DIBCO 2009)," in Proc. Int. Conf. Document Anal. Recognit., Jul. 2009, pp. 1375–1382.
- [4] I. Pratikakis, B. Gatos, and K. Ntirogiannis, "ICDAR 2011 document image binarization contest (DIBCO 2011)," in Proc. Int. Conf. Document Anal. Recognit., Sep. 2011, pp. 1506–1510.
- [5] I. Pratikakis, B. Gatos, and K. Ntirogiannis, "H-DIBCO 2010 handwritten document image binarization competition," in Proc. Int. Conf. Frontiers Handwrit. Recognit., Nov. 2010, pp. 727–732.
- [6] S. Lu, B. Su, and C. L. Tan, "Document image binarization using background estimation and stroke edges," Int. J. Document Anal. Recognit., vol. 13, no. 4, pp. 303–314, Dec. 2010.
- [7] B. Gatos, I. Pratikakis, and S. Perantonis, "Adaptive degraded document image binarization," Pattern Recognit., vol. 39, no. 3, pp. 317–327, 2006.
- [8] Y. Liu and S. Srihari, "Document image binarization based on texture features," IEEE Trans. Pattern Anal. Mach. Intell., vol. 19, no. 5, pp. 540–544, May 1997.
- [9] M. Cheriet, J. N. Said, and C. Y. Suen, "A recursive thresholding technique for image segmentation," in Proc. IEEE Trans. Image Process. Jun. 1998, pp. 918–921.
- [10] S. Kumar, R. Gupta, N. Khanna, S. Chaudhury, and S. D. Joshi, "Iterative multi model subimage binarization for handwritten character segmentation," IEEE Trans. Image Process., vol. 13, no. 9, pp. 1223–1230, Sep. 2004.
- [11] Y. Chen and G. Leedham, "Decompose algorithm for thresholding degraded historical document images," IEE Proc. Vis., Image Signal Process., vol. 152, no. 6, pp. 702–714, Dec. 2005
- [12] Q. Chen, Q. Sun, H. Pheng Ann, and D. Xia, "A double-threshold image binarization method based on edge detector," Pattern Recognit., vol. 41, no. 4, pp. 1254–1267, 2008.
- [13] I. Blayvas, A. Bruckstein, and R. Kimmel, "Efficient computation of adaptive threshold surface for image binarization," Pattern Recognit., vol. 39, no. 1, pp. 89–101, 2006.

- [14] S. Nicolas, J. Dardenne, T. Paquet, and L. Heutte, "Document image segmentation using a 2D conditional random field model," in Proc. Int. Conf. Doc. Anal. Recognit., Sep. 2007, pp. 407–411.
- [15] J. G. Kuk, N. I. Cho, and K. M. Lee, "Map-MRF approach for binarization of degraded document image," in Proc. Int. Conf. Image Process., 2008, pp. 2612–2615.
- [16] S. Kumar, R. Gupta, N. Khanna, S. Chaudhury, and S. D. Joshi, "Text extraction and document image segmentation using matched wavelets and MRF model," IEEE Trans Image Process., vol. 16, no. 8, pp. 2117–2128, Aug. 2007.
- [17] A. Dawoud, "Iterative cross section sequence graph for handwritten character segmentation," IEEE Trans. Image Process., vol. 16, no. 8, pp. 2150–2154, Aug. 2007.
- [18] B. Su, S. Lu, and C. L. Tan, "A self-training learning document binarization framework," in Proc. Int. Conf. Pattern Recognit., Aug. 2010, pp. 3187–3190.
- [19] N. Howe, "A Laplacian energy for document binarization," in Proc. Int. Conf. Doc Anal. Recognit., Sep. 2011, pp. 6–10.
- [20] F. Deng, Z. Wu, Z. Lu, and M. S. Brown, "Binarizationshop: A userassisted software suit for converting old documents to black-and-white," in Proc. Annu. Joint Conf. Digit. Libraries, 2010, pp. 255–258.
- [21] H. Yi, M. S. Brown, and X. Dong, "User-assisted ink-bleed reduction," IEEE Trans. Image Process., vol. 19, no. 10, pp. 2646–2658, Oct. 2010.
- [22] E. Badekas and N. Papamarkos, "Optimal combination of document binarization techniques using a selforganizing map neural network." Eng. Appl. Artif. Intell., vol. 20, no. 1, pp. 11–24, Feb. 2007.
- [23] B. Gatos, I. Pratikakis, and S. Perantonis, "Improved document image binarization by using a combination of multiple binarization techniques and adapted edge information," in Proc. Int. Conf. Pattern Recognit., Dec. 2008, pp. 1–4.

Devnagari Character Recognition Using Segmentation And Artificial Neural Network

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ABSTRACT:

Handwritten character recognition is the ability of a computer to receive and interpret intelligible handwritten input from sources such as paper documents, photographs, touch-screens and other devices. Handwritten Marathi Characters are more complex for recognition than corresponding English characters due to many possible variations in order, number, direction and shape of the constituent strokes. The main purpose of this paper is to introduce a new method for recognition of offline handwritten devnagari characters using segmentation and Artificial neural networks. The whole process of recognition includes two phases-segmentation of characters into line, word and characters and then recognition through feed-forward neural network.

KEYWORDS: handwritten character recognition, Segmentation, line segmentation, word segmentation, character segmentation, lower modifier, upper modifier, Header line, Baseline, feed-forward neural network.

INTRODUCTION

The growing need have handwritten Marathi character recognition in Indian offices such as passport, railways etc has made it vital area of a research. To the best of our knowledge, little work has been done in Devnagari script compared with those for non Indian scripts like Latin, Chinese and Japanese. In this project we propose an effective system for recognition of Marathi handwritten numerals and words written in Devnagari script. Marathi is a language spoken by about 71 million people mainly in the Indian state of Maharashtra and neighboring states. Marathi language is developed from Sanskrit. The proposed technique is independent of size, slant, orientation, translation and other variations in handwritten characters. Even though the Technology in India is develop so much but there is a lack of software which recognizes devnagari text. This software can be used for communicating with computers in our native language. Marathi is an official language of Maharashtra. Marathi script consists of 16 vowels and 36 consonants making 52 alphabets. Marathi is written from left to right. It has no upper and lower case characters. Every character has a horizontal line at the top called as the header line (Shirorekha). The header line joins the characters in a word Numeral recognition is one of the most challenging problems in pattern recognition. This has numerous applications including those in postal sorting, bank cheque processing, and automatic data entry. Many approaches have been proposed by the researchers for recognition of handwritten numerals/characters in the literature. Research in this field has

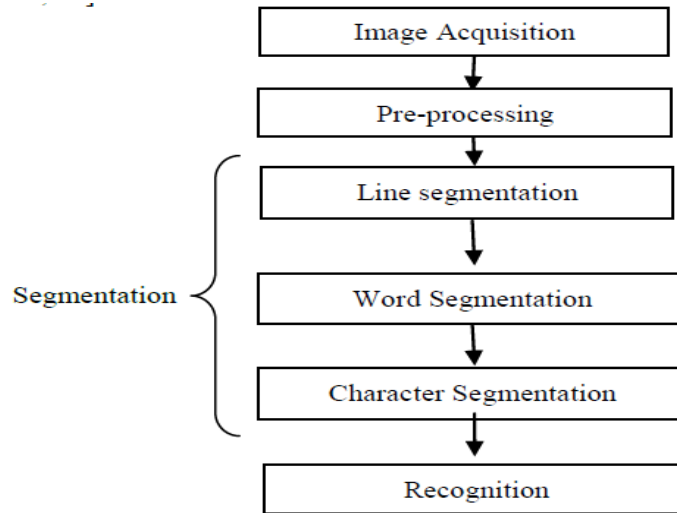
basically considered feature extraction methods, classification method, and system architectures based on different strategies such as combination of multiple classifiers and the use of multiple features.

LITERATURE SURVEY

A literature review is a critical and an evaluative summary of the themes, issues and arguments of a specific clearly defined research topic obtained from the published (and unpublished) literature. Character recognition task has been attempted through many different approaches like template matching, statistical techniques like NN, HMM, Quadratic Discriminated function (QDF) etc. Template matching works effectively for recognition of standard fonts, but gives poor performance with handwritten characters and when the size of dataset grows. It is not an effective technique if there is font discrepancy. HMM models achieved great success in the field of speech recognition in past decades, however developing a 2-D HMM model for character recognition is found difficult and complex. NN is found very computationally expensive in recognition purpose. Byes Theorem for handwritten character recognition. Later, discriminative classifiers such as Artificial Neural Network (ANN) and Support Vector Machine (SVM) grabbed a lot of attention. The performance of three classifiers were compared Naive Bayes, K-NN and SVM and attained best performance with SVM. However SVM suffers from limitation of selection of kernel. ANNs can adapt to changes in the data and learn the characteristics of input signal. Also, ANNs consume less storage and computation than SVMs. The error back propagation algorithm was used to train the MLP networks. Which shows effectiveness of MLP for Tamil HCR using the Fourier descriptor features. Computer Science & Information Technology (CS & IT) 27 similar shaped characters are difficult to differentiate because of very minor variations in their structures. F-Ratio (Fisher Ratio) based feature extraction method is use to improve results of similar shaped characters. They considered pairs of similar shaped characters of different scripts like English, Arabic/Persian, Devnagari, etc. and used QDF for recognition purpose. QDF suffers from limitation of minimum required size of dataset. The method that combines both structural and statistical features of characters for similar handwritten Chinese character recognition. . As it can be seen that various feature extraction methods and classifiers have been used for character recognition by researchers that are suitable for their work, we propose a novel feature set that is expected to perform well for this application. In this paper, the features are extracted on the basis of character geometry, which are then fed to each of the selected ML algorithms for recognition of SSHMC.

Methodology:

The proposed system basically performs recognition of Handwritten characters written in Devnagari script from an image of Devnagari text. A typical handwriting recognition system consists of pre-processing, segmentation. The schematic diagram of the proposed recognition system is shown in Figure.



Schematic diagram

Image Acquisition:

The system take a scan image as an input the image should have specific file format such as .jpg.png. Image acquisition in image processing can be broadly defined as the action of retrieving an image from some source, usually a hardware-based source, so it can be passed through whatever processes need to occur afterward. Performing image acquisition in image processing is always the first step in the workflow sequence because, without an image, noprocessing is possible. The image that is acquired is completely unprocessed and is the result of whatever hardware was used to generate it, which can be very important in some fields to have a consistent baseline from which to work. One of the ultimate goals of this process is to have a source of input that operates within such controlled and measured guidelines that the same image can, if necessary, be nearly perfectly reproduced under the same conditions so anomalous factors are easier to locate and eliminate.

Pre-processing:

In Pre –Processing series of operation are performed on Scanned input image they are:

Gray Scale:

Convert the scanned image input into Grayscale.

The algorithms used in the system is as follows:

Grayscale Conversion algorithm:

All grayscale algorithms utilize the same basic three-step process:

- Get the red, green, and blue values of a pixel
- Use fancy math to turn those numbers into a single gray value
- Replace the original red, green, and blue values with the new gray value using math to turn color values into a grayscale value. Use the following formula like this:

Gray = (Red + Green + Blue) / 3
Suppose you have a color image:



Figure 2:

And you want to convert it to a grayscale image.
At first, you can simply add up the red, green, and blue color values, and divide by 3:
$$\text{Gray} = (\text{Red} + \text{Green} + \text{Blue})/3$$

If you do that, this is what you'll get that is the Gray Scale image.

Noise Removal:

Remove the unwanted/noise signal from the input image

Chroma and Luminance Noise Separation:- In real-world photographs, the highest spatial-frequency detail consists mostly of variations in brightness ("luminance detail") rather than variations in hue ("chroma detail"). Since any noise reduction algorithm should attempt to remove noise without sacrificing real detail from the scene photographed. In addition, most people find chroma noise in images more objectionable than luminance noise; the colored blobs are considered "digital-looking" and unnatural, compared to the grainy appearance of luminance noise that some compare to film grain. For these two reasons, most photographic noise reduction algorithms split the image detail into chroma and luminance components and apply more noise reduction to the former in-camera noise reduction algorithm.

Linear Image Smoothing Filters:- One method to remove noise is by convolving the original image with a mask that represents a low-pass filter or smoothing operation. For example, the Gaussian mask comprises elements determined by a Gaussian function. This convolution brings the value of each pixel into closer harmony with the values of its neighbors. In general, a smoothing filter sets each pixel to the average value, or a weighted average, of itself and its nearby neighbors; the Gaussian filter is just one possible set of weights.

Binarization:

Process that convert a gray scale image into binary image. This image is given to the segmentation phase.

RGB-to-Binary image conversion

Binary image avoids unnecessary image segmentation and features extraction.

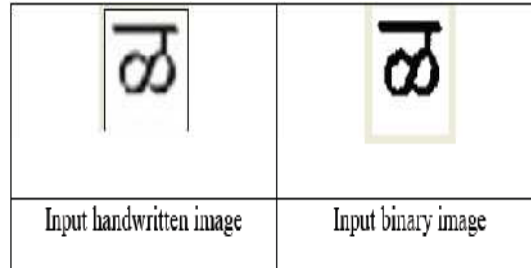


Figure No. 2.2 RGB-to-Binary image conversion

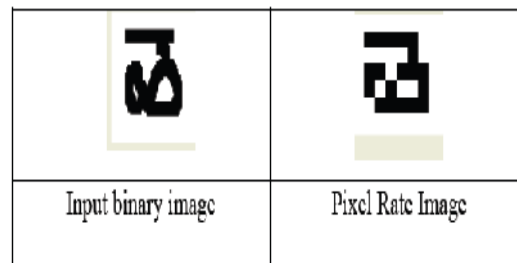
d) Pixel rate an image

Figure No. 2.3 Pixel rate an image

Pixel rate an image used to identify an image pixel value either on or off. We set pixels height and width equal to 10 of which we got result. Height, Width of an pixel rate image should be proportionate to size of an binary image. It is observed that having pixels size 10 x 10 leads to loss of pixels which are represented with an equation

Where

Pl= No. of Pixels loss

Pnhw= Pixels new height, width.

n=No. of off pixels in binary image.

Image edge smoothing

From literature review, it is observed that patterns in handwritten characters have large deviation factor with respect to its standard image pattern. Deviation factor is a mod difference value between no. of pixels patterns in training and testing images and represented with

Where,

Df= Deviation factor.

Tr= No. of segments of training image.

Ts= No. of segments of testing image.

Where

S= size of an image.

hw= new height, width of segment.

Dn = new segment size

Average searching time for character recognition of test image uses best-fit search approach

with training set images.

Where

$O(t)$ = Average searching time.

Segmentation

Segmentation includes segmentation of lines, lines into words, words into characters.

Line segmentation:

The image of text contains number of lines. First separate the lines from the document. This is what line segmentation means. For line segmentation, we take horizontal projection for every horizontal pixel row starting from the top of document. The lines are separated where we find a row with no black pixels. That means, $HP(k) = 0$ where k is the row number where white space is found. This row acts as a separation between two lines.

Word Segmentation

After line segmentation next task is to segment the words from the lines. This can be done using the concept of vertical projection. If we take vertical projection for each line, then the words can be separated by looking for the column with zero black pixels. That means, $VP(k) = 0$, where k is the column number where the white space is found. This k serves as the separating index for words

Character Segmentation

Segment characters from the image, we need to use the words separated and then find the position of header line (*Shirorekha*). Once the header line is separated from the word, we can separate the characters individually. To find position of header line, we compute the horizontal projection of the word image.

The row that contains maximum black pixels corresponds to the position of the header line in the word. Characters are identified in absence of header line.

Once the segmentation process get completed all the characters are bring down to Standard size to make recognition independent of size. after the segmentation process, we then brings down the characters to a standard size so as to make the recognition size independent. This standard sized image matrix is then given to the recognition module which employs Artificial Neural Network to recognize the characters.

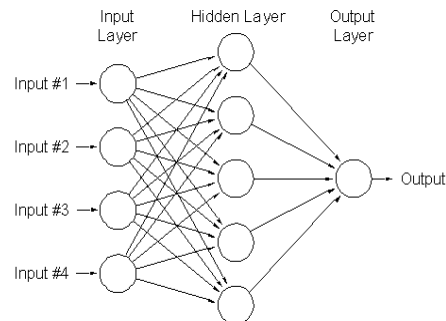
Artificial neural network:

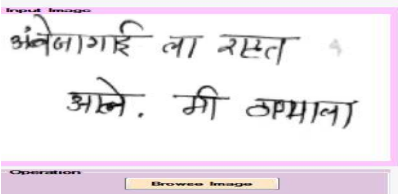
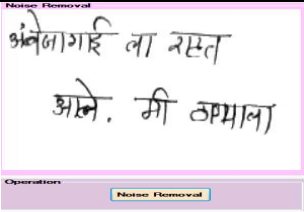
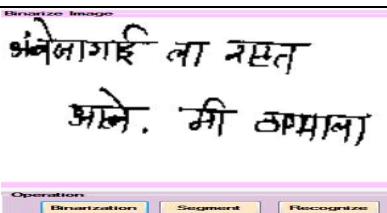
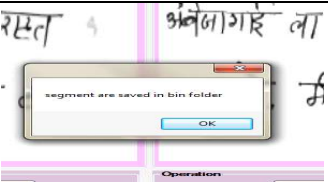
Artificially neural network is one of the preferred approach for recognizers for small variability of patterns. It is powerful Modeling tools. ANN used for finding trends in graphical patterns. In this paper, we proposed a system capable of recognizing handwritten characters with the help of neural network.

The pattern of character are created in matrix form they are store in a file, A new character pattern is given as an input to the system. The system matches this pattern with pattern that are already stored in a file.

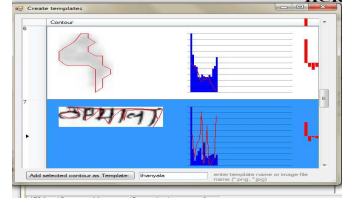
Patterns are in the matrix form, they are written as:

0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
0	0	0	0	0	1	1	0	0	0	0	1	1	1	0
0	0	0	1	1	0	0	0	1	0	0	0	1	1	0
0	1	1	0	0	0	0	0	1	0	0	1	1	0	0
0	1	1	0	0	0	0	1	1	0	0	1	1	0	0
0	0	0	0	0	0	1	1	0	0	0	1	1	0	0
0	0	0	0	0	1	1	0	0	0	0	1	1	0	0
0	0	0	0	1	1	1	1	1	1	1	1	1	0	0
0	0	0	1	1	1	1	1	1	1	1	1	1	0	0
1	1	0	0	0	1	1	0	0	0	1	1	0	0	0
0	1	1	0	0	0	1	1	0	0	0	1	1	0	0
0	1	1	1	0	0	0	1	1	0	0	1	1	0	0
0	0	0	1	1	0	1	1	0	0	0	1	1	0	0
0	0	0	0	1	1	0	0	0	0	0	1	1	0	0



Input Image	
Noise Removal	
Binarization	
Segmentation	

Recognition



Conclusion:

We conclude that, most of the work in character recognition area is done on either segmentation or on only recognition of segmented characters. Development of handwritten Devnagari OCR is still a challenging task in Pattern recognition area. Here, we propose a method which does the segmentation of handwritten characters into line segmentation, word segmentation and character segmentation. And further recognition process will be done with the help of neural networks. Once's the characters are recognized the system generate text file of it.

Future Scope:

In future we will try to do this application in such a way that suppose if the user inputs and unknown pattern to this application then according to the previous recognized pattern it will predict this newly pattern.

References:

- [1] Sushma Shelke And Shilpa Apte., "International Journal Of Signal Processing", Image Processing And Pattern Recognition, vol. 4, No. 1, March 2011
- [2] IEEE Transactions On Pattern Analysis And Machine Intelligence, Vol. 34, No. 4, April 2012. By Ajay K. Mishra, Yiannis Aloimonos, Loong-fah Cheong, And Ashraf Kassim.
- [3] Schlecht, Ommer: Contour-based Object Detection.
- [4] D. Mumford, J. Shah, Optimal approximation by piecewise smooth functional and associated variational problems, Commun. Pure Appl. Math. 42 1989) 577 –685.
- [5] S. Osher, J. Sethian, Fronts propagating with curvature-dependent speed: algorithm based on the Hamilton–Jacobi formulation, J. Comput. Phys. 79 (1988) 12–49.
- [6] T.F. Chan, L.A. Vese, Active contours without edges, IEEE Trans Image Process. 10 (2) (2001) 266–277.

Missed2 Suite

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ABSTRACT:

MISSED2 SUITE is software, inhibits all its actions depending upon a missed call. Different uses, which could be integrated with help of a mere missed call, are integrated to make use of it as much as one can. The basic idea was to target large populace in order to bridge the gap between two sets of people. With the help of this even the rural populace can be targeted and we can there by the most of it as a result. To make the barriers between people and make it free as per the customer point of view was the reason to make use missed call technology. The other reasons were reduce waiting time, to have one to one correspondence, to get response dynamically and without any human intervention. Missed2 Suite consists of four modules/ applications, which comprises of applications, which are integrated, with the help of missed call. Working and functionality change depending upon the type of applications. Missed2 Suite is fragmented into four parts, which are IVR (Interactive Voice Response), Call, SMS's, and Voice Response. Other functions like filtering, Fetching, calculating, scheduling logic, bulk SMS's etc. are also integrated.

1. INTRODUCTION

The main purpose of using the missed call facility was to bridge the gap between the customers and the agents or in between two sets of people. Missed call was a mere word, we have added meaning to it and tried to use this facility in turn where so ever, so that it won't just act as missed call but depending on it we could do multiple functions.

The missed call provided can act as a response any phone can use it like dumb phone, smart phone or even a landline phone. User-friendly service, free of cost and it is extremely convenient since there is instant access to a required service at no cost and in no time. Participation from masses can be made to its maximum level, since the ease of use as simple as dialing a number and the rural population can be easily targeted without having any language barrier.

This offers services based on missed calls. Also, the users are not confined to just the smaller centers. The user-base is almost equally split between smaller and larger centers. "Zipdial users are present pan-India with around 15% in metros and an additional 38% in tier-2 cities with the rest spreading beyond that," points out Wagoner.

The ease of use of missed calls and zero charges associated with it gives it a huge advantage over other newer forms of communication, says Daman Soni, co-founder of Bangalore-based Adchakra, a company providing advertising solutions. "In comparison, social media is only a 3-4 year old story. SMS also has two negatives in comparison - delivery rate is worse and it comes at a price."

Critics, however, point out that it is hard to accurately identify the intention behind missed

calls and so it may not be the best tool available for market research or for gauging interest. "It's more like the flavor of the month," says brand consultant Harish Bijoor. "In a short time, companies will find out its not that effective." For the moment, though, millions around the country are dialing - and disconnecting.

Product Name: Missed2 Suite.

Sub Products:

1. Missed2Call.
2. Missed Call to IVR.
3. Missed Call to Voice SMS.
4. Missed Call to SMS.

Sectors in which can be used Missed2 Suite:

- Lead Generation.
- Voting.
- Feedback.
- Telephonic Banking.
- Promotions.
- Event notifications/Reminders.
- Support/Sales.
- Campaigning.
- Entertainment and Reality shows.
- Anonymous Access.

Why should one use this technology?

- Free as per customer point of view, therefore there is an increase in response.
- Response generated can be in one of the form as per the application used.
- Simple to integrate with other systems.
- Reports can be generated which will serve as a measure for campaigning to calculate the responses accurately.

Advantages/Features:

- Cost is not incurred from the customer point of view.
- Wait time is only of one minute therefore it increases customer satisfaction.
- Online reports can be generated based on call details.
- Don't lose your lead since agent, which is free, can immediately respond to the customer.
- It helps in breaking barriers and bridging the gap between the user and the organization.
- Once the call is set Call/ SMs gets exhibited even on DND numbers as the number acts like a transactional number now instead as an promotional number therefore, it can be helpful for next campaigning.

Procedure:

The user or customer just has to give a miss call as an input then just sit and rest. It is cheaper than a toll free number. Depending upon the particular service, the user should give a missed call; the user will be reverted according to that particular service.

1.1 MISSED2CALL:

As soon as the customer or user gives a miss call on a number then immediately customer or user will get a call back from the agent.[2]

**Facilities Provided:**

- Access: Customer information like mobile/landline number can be accessed through the Google Spreadsheet.
- Convenient: As only miss call is to be provided.
- User-friendly: It uses a simple concept therefore it is easy to understand and anyone can make use of it.
- Maximum Participation: As there is no language barriers it can reach the masses as well as rural areas can also participate easily.
- Cost free: Since only miss call is to be provided no cost is incurred as per customer point of view.

Applications:

- Customer Service oriented organization where direct and immediate communication is required between the customer and the agent. Like Automotive Service Centers.

1.2 MISS CALL TO IVR:

As soon as the customer or user gives a miss call on a number then immediately customer or user will get a response from a company's host system. There will be a two way communication between the customer and the IVR system. There is no human intervention between them. The

response is generated through a pre-recorded or dynamically generated audio to further direct and proceed.



Facilities Provided:

- Access: Customer information like mobile/landline number can be accessed through the Google spreadsheet.
- Convenient: As only miss call is required.
- User Friendly: Since as soon as the call disconnects the IVR system generates a call to the user and the user only has to follow the instructions given by the IVR using a telephone keypad.
- Cost free: Since only miss call is to be provided no cost is incurred as per customer point of view.

Applications:

- Telephonic Banking: Services like debit and credit services can be provided for creating awareness.
- Entertainment and Information: Televoting and Television game shows.
- Anonymous Access: Hospitals and clinics can use IVR systems to allow callers to receive anonymous access to test results. Basically used to preserve privacy of sensitive information.
- Clinical Trials: Can be used by the pharmaceutical companies and research organization to conduct clinical trials and handle large volume of data.
- Lead Aggregation: Lead information can be appeared in Google Spreadsheet which can be handled by the Customer Service Representative so that it increases the Sales.

1.3 MISS CALL TO VOICE SMS:

As soon as the customer or user gives a miss call on a number then immediately customer will receive a pre recorded audio prompt; e.g. "Thanks for calling, we will get back to you soon". It provides an acknowledgement that input has been received and feedback received is valuable for them as well customer's expectations are maintained.



Facilities Provided:

- Access: Customer's information like mobile/landlinenumber, date and time of the SMS been sent can be accessed through the Google spreadsheet.
- Convenient: As only a missed call is required.
- User friendly: As soon as the call disconnects the user gets a response by a pre-recorded voice SMS, which also acts as an acknowledgement.
- Cost Free: Since only miss call is required as an input there is no cost incurred that it as per customer point of view the service is free of cost.

Application:

- Campaigning: They can be used by organization for campaigning purpose. Politicians can also use the same to promote the campaign effectively in a large area. Reports can also be generated to view at a glance. We can play the audio in any language that is it is not language dependent.
- Promotional offers: They are used to offer or let the masses know about the current offers.
- Serves as knowledge-base/ Public information/ addressing system: They can also be used for generating awareness not only for campaigning but also serves as a source to spread news to educate people. Like if there is a scenario of epidemic we can let people know about the safety measures.

1.4 MISS CALL TO SMS:

As soon as the customer or user gives a miss call on a number then immediately the customer or user will receive an SMS as an acknowledgement. We have even integrated the Bulk SMS facility here in we can send a selected SMS to the dedicated set of people in order to notify them[3].



Facilities Provided:

- Access: Customer information like mobile/landline number can be accessed through the Google spreadsheet.
- Convenient: As only miss call is required.
- User friendly: As soon as the call disconnects the user gets a response by a SMS, which also acts as an acknowledgement.
- Cost Free: Since only miss call is required as an input there is no cost incurred that it as per customer point of view the service is free of cost.

Application:

- Campaigning: For example we are showing our support for a particular Service or Act or Rule or Politician by providing a miss call on a number. For say" Your vote is valued".
 - Entertainment and Information: Television voting for Television game shows.
- a) Product Functions
- Required information can be well communicated through emails or SMS's.
 - Easy to use and maintain.
 - It is available at a reasonable cost than any other software in market.
 - Data is stored and saved automatically at run-time or dynamically without any human intervention.
 - We can generate reports whenever required.
 - We can even calculate the cost incurred at our side to keep a track of financial ends that are bared at our side or at the organization's side.
 - We can keep a track of on going progress
 - The database is the form of Google Spreadsheet, which is maintained at the organizations ends in order to review the details as and when required.
 - The whole data is on cloud. So the main advantage is that the software is not system dependent. Even if the system gets crashed the data is saved and secure any can be access through any system whenever required.[4]

2. LITERATURE REVIEW

There is a need of the new system to replace the current market situation and replace it with a more valuable and convenient one. It has mainly focus onto satisfy most of the needs of clients or customers and data should also be easily available, accessible and easy to use. It can work from small to medium companies and even large organization can be targeted. It is free as per customer point of view. The main reference, which is focused, is that it saves time and money as well as client satisfaction is taken care off. It can use for all type of populace. The responses can be generated since it is free and we can there expect large amount of participation. The language barrier can be taken care by the IVR system.

2.1 ADDITIONS TO THE PREVIOUS SYSTEM:

Following are the additions to the previous systems, which has helped to generate the altogether new system, which has reduced our end time and efforts.

- Data comes into the spreadsheet automatically, because of which we can track responses, which are generated without human intervention.
- All existing systems are manual. For E.g. Lets consider the following example of conducting surveys, interviews or feedback. Our main aim is to reduce time and manual efforts, which help us to gather results in fewer amounts of time as well as large populace, can be focused on.
- Communication barrier is one of the biggest barrier which creates a gap with the help of our system we focus onto bridge the gap and focus is remove all communication barriers in order to bring them closer and the needs of the customers or client can be taken care of and their resolutions can be generated and their queries can be solved.
- Another problem or drawback, which we have come across in India, is there are biased people, corruption are some of the hurdles. We have overcome this by removing the human intervention work. All people are treated as one and similar treatment is provided to all the people, as there is no prior knowledge about it before.
- Easy to use back end as well as simple and easy to understand. Data comes at run-time and there by reports can also be generated at runtime any peculiar data is required can be obtained using filters.
- Scheduling can be taken care of; as the system is automatic we can trigger calls, SMS's, IVR calls, as per the users requirements. So that it won't cause any inconvenience even to the attendees.
- Accessibility of the data can be provided to the people as per the requirements, it can be shared and we can provide them access like only to view or to edit etc.
- Cost of per call is also calculated simultaneously for per call, which comes in automatically after the call ends. So, one can keep a track of expenses which are incurred for per call an there by of total calls.

2.2 DETAILED PROBLEM DEFINITION:

A missed call is a telephone call that is deliberately terminated by the caller or by the system before being answered by its intended recipient, which then appears as a missed call on the receiver's phone or cellphone [1].

India has a very high mobile penetration rate and the fact most people would want to save on the mobile phone expenses. So in order to overcome this missed call comes into the picture. From saying 'reached home' and 'call me back' to 'I'm ready, come now', the missed call speaks a thousand words and Indians have been pioneers in using it in ingenious ways. Today, though, the missed call is taking on newer roles, moving beyond mere personal communication. A number of businesses including big brands are embracing it to better engage with their customers. Popular campaigns such as the anti-corruption movement and Delhi rape protests also recently used missed calls contributing to its popularity.

Missed call has a good business sense. Missed Call speaks a thousand words and Indians are pioneer, in using it in, ingenious ways. Though, today, missed call is taking on new roles and is moving beyond mere personal communication. Today a number of business including big brands are embracing it for customer engagement.

The IVR can be collaborated with the missed call to solve multiple problems faced by the organization today. Like interviews, feedback, survey etc. an outbound call be an excellent solution to this problem. But others problems faced are large amount of data of agents, total number of outbound calls to be made; dedicated person is required for each phone call etc.

The SMS feature is collaborated in order to send SMS's after we get the missed call response, which has been captured. Based on the number different details can be fetched and there after the SMS is triggered as per the requirement or desire. In case we want to trigger a SMS to multiple people at a time we can do this by integrating the bulk SMS feature so a single dedicated SMS will be go to all those required set of people.

2.3 CURRENT MARKET SURVEY:

The following market survey is based on Chennai, Bangalore and Delhi. "Missed calls can be used to verify a lead, to gauge customer response, mobile number verification, voting services and surveys," says Aniketh Jain, CEO of Solutions Infini, a Bangalore-based firm which provides a variety of missed call and SMS services.

Industry wise, branding for retail is the largest user of these services with the banking sector following closely. Branding and retail firms try to measure response to their ad campaigns through the number of missed calls they get. Besides activities like couponing, surveys, friend referrals and recommendations, it is not uncommon to find reality TV shows asking you to vote for your favorite contestant by simply giving a missed call.

In banking, you can give a missed call to get your bank balance or to give feedback regarding call center support, among others. ICICI, Bank of India, Corporation bank and Syndicate Bank are some of the clients of these firms.

Interestingly, missed calls score over SMS's, that other mobile tool employed by marketers. "When we launched our company at the end of 2009, all customers I spoke to resisted the idea of missed calls. And today, missed calls drive two to fifty times more engagements for businesses than when they use SMS," says Valerie Rozycki Wagoner, founder of Zipdial.

3. METHODOLOGY

Google AppScript:

A scripting language or script language is a programming language that supports scripts, programs written for a special run-time environment that can interpret (rather than compile) and automate the execution of tasks that could alternatively be executed one-by-one by a human operator. Environments that can be automated through scripting include software applications, web pages within a web browser, the shells of operating systems (OS), and embedded systems. A scripting language can be viewed as a domain-specific language for a particular environment; in the case of scripting an application, this is also known as an extension language. Scripting languages are also sometimes referred to as very high-level programming languages, as they operate at a high level of abstraction, or as control languages, particularly for job control languages on mainframes.

Google Apps Script is a cloud based scripting language for light-weight application development in the Google Apps platform. It is based on JavaScript with some portions of 1.7 and 1.8 and provides subset of ECMAScript 5 API however instead of running on the client, it gets executed in the Google Cloud. According to Google, Google Apps Script "provides easy ways to automate tasks across Google products and third party services.

Benefits:

1. Based on JavaScript. Easy to learn.
2. Under the hood, Google Apps Script uses the Google Web Toolkit (GWT) to create and display user interface elements. GWT is easy to learn, and completely abstracts the complexity of AJAX/HTML from the developer.
3. Cloud based debugger for debugging App Scripts in the web browser.
4. It can be used to create simple tools for an organization's internal consumption.
5. It can be used to perform simple system administration tasks.
6. Community-based support model.

Google Drive:

Google Drive is a file storage and synchronization service provided by Google, released on April 24, 2012, which enables user cloud storage, file sharing and collaborative editing. Rumors about Google Drive began circulating as early as March 2006. Files shared publicly on Google Drive can be searched with web search engines. As of November 2013, Google Drive had 120 million active users.

Google Drive is the home of Google Docs, an office suite of productivity applications that offer collaborative editing on documents, spreadsheets, presentations, and more.

Storage:

Google offers all users an initial 15 GB of online storage space, that is shared across three of its most-used services: Google Drive, Gmail, and Google+ Photos (aka Picasa Web Albums). Users can upgrade their free 15 GB account through a paid monthly subscription plan to get additional storage. Documents using Google Docs native formats (Including .gdoc, .gslides, and gsheets) do not count towards this quota. In Google+ Photos, photos of resolution less than 2048 quota.

Operating Environment:

Proposed system can work for any organization and can be easily customized as per the organizations needs. The sectors, which can be focused on, are:

- Lead Generation.
- Voting.
- Telephonic Banking.
- Feedback.
- Interviews.
- Surveys.
- Promotions.
- Event Notifications/ Reminders.
- Support/ Sales.
- Campaigning.
- Entertainment and Reality shows.
- Anonymous Access.
- Educational Institute's like School's / College's.
- COD Verification.

The database is stored on the cloud. So, therefore, even if the system crashes, the data remains intact. It is easily available and is accessible s and when required. It is stored on the Google Spreadsheet, so Google account is mandatory to have. It can perform all its actions on any browser. Any phone can be used to provide a missed call it could be asmart phone, dumb phone or even a landline will work.

Design and Implementation Constraints:

- General Constraints:
 - It is supported by all the Operating Systems like WINDOWS, MAC, LINUX, ANDROID and CHROME OS.
 - Mobile support is for ANDROID, IOS, FIEFOX, WINDOWS PHONE 8 onwards, Operating System.
 - It is not restricted to any specific kind of industry.
- Time Constraints:
 - Project is limited with the time period of 6 months.
- Scale Constraints:
 - It is restricted to small to medium scale industry but can also support large scale industry.

4. EXPERIMENTAL DATA AND RESULT

Experimental Data and Result comprises of the overall functioning, which includes Input, the process and its respective output.

All the inputs to the current system are generated through a phone device that could be a landline phone, smart phone, dumb phone or a tablet. The response is generated by giving a missed call on a virtual number. The response is captured dynamically into a spreadsheet.

With its Time stamp that is date and time incorporated with the sender's phone number. All the data there by comes into the spreadsheet automatically at run-time without any human intervention.

Session includes the data of the current or on going call. Session is basically used to track the on going call data in order to keep a track of the current call details. Current call details consist of the mobile number's of the people either to whom the response is generated or the numbers of people who are currently talking to each other.

Process is the background actions that are been taken in order to receive some desired action. For e.g. Consider the following sub product of Missed2 Call. We need to fetch in the details of the student and fetch a free teacher of a specific department and there by then patch the call of teacher with that particular student.

In Missed2SMS the background processes that take place, when the response of a student is generated, we need to check whether the student's number in they're maintained in the student's list or the spreadsheet. If yes, then check the current date and day; fetch the department and that particular work sheet. Fetch the desired details from the spreadsheet and pass it using the url to the Exotel flow and there by the response in for of SMS is sent to the student. If the details of student were not present then we would stop the process.

In Missed2 IVR [5] [6] [7], the process is that as soon as the missed call is generated then a back call is given to the interested candidate. IVR system is connected and various questions are fired one by one and their response is saved one after the other. All the details, which are given in response to the questions are saved in the spreadsheet automatically and there by pragmatically by using filter we have short listed student on basis of say work experience and two list are generated say eligible candidates and non-eligible candidates. We also send an SMS and email to both the criteria of students that works as an acknowledgment. SMS consist of the hall ticket number, which are generated automatically at run-time and sent to eligible candidates.

Missed2Voice SMS the main idea behind this is to notify students with the current notices, events or news related to current affairs if any, Student provides a missed call. Their response gets generated and they're by depending on their respective department they are interested in their response as per pre-recorded voice SMS is been sent to the student. Or we can say they are able to hear that specific response.

The output of this particular system means that, a particular response to a specific requirement, which is generated. In Missed2 Call the student and teacher's conversation takes place. Call the details are jotted dynamically at run time which includes the recording url where in we can hear the entire conversation between them. The time stamp including the date and time. The other details include student's mobile number, teacher's mobile number and they're by the specific department.

In Missed2SMS we have the SMS log which includes student's details that is student is authenticate or not, their department the time table of the specific department and that particular day's time-table. A bulk SMS option is also present in order to send the SMS's.

In Missed2Voice SMS, after the missed call response is generated we need to give a back call, which is connected to the IVR system. Select in that particular department and they're by about which department and of which specific event.

Missed2 IVR we have a mini-interviewing system, which does the first level filtering. We also have a hall ticket generation, which generates a hall ticket and sends it to the eligible candidates in the form of SMS and email.

5. CONCLUSION:

We have concluded that we can have multiple uses of just a missed cost. It is cost effective, no methodology as per customer point of view. We can have their use in Lead Generation, Voting, Telephonic Banking, Feedback, Interviews, Surveys, Promotions, Event Notifications/ Reminders, Support/ Sales, Campaigning, Entertainment and Reality shows, Anonymous Access, Educational Institute's like School's / College's, COD Verification. You just name a sector and we can use it. There are multiple ways in which we can have a missed call used in different manner and can derive various results on it by analyzing its result. We can use a simple missed call and can give it different meaning to it. With the outward of new era and cloud telephony we can take this technology to a different level and there by acquired the desired result.

REFERENCES

- [1] (2011) Public Switched Telephone Network - Wikipedia, the free encyclopedia [Online]. Available: <http://en.wikipedia.org/wiki/Pstn>
- [2] Li Dongjin, Marketing Dept., Nankai Univ., Tianjin, China, Ma Yunfei ; Du Liting "The value of positive information: Calling back consumers missing a purchase", Service Systems and Service Management (ICSSSM), 2011 8th International Conference
- [3] Nurhalim, I. Sch. of Electr. & Inf. Eng., Inst. Teknol. Bandung, Bandung, Indonesia Gunawan, D. , "PSTN VoIP Application Support System Design using mobile Short Message Service (SMS): Case Study of PSTN VoIP Missed Call Notification to mobile phone by SMS ", Electrical Engineering and Informatics (ICEEI), 2011 International Conference
- [4] Morita, K. ; Dept. of Adv. Inf. Technol., Kyushu Univ., Fukuoka, Japan , "Platform for Pushing the Device-Oriented Information into a Cloud", Applications and the Internet (SAINT), 2011 IEEE/IPSJ 11th International Symposium
- [5] Soujanya, M. ; Dept. of Comput. Sci. Eng., Int. Inst. of Inf. Technol., Bhubaneswar, India; Kumar, S. "Personalized IVR system in contact center" Electronics and Information Engineering (ICEIE), 2010 International Conference On (Volume:1)
- [6] Ndwe, T.J. ; Dept. of Electr. Eng., Univ. of Cape Town, Cape Town, South Africa ; Dlodlo, M. ; Nichols, J. "Comparison of touch and speech-enabled IVR systems in low literacy users", User Science and Engineering (i-USer), 2010 International Conference
- [7] Chang-Xing Qi ; Sch. of Software, Shenyang Normal Univ., Shenyang, China ; Qing-Dong Du " A Smart IVR System Based on Application Gateways", Hybrid Intelligent Systems, 2009. HIS '09. Ninth International Conference on (Volume: 3)

Two stage Multimodal Authentication

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ABSTRACT

In this paper we have proposed a concept of watermarking. Biometrics is used for giving security. And biometrics is further made secure by watermarking concept. Face of an individual is watermarked in his fingerprint and a token is generated. That watermark is compared with the host watermark, if it is correct then validation is performed and authentication is given to the user for further usage. For watermarking inner outer clip concept is used and for image comparison byte array conversion is used. In inner outer clip concept, we are merging face and fingerprint to one another to make a watermark, which is further saved in the database to be compared with the host watermark.

KEYWORDS: Watermarking, Inner Outer Clip, Grayscale Conversion, Byte array

INTRODUCTION

Biometric Security is very needful concept today in every field. To provide authenticity biometric security is widely used. Without biometrics we cannot imagine security today. Because passwords are easily hacked by hackers, id is also hacked by hackers, so in that case we need a system which provides top most security. And the solution is biometric security.

Along with the widespread applications of biometric based authentication technique, insuring the security and authenticity of biometric data is becoming increasingly critical. *Template protection* is a classical countermeasure to this problem. Inherited from conventional cryptographic tools, it mainly transforms the extracted biometric features into secret domain and effectually guarantees their security by the secrecy of transformation function or secret keys. However, in some scenarios, especially when human interaction is required, the biometric data have to be kept in explicit form rather than encrypted templates, such as: face images on smart cards, fingerprint images retained as legal evidences. Under these conditions, digital watermarking turns out to be an appropriate solution. Hidden within digital content imperceptibly, the watermark could serve as forensic token throughout the chain-of custody.

Biometrics is the things which individually identify a person and differentiate him/her from crowd. It is the only thing which cannot be hacked. This is why we have chosen a paper on biometric security. In this paper we are increasing biometric security by adding a concept of watermarking. We are making watermark of biometrics and that watermark is a key of token for every user. If watermark is valid then only authentication is done else not.

For making watermark we have chosen concept of inner and outer clip image merging. Face and fingerprint is taken in inner and outer clips and merged together to generate watermark. And reverse process is applied again to access the information of that watermark. To compare the

watermarks we have used the concept of byte array comparison. The images are first converted into byte array and then byte array comparison is done to check validation of images.

LITERATURE REVIEW

According to other papers we have seen comparison algorithms are also available there. But all those algorithms and concepts are too much technical and complicated. For face detection there are PCA based Eigen face coefficients [1], Gabor filter based recognition [2]. For watermarking there are various methods like DWT based watermarking and SDPQ based watermarking.

We have used Inner Outer Clip merging for generating watermarks and byte arrays for image comparisons.

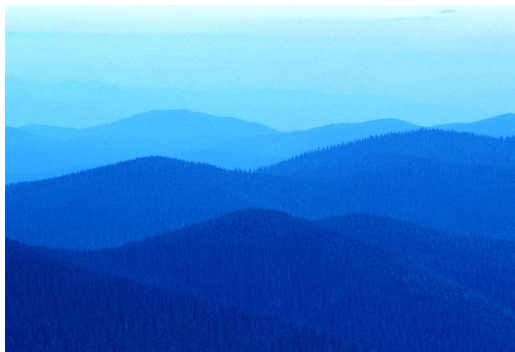
METHODOLOGY

Three methodologies are used for this project.

1. Grayscale conversion
2. Inner outer clip concepts for image merging
3. Byte array conversion
4. Image comparison

5.1 GRAYSCALE CONVERSION:

Image processing cannot be done neatly with RGB images. For image processing we need grayscale conversion. For this purpose we have used grayscale conversion algorithms. It is the very first stage of our project. After onwards other processes are done. Gray Out function is used which takes Buffered Image and converts it to gray for further processing.



5.2 INNER OUTER CLIP CONCEPT FOR IMAGE MERGING:

For image merging or for watermarking we have used inner outer clips. Face and fingerprint data is taken into inner and outer clips and thus watermark is made.



5.3 BYTE ARRAY CONVERSION :

Image comparison is the main task of the project. To compare images there are various methods given. But we are using array concept for image comparison. So images are then converted in byte array.

Where each image has different byte array, which is very large. These byte arrays are then stored in character arrays for further conversions.

5.4 IMAGE COMPARISON:

To compare images we have again converted byte array to character array and compared them. Because byte array is very large and which needs to be taken in a character array to be compared with one another. Hence we have chosen to store byte array into character arrays and then compare them.

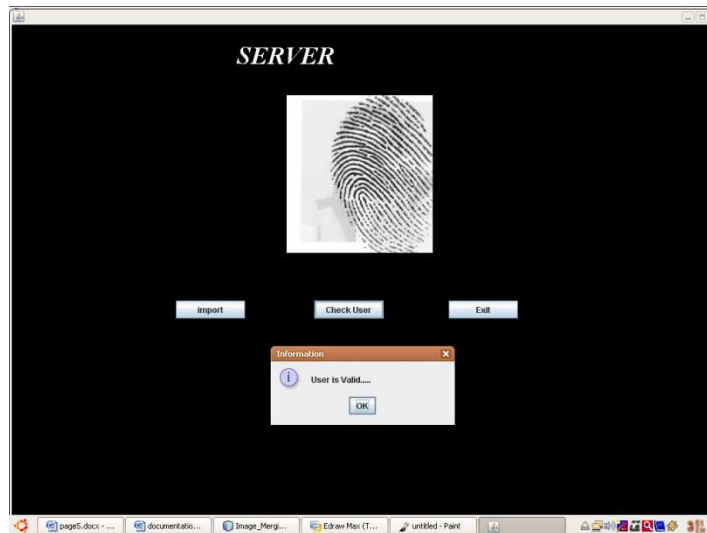
EXPRIMENTAL DATA AND RESULT

A. EXPRIMENTAL DATA

Images are first converted to grayscale without which image comparison cannot be done. In results we have seen that the images which are already in grey color are also undergone through the grayscale conversion. Because RGB images are more in size as well as color identification is also difficult. So we have taken grey images for image comparison[4]

Since the base of the paper is watermarking[5], fingerprints without watermark are not accepted for validation. If face is watermarked in fingerprint, then only user validation will be done. Watermarked images and non watermarked images are compared, and only watermarked images are accepted.

Images are converted to byte array. To compare two byte arrays they are further converted to char array and then they are compared. Because two byte arrays are not always same. Hence character arrays are used for further comparison.

B. RESULT:**CONCLUSION**

In this paper, we have proposed a watermarking based authentication framework to enhance biometric security. It is theoretically appropriate for any biometric trait(s), and the two stage strategy could be modified flexibly according to the practical requirements. The employment of face detector and SRC classifier offers a novel perspective of combining powerful pattern recognition tools with watermarking as promising intersections. But we don't have tools so we have used database for images. Meanwhile, byte array comparison is used for comparing images.

REFERENCES

- [1] Wie-Hung Lin, Yuh Rau Wang, Shi Jinn Horng, Tong-Wann Kao, Yi Pan "A blind watermarking method using maximum wavelet coefficient quantization", 2009
- [2] Tudor BARBU, "Gabor Filter Based Face recognition Technique", 2010
- [3] J. Abernethy, O. Chapelle, and C. Castillo, "Webspam identification through content and hyperlinks," in Proc. Fourth Int. Workshop on Adversarial Information Retrieval on the Web (AIRWeb), Beijing, China, 2008, pp. 41–44.
- [4] [Melen, R.](#) ; Univ. di Milano Bicocca, Milan ; [Pignolo, M.](#) ; [Sioli, M.](#), "A Multimodal Authentication System for Authorizing the Access to NGN Services", Networking and Services, 2006. ICNS '06. International conference
- [5] [loi-Tun Lam](#) ; Dept. of Comput. & Inf. Sci., Univ. of Macau, Macau, China ; [Chi-Man Pun](#), "Embedding biometric watermark on document image using discrete wavelet transform ", Information and Automation, 2009. ICIA '09. International Conference

Automated Identification of White Blood Cell

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ABSTRACT

Evaluation of blood smear is a commonly clinical test these days. Most of the time, the hematologists are interested on white blood cells (WBCs) only. Digital image processing techniques can help them in their analysis and diagnosis. For example, disease like acute leukemia is detected based on the amount and condition of the WBC. The main objective of this paper is to segment the WBC to its two dominant elements: nucleus and cytoplasm. The segmentation is conducted using a proposed segmentation framework that consists of an integration of several digital image processing algorithms.

KEYWORDS: White blood cell segmentation, Active contours, Snake algorithm, Zack thresholding

INTRODUCTION

In traditional terms, blood cell analysis i.e. complete blood cell count (CBC) is done as a “convention”. In which it measures the red blood cells, white blood cells usually assesses the size and shape of red blood cells as per old delayed procedures. Today in this busy hectic schedule; pathologists need some help in terms of software for blood cell analysis. Thus, the idea of our project is to serve the pathologists, medical technicians for the same, by using Image Processing techniques. It is a novel use of Image Processing, as we take clean and properly stained blood cell sample image for our software, to assist the pathologists and medical technicians.

White blood cells play a role in reducing inflammation in the body. A high white blood cell count could mean that there is inflammation somewhere in the body, such as can occur in the gastrointestinal tract of people who have inflammatory bowel disease (IBD). The white blood cell (WBC) count is also sometimes known as a leukocyte count or white count. A WBC count is typically done along with another common blood test, the complete blood cell count (CBC). A WBC count is the number of white blood cells per volume of blood, and is reported in either thousands in a micro liter or millions in a liter of blood.

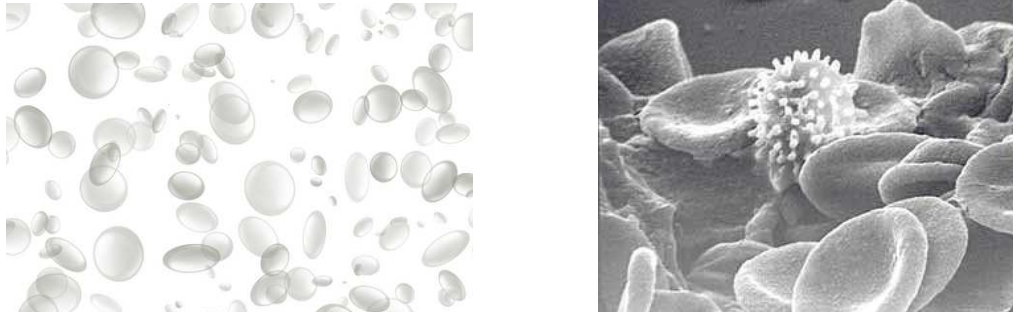


Fig .1.1 White Blood Cell

White blood cells play a role in reducing inflammation in the body. A high white blood cell count could mean that there is inflammation somewhere in the body, such as can occur in the gastrointestinal tract of people who have inflammatory bowel disease (IBD). The white blood cell (WBC) count is also sometimes known as a leukocyte count or white count. A WBC count is typically done along with another common blood test, the complete blood cell count (CBC). A WBC count is the number of white blood cells per volume of blood, and is reported in either thousands in a micro liter or millions in a liter of blood.

White blood cells (WBC) or leukocytes play a significant role in the diagnosis of different diseases, and therefore, extracting information about that is valuable for hematologists. In the past, digital image processing techniques have helped to analyze the cells that lead to more accurate, standard, and remote disease diagnosis systems. However, there are a few complications in extracting the data from WBC due to wide variation of cells in shape, size, edge, and position. Moreover, since illumination is imbalanced, the image contrast between cell boundaries and the background varies depending on the condition during the capturing process.

This study is focusing on WBC segmentation using L2 microscopic images. The goal is to segment the WBC nucleuses and cytoplasm using a framework that has been developed using digital image processing. The use of image processing techniques have developed rapidly in the last few years, to the point where hematologists can use blood images to automatically process blood slides for the first screening in detecting diseases. These techniques can help to find cell counts in human blood automatically.

Several researchers have previously proposed features to differentiate leukocyte (white blood cells) cells. In this paper, we have proposed an automated segmentation, identification of Leukocytes (White Blood Cells) namely, lymphocyte, monocyte and neutrophil in light microscopic images based on histogram equalization, threshoding and edge detection algorithms. The experimental results are compared with the manual results obtained by pathologist. The proposed method is more reliable and computationally less expensive.

LITERATURE REVIEW

Automatic recognition of white blood cells in light microscopic images usually consists of four major steps, including: preprocessing, image segmentation, feature extraction and classification. The pre-processing stage usually includes image enhancement of acquired image

and is essentially performed in order to prepare the image for the vital segmentation stage. Individual objects of interest are separated from the background in the segmentation process. This is followed by a labeling operation (post-processing) in which, segmented objects of interest are tagged with unique labels that can be used to count the number of objects in the image. These labels along with spatial information of the segmented objects are used for the subsequent feature extraction procedure. The geometrical features are used to identify and classify the leukocyte cells, namely, lymphocyte, monocyte and neutrophil[2]. In past decades it is observed that traditional used Manual Method and Rack Analyzer Method developed calculating the White Blood Cell. The most economical and quick solution in this case is to provide Digital Image processing. [3][4][5][6][7].

METHODOLOGY

There are two methods for testing of blood sample:

- Manual Method
- Rack analyzer Method

5.5 MANUAL METHOD:

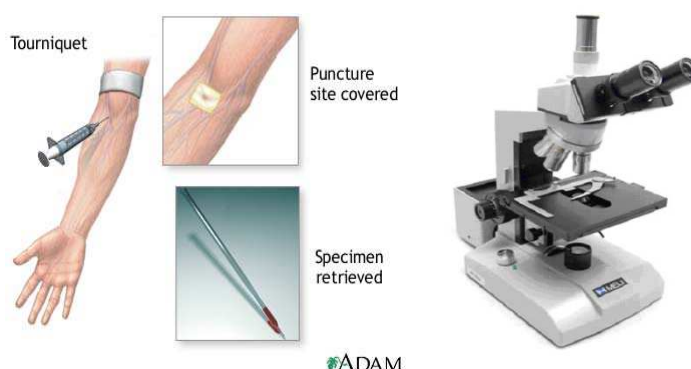


Fig. 3.1.1 Manual method

A Count Blood Cell [CBC] is one of the most commonly performed blood tests. It measures the red blood cells, white blood cells. Red blood cells carry oxygen from the lungs to the tissues and take carbon dioxide away. White bloods cells help fight infections. In addition to determining the number of blood cells, the percentage of each type of white blood cell and the content of hemoglobin (an oxygen-carrying protein in red blood cells) is found. The CBC usually assesses the size and shape of red blood cells.

A test to measure red blood cells (hemoglobin or hematocrit) can be done by a nurse, medical technician or phlebotomist who cleans your fingertip and then makes a simple prick with a small lancet. A blood sample is drawn into a tube. A blood sample for a CBC is taken from a vein, usually in your forearm. The puncture site is cleaned with an antiseptic, and a tourniquet (an elastic band)

This causes the vein below the tourniquet to fill with blood. A needle is inserted into the vein, and the blood is collected in a vial or syringe. During the procedure, the tourniquet is

removed to restore circulation. Once the blood has been collected, the needle is removed, and the puncture site is covered to stop further bleeding. When a blood test is done on an infant or child, a small amount of blood can be taken from the finger or earlobe. But many pathologists and medical technicians strongly need the assistance of a software system by which, clean and properly stained blood cell sample image can be processed and approximate results can be drawn.

5.6 RACK ANALYZER METHOD:

In Rack Analyzer method, a well shaken sample of blood is taken in the test tube. It is then mixed with some chemical. The sample is given to the machine; it is absorbed by the sensors in the machine. Then after further processing on the sample result is displayed on the screen. The result which is displayed by an automated method is also accurate but it takes comparatively more time than our proposed system. Also, it is totally hardware dependant. Since more hardware is involved, the cost of this system is also more than the other two systems. So, it is costly and somewhat difficult to handle.

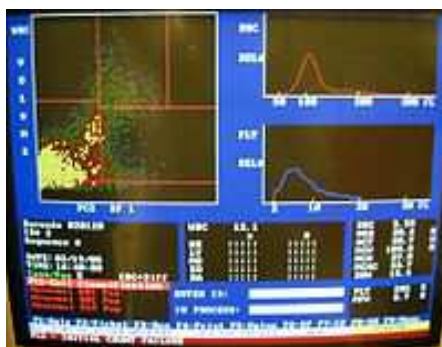


Fig.3.2.1 Rack Analyzer

The blood is well mixed (though not shaken) and placed on a rack analyzer. This instrument has many different components to analyze different elements in the blood. The cell counting component counts the numbers and types of different cells within the blood. The results are printed out or sent to a computer for review.

Blood counting machines aspirate a very small amount of the specimen through narrow tubing. Within this tubing, there are sensors that count the number of cells going through it, and can identify the type of cell, this is flow cytometry. The two main sensors used are light detectors, and electrical impedance. One way the instrument can tell what type of blood cell is present is by size. Other instruments measure different characteristics of the cells to categorize them. Because an automated cell counter samples and counts so many cells, the results are very precise. However, certain abnormal cells in the blood may be identified incorrectly, and require manual review of the instrument's results and identifying any abnormal cells the instrument could not categorize.

In addition to counting, measuring and analyzing red blood cells, white blood cells and platelets, automated hematology analyzers also measure the amount of hemoglobin in the blood and within each red blood cell. This information can be very helpful to a physician who, for example, is trying to identify the cause of a patient's anemia.

If the red cells are smaller or larger than normal, or if there's a lot of variation in the size of the red cells, this data can help guide the direction of further testing and expedite the diagnostic process so patients can get the treatment they need quickly.

3.3 GUI AND IMAGE ANALYSIS:

A clean and properly stained blood cell sample image is processed in the software. Blood cell sample image can be taken through CCD camera. For this first we have to take sample of blood on slide is to taken and its image be captured by using CCD camera under microscope. It uses conventional algorithms to process image of blood sample which is helpful for reading pathologist workload.

Image Processing:

Image processing tasks like Filterization, Threshold, and Edge detection are done according to Image and all views of image processing like contrast, convolution, sharp, Laplace, Emboss, Custom, Histogram, Lookup table, Grayscale, Render, Scaling, Image viewer are generated. Thus any pathologist and medical technician can see the image in different views and in clear Visibility using this software and can find out the approximate count of cells and can recognize diseases from the count cells.

Blood carries out many vital functions as it circulates through the body. It transports oxygen from the lungs to other body tissues and carries away carbon dioxide. It carries nutrients from the digestive system to the cells of the body, and carries away wastes for excretion by the kidneys. Blood helps our body fight off infectious agents and inactivates toxins, stops bleeding through its clotting ability, and regulates our body temperature.

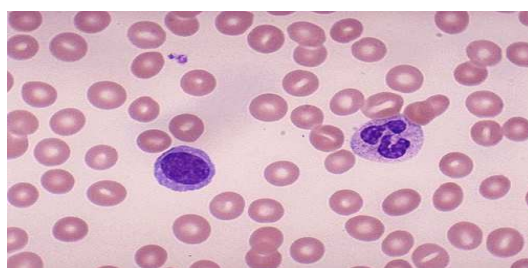


Fig. 3.3.1 Digital Image Processing

Doctors rely on many blood tests to diagnose and monitor diseases. Some tests measure the components of blood itself; others examine substances found in the blood to identify abnormal functioning of various organs. Hence, we here propose a software system which will assist pathologists to detect blood cell count and help to find out the diseases. This information can be very helpful to a physician who, for example, is trying to identify the cause of a patient's diseases.

In blood cell image detection, the task is usually split into two stages; one is image enhancement, for the purpose of reducing noise, and the other is detection of blood cell characteristics. In our proposed stage, image filtering and enhancement is one part of stage and the detection in the later stage. Convolution filtering is often used to reduce the effects of noise in

images or to sharpen the detail in blurred images. Counts are calculated by scanning the image and using Edge Detection Algorithm.

3.4 CANNY EDGE DETECTION:

The Canny edge detection operator was developed by John F. Canny in 1986 and uses a multi-stage algorithm to detect a wide range of edges in images. Most importantly, Canny also produced a computational theory of edge detection explaining why the technique works. The Canny edge detector applied to a color photograph of a steam engine.

In computer vision, the Canny's edge detection is one of the earliest edge detection algorithms which are efficient to count total cell as well as WBC's present in the blood sample image. The blood cell boundaries have been extracted using Canny's edge detection. By using this method, edges occurring in image would not be missed, and there would be no responses to non-edges. Canny's aim was to discover the optimal edge detection algorithm. In this situation, an "optimal" edge detector means:

- Good detection – the algorithm should mark as many real edges in the image as possible.
- Good localization – edges marked should be as close as possible to the edge in the real image.
- Minimal response – a given edge in the image should only be marked once, and where possible, image noise should not create false edges.

3.4.1 GRADIENT VECTOR FLOW SNAKE:

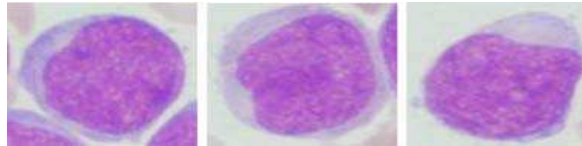
A gradient vector flow (GVF) snake is an extension of the well known method snakes or active contours. The difference between traditional snakes and GVF snakes consists in that the latter converge to boundary concavities and they do not need to be initialized close to the boundary. The process starts by calculating the edge map of the given image, using any edge finding algorithm from the image processing literature. The edge map has three important features relating to snake formation. One, the gradient of this edge map has vectors pointing towards the edges which are a desirable property for snakes. Two, these vectors have large magnitude at the vicinity of the edges. Three, in homogenous regions (regions with little variation in image intensity) on images obtained from the author's websites and also on images obtained by the system. The images contain both binary valued and grayscale images. Canny edge detection algorithm is then performed on the same.

3.4.2 NUCLEUS EXTRACTION:

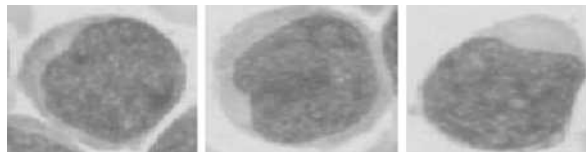
By using previous Snake algorithm it finds the connected boundaries. Nucleus Extraction will select the nucleus & fills the boundaries. Sharp Changes in the images as brightness are very important in the boundary detection. Points in the where brightness changes significantly are often referred to as edges or edge points. In nucleus segmentation, snake algorithm is used which is not related to size and color of nucleoli because there are various shapes of nucleus in a different kind of white blood cells.

So, it gives high accuracy result in segmenting nucleus in any type of WBCs and in any capture illumination that cause different color space in images "A Framework for White Blood Cell Segmentation in Microscopic Blood Images Using Digital Image Processing"

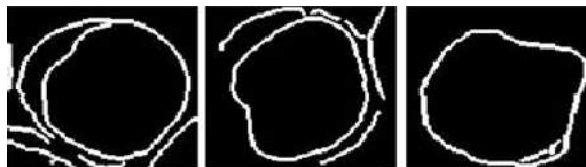
White blood cells (WBC) or leukocytes play a significant role in the diagnosis of different diseases, and therefore, extracting information about that is valuable for hematologists. In the past, digital image processing techniques have helped to analyze the cells that lead to more accurate, standard, and remote disease diagnosis systems. However, there are a few complications in extracting the data from WBC due to wide variation of cells in shape, size, edge, and position. Moreover, since illumination is imbalanced, the image contrast between cell boundaries and the background varies depending on the condition during the capturing process. This study is focusing on WBC segmentation using L2 microscopic images. The goal of WBC segmentation is to separate leucocytes from other different components in blood image. It is a two-part process of WBC segmentation into nucleus and cytoplasm after converting RGB original images to gray scale. All modules in this framework work on gray level images. Step by step implementation of WBC segmentation in microscopic blood images using digital image processing is as shown in figure below.



A. Original WBC sub image



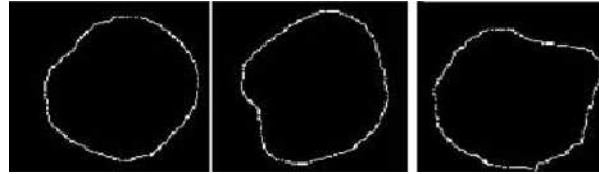
B. Original WBC sub image



C. Canny edge detection



D. GVF Snake



E. Nucleus extraction

Fig.3.4.2.1 (A, B, C, D, E): A Framework for White Blood Cell Segmentation in Microscopic Blood Images Using Digital Image Processing

EXPRIMENTAL DATA AND RESULT

A. EXPERIMENTAL DATA

For the purpose of experimentation, 100 light microscopic images of different types of leukocyte cells (non-overlapping) are considered which are taken from light microscopy. The implementation is done on Intel Pentium III using JCreator 4.0 / Net Beans IDE 6.5.1 and ORACLE 10g. The input of leukocyte cell image is converted into grayscale image and then we perform histogram equalization and the morphological operations are applied. The resulting image is global thresholded to obtain segmented binary image. The segmented image is labeled and for each segmented region (known leukocyte cells), the geometric features are extracted and finally it shows the total count of WBC cells.

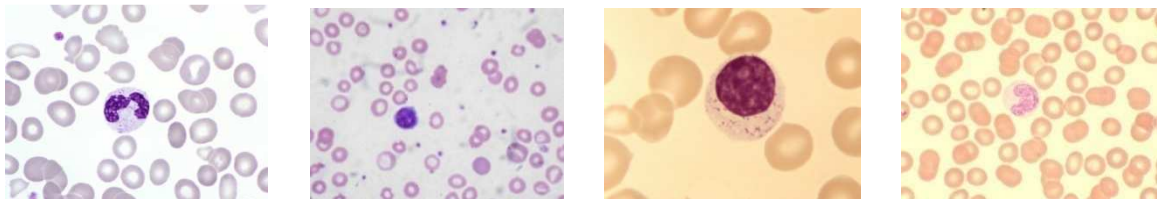
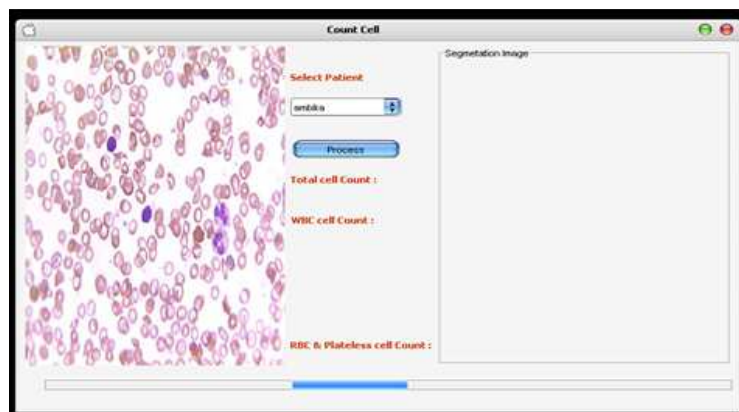
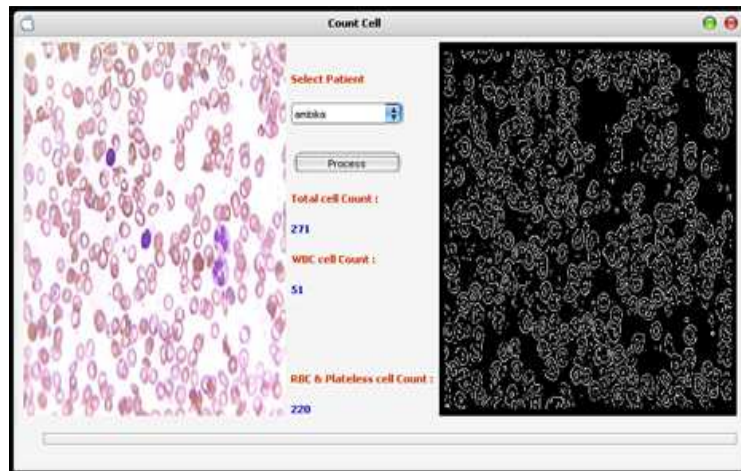


Fig. 4.1 Microscopic images for Input to the system

B. RESULTS





This system is more efficient in reducing the valuable time than manual system. The system is user friendly so that the pathologist can observe the blood cell sample image in different views. Also pathologist can get the result of blood cell test within 20 seconds to 1 min. as tested. Also we have compared lively, the results of our system with existing one in laboratory. And they proved to be correct as guaranteed by the pathologist.

CONCLUSION

As mentioned earlier, the data is highly reliable and cost effective than automated method. The aim of this system is to provide CBC i.e. complete blood Cell Count, which has been achieved by using the Powerful Image processing technique.

This system is more efficient in reducing the valuable time than manual system. The system is user friendly so that the pathologist can observe the blood cell sample image in different views. Also pathologist can get the result of blood cell test within 20 seconds to 1 min. as tested. Also we have compared lively, the results of our system with existing one in laboratory. And they proved to be correct as guaranteed by the pathologist.

REFERENCES

- [1] Mohammad Hamghalam and Ahmad Ayatollahi, "Automatic Counting of Leukocytes in Giemsa-Stained Images of Peripheral Blood smear" IEEE International Conference on Digital Image Processing, pp. 13-16, 2009
- [2] P.S.Hiremath, Parashuram Bannigidad, Sai Geeta, "Automated Identification and Classification of White Blood Cells (Leukocytes) in Digital Microscopic Images" *IJCA Special Issue on "Recent Trends in Image Processing and Pattern Recognition" RTIPPR, 2013*
- [3] P.S. Hiremath and Parashuram Bannigidad , Automatic Classification of Bacterial Cells in Digital Microscopic Images, ICDIP 2010, February 26-28, 2010 Singapore (Accepted)
- [4] http://en.wikipedia.org/wiki/White_blood_cell

- [5] F. Kurugollu, B. Sankur. A. E. Harmanci, "Color Image Segmentation using histogram multithresholding and fusion," Image and Vision computing 19, pp. 915-928, 2001
- [6] Sawsan F. Bikhel, Ahmed M. Darwish Hany A. Tolba, and Samir I. Shaheen, "Segmentation and Classification of White Blood Cells " IEEE pp. 2259-2261, 2000
- [7] Vincenzo Piuri, Fabio Scotti. Morphological Classification of Blood Leukocytes by Microscope images, 2004. IEEE
International conference on computational Intelligence for Measurement Systems and Applications Boston. MD, USA, 14-16 July 2004
- [8] [Java Swing](#) by Robert Eckstein (O'Reilly)
- [9] [Java, The Complete Reference](#) by Patrick Naughton, Herbert Schildt (Osborne/McGraw-Hill)
- [10] Digital Image Processing 3rd Edition (DIP/3e) by Gonzalez and Woods (Prentice Hall)
- [11] [The Java AWT Reference](#) by John Zukowski (O'Reilly & Associates, Inc.)

Development over Google Apps for Lead Aggregation (Business to Business Application)

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ABSTRACT:

Lead Aggregator is a UMS Tech Labs Software Product which add valuable business leads in a clean uncluttered interface automatically without any kind of human interference.

The system can currently collect data from Phone calls, Emails, Missed calls, Website API's. It can handle large amount of data. The system can read email attachments using email crawler program. All the data from these multiple sources is dumped in a Google Spreadsheet, where these leads are evenly assigned to CSR's present at that particular day. The CSR can entertain the customer's query at his convenience.

The plus point of this system is that, it can be integrated with other various software products which work on SaaS model of cloud computing.

IndexTerm- Google Apps Platform, Cloud Computing, Google Spreadsheets, Web Services, Website API's, Real Time Responses, E-mail Crawler, Template Identification, CRM API.

Introduction

In proposed software i.e. Lead Aggregation System adds valuable business leads in a clean uncluttered interface. The system collect data (leads) from Phone calls, Emails, Missed calls, Website API's. The system can read email attachments using email crawler program. All the data from these multiple sources is dumped in a Google Spreadsheet, where these leads are evenly assigned to CSR's present at that particular day. The CSR can entertain the customer's query at his convenience.

What is Lead Aggregation?

Lead aggregation is the business of collecting leads for the purpose of selling them to another business for their sales team to call and convert to a sale. A lead aggregation system is the infrastructure or framework that helps you generate sales ready leads.

Lead aggregation is a way to gather a large number of leads at one time in one place. These leads are then followed up on or sold to others to use for their sales and marketing needs. The development of new technology and tools in the marketing sphere has changed the way lead aggregation is done and how efficiently it can be accomplished.

Why use Lead Aggregation?

Lead Aggregation is an easy to use system that aggregates leads from multiple sources such as Phone calls, Emails, Missed calls, Website API's into a unified Google Spreadsheet. Aggregated leads are assigned to available CSR's automatically. Lead Aggregation System takes care of not calling same customer twice.

How does it work?

Lead Aggregation System adds valuable business leads in a clean uncluttered interface. It can currently collect data from Phone calls, Emails, Missed calls, Website API's. The system can read email attachments using email crawler program. All the data from these multiple sources is dumped in a Google Spreadsheet, where these leads are evenly assigned to CSR's present at that particular day. The CSR can entertain the customer's query at his convenience. Rest assured, with the help of Lead Aggregation System you will "Never miss a single lead" in your business.

1. Objectives:

The main objective behind the proposed system is to organize leads efficiently. The objective of the proposed system.

- Provide easy software interface to the customer.
- Help customer to optimize the use of resources in terms of manpower and time.

2. Scope of the Project:

- Car Dealership.
- Online Shopping.
- Real Estate.

3. System Architecture:

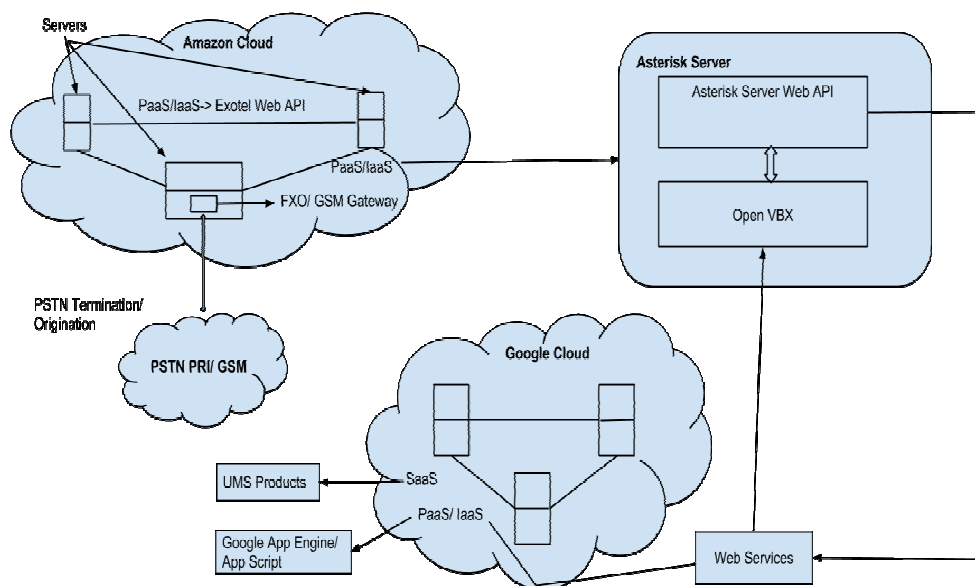
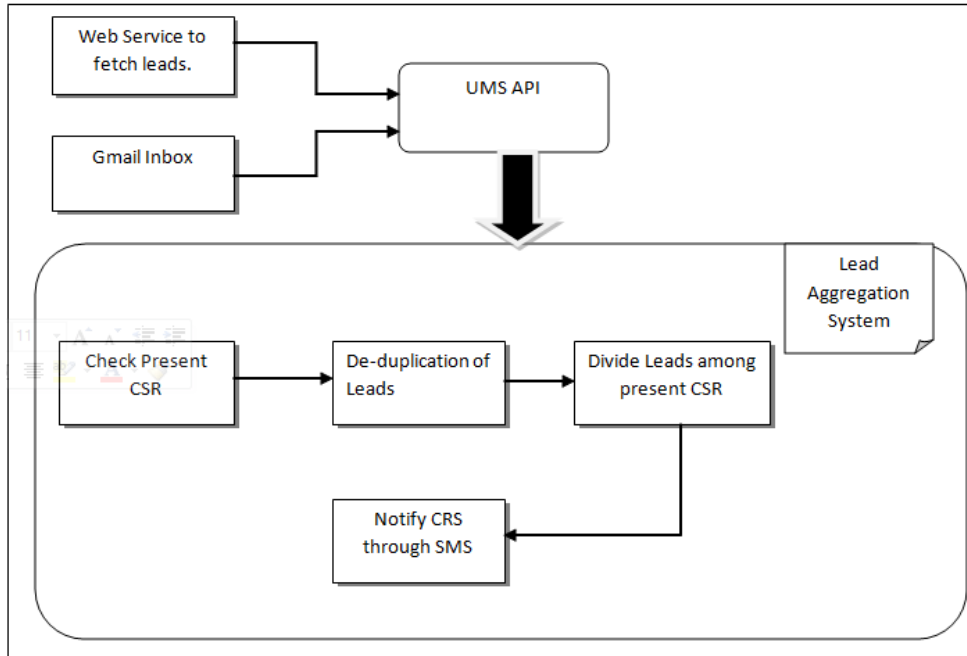


Fig.1 : Cloud Architecture

Proposed System:**Implementation Details:**

- Develop a system to aggregate business leads into a easy to use Google spreadsheet.
- Setting up Asterisk server and programming on AGI (Asterisk Gateway Interface) and controlling Dialplan.
- Develop Web Services for fetching the leads from email, 3rd party API's.
- Develop email crawlers and read lead data which come as an email from Justdial, Gaadi, Carwale, Cardekho.
- Develop passthru/web services for reading telephonic leads.
- Reading of lead data from an incoming SMS.
- Developing web service on Google for fetching the leads from Exotel (Cloud Telephony).
- Develop SMS Web Services for sending SMS to customer and sales-person.
- Developing web services that can talk to web APIs of Google being able to store data in real time on to a Google Spreadsheet.
- Assignment of leads to Sales Representatives.
- Distributing leads to available Agents with SMS notification.
- De-duplication of leads.
- Handling agent's attendance.
- Transfer of leads to CSR history once the call is done.
- Calling Exotel SMS API (built on Exotel), to send SMS to customer/salesperson.
- Using Gmail APIs to send emails to customer: After leads are generated successfully.
- Generate analytics on leads in real time.

Lead Aggregation System Features:

1. Completely Cloud Based System - Lead Aggregation System is a completely cloud based System which brings all the goodies of cloud computing such as
 - a) All your data is on the cloud, which means data can be accessed from anywhere irrespective of device or location.
2. Customized template for each customer - Every single customer is special, that's why we provide customized template for each customer.
3. Automatically add leads by reading emails and attachments - Our email crawler program can read your email and its attachments to add leads automatically.
4. Ease to contact your customer - Easily contact the inquiring customer via call,sms or email.
5. Analytics on leads - The System can generate statistics on leads for the purpose of analysis.
6. Interface is very easy, even a non-techie person can use the product - The interface of the System is very easy to use, because it uses Google's Spreadsheet.
7. Toll Free Number Not Required: This System can also add leads from missed calls from customers which minimize the need for costly toll free number. You can arrange a call back when it is convenient for both Customer Service Representatives (CSRs) and customer.
8. Attendance Tracking: By tracking CSR attendance, the System assures that leads do not get distributed to Absent CSRs.
9. Auto Distribution: All data automatically distributed among multiple CSRs. No manual intervention required.
10. Avoid Customer frustration: The customer can evade waiting for long waiting tones and dreary IVRs by using the missed call feature. If the same customer contacts you using multiple media, it doesn't mean the lead gets contacted multiple times.
11. Multiple incoming source: Lead data come from multiple source such as Emails, Website APIs, Calls, Missed Calls are all integrated and then de-duplicated into one common system.

CONCLUSION:

In this paper, we have presented a system to aggregate leads from various sources. The system exploits Google Cloud Services/ Products. Moreover, the flexibility of the system in terms of aggregating lead is enhanced through the Google cloud. This work is the first step of a wider project. The work results have pointed out some feature enhancements that can be done in the project such as using RegEx to design a new email crawler. The use of Google Spreadsheet as a database has encouraged its customers to use the software.

REFERENCES

- [1] Smutny, P. ; Dept. of Control Syst. & Instrum., VSB - Tech. Univ. of Ostrava, Ostrava, Czech Republic, "Mobile development tools and cross-platform solutions", Carpathian Control Conference (ICCC), 2012 13th International
- [2] Yadav, S.S. ; Sch. of Inf. Sci. & Technol., Xiamen Univ., Xiamen, China ; Zeng Wen Hua, "CLOUD: A computing infrastructure on demand", Computer Engineering and Technology (ICCET), 2010 2nd International Conference on (Volume:1)

Quantum Computing: New Edge Computing

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ABSTRACT:

A promising technology in today's world is "quantum computers". The revolutionary changes that are to be brought into the field of computing is getting scientists interested in it because of the performances enhancement it could bring to the today's computing world. The massive amount of processing power in today's world is lacking to meet the demand for higher speed and computing capacity. Quantum computers require quantum logic. This is fundamentally distinct from classical Boolean logic. This differentiation leads to a greater effectiveness and speed of quantum computation over its classical counterpart.

Dimensions of modern computers shrink as humans require more and more computing power; this can be resolved with the help of Quantum Mechanics. Using those laws one can harness the most out of the possibilities offered by nature. Quantum computers will utilize the strange rules of quantum mechanics to process information in ways that are impossible on a standard computer.

KEYWORDS: Computational primitive, Distributed computing, Global view, One-way quantum computing model, Input-output algorithm, Concurrency, Abstraction.

Introduction:

Quantum computation is a field of research that is rapidly acquiring a place as a noteworthy topic in computer science. To be sure, there still are essential technological and conceptual problems to overcome in building functional quantum computers. Only few small scale quantum computers have been built to date, but quantum computers in principal outperform today's traditional computers in significant ways. Much of the theoretical work is aimed at using the new tools available for algorithmic effectiveness. These are given by superpositions, which lie at the basis of quantum parallelism, entanglement, which allows for reaching all superposition terms through correlations despite measurement collapse, and the linearity of quantum operations. However, the fact that quantum computations are currently described at a very low level only comparable to classical computing 70 years ago is a much less explored aspect of the scope. In its current state, quantum computation can barely cope with a limited number of secluded, handcrafted algorithms. Their authors use their intimate knowledge of the aforementioned quantum phenomena to leapfrog the abstraction levels between the physical and the conceptual world that we are used to in classical computation. Turing machines predate classical computers; the analogue is true for quantum computers. Classical programming paradigms were developed as computer technology was introduced.

Programming languages have turned out to be very useful with respect to classical computation, as they help to theoretical problems. Therefore, one expects them to be similarly

advantageous for quantum computing. In computer science the idea of developing and evolving programming languages through formal models is of considerable importance. They are an essential tool for language designers, compiler writers and programmers, and also provide a basis for formal analysis and mathematical proofs of the correctness of programs. The necessity of analogous developments for quantum computation is often negatively reviewed on the basis that physical implementations of quantum computers are still very limited. While it is clear that quantum devices will also need to be programmed in high level, expressive programming languages, until recently the attitude has been that it is rather premature to design them now.

Literature Review:

The main focus here is given to clarify the nature and character of energy and matter on the level of quantum. There is a lot of development in the quantum computing from the last billion fold area in increasing the capacity of quantum computer in the similar way how the development from abacus to today's super computer.

Quantum computing can be understood by learning the quantum laws of physics by which so much of processing power is achieved and the capacity will be developed to several states and these will together helps in executing the tasks in terms of parallel feasible combinations. Quantum information processing (QIP) uses qubits as its primitive information units. QIP has many facets, from quantum simulation, to cryptography, to quantum computation. A quantum-mechanical object with two energy levels at its disposal can occupy either of those two levels, but also an arbitrary combination ("superposition") of the two, much like an electron in a two slit experiment can go through both slits at once. This results in infinitely many quantum states that a single quantum bit, or "qubit" can take. Generally quantum computing depends on quantum laws of physics because there are many advantages from the quantum physics atoms and nuclei properties which are definite, as the quantum physics laws and quantum computing are permitted by these properties to work mutually as quantum bits or simply as qubits, to be the processor or memory of a computer. The advantage of qubits is particular calculation are made faster exponentially when compared to the usual computers.

The computations on usual binary characters is not the base for qubits always, because by using the usual computers the information is encoded using the binary characters particularly into bits is encoded into '1' or '0' and also the calculations for only one set of number can only done at a time. But in case of the quantum computers information is encoded into a series of quantum mechanical states like electrons in spin direction or arrangement of photon polarization which can also be represented with '0' or '1', or can also be represented as superposition of many numbers which are not similar and sometimes represented as a number that express the state of qubits represented among '1' or '0' anywhere or may also represented as orientation of both.

Methodology:

Our general approach in this work has been to investigate the power and expressiveness of quantum distributed systems, focusing on these topics by sometimes ignoring others. In this foremost exploration of the distributed quantum computing paradigm, we have indicated a basic set of primitive operations. To build a universal QC is well above the abilities of current technology. However, the principles of quantum information physics can be tested on smaller

devices. Quantum mechanics tells us that directly measuring the status state of a qubit unfailingly destroys the superposition of states in which it exists, forcing it to become either a 0 or 1. Rather than a straightforward measurement, the group compared the spins to see if any new discrepancy arose between them without learning the information itself. This technique gave them the ability to detect and fix errors in a qubit's phase coherence, and thus maintain a higher level of coherence in the quantum system. We have studied these in networks with non flawed processors; it is worthwhile investigating how protocols can achieve their goal if processors do not always work properly or to see if they are malicious. In addition to this, a logical next step would be to use these primitives in higher level development.

Conclusion:

At current stage, quantum computers and quantum information technology remains in its developing stage. At this very moment hindrances are being surmounted that will provide the knowledge needed to thrust quantum computers up to their rightful position as the quickest computational machines in existence. Measurement based models have drawn considerable attention in the quantum computing research community. One of the main reasons for this is that the one way quantum computer suggests new developmental realizations for quantum computers. However, they also provide a clearly stated pattern shift with respect to the quantum circuit model. Entanglement and measurement are foremost class ingredients of those models which adequately steer the computation, whereas quantum circuits focus more on superpositions and linearity. Of course both models are equivalent, but in an investigation of the low level concepts that are at the basis of quantum computation, it is appealing to have a direct grip on those aspects that are indeed quantum.

The two most promising uses for Quantum Computing would be in the fields of Quantum Search and Quantum factoring. Though Quantum Computing is very impressive, it does posses a big threat to Security worldwide as it would be able to break worldwide codes in a much faster span.

References:

- **Quantum Computing**
A Gentle Introduction By Eleanor G. Rieffel and Wolfgang H. Polak
- **Quantum Computers**
Author: Daniel Klöck
Giuliano Benenti (2004). **Principles of Quantum Computation and Information Volume 1**. New Jersey: World Scientific.

Comparison Study For Various Software Testing Tools For Domain Based Used In Software Industry

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ABSTRACT:

This paper will focus on comparison of various characteristics of testing such as performance for domain such as Web based testing, how domains are tested by various tools are studied in this paper. In this paper different performance testing tools are compared in terms of their different performance parameter results on different platforms. Some challenges are discussed for web based testing tools. Web based testing tools are compared in terms of their different performance parameters results in different browsers. Performance parameter results generated by these performance testing tools have been evaluated and analyzed.

This paper covers 5 Sections. Section 1 Introduction, Section 2 focuses on Web Based Testing and Section 3 gives literature Review, Section 4 Performance Testing and last section concludes this paper.

KEYWORDS: Software Engineering, Software Testing, Tools, Domain.

Section 1-Introduction:

Software engineering:

Software engineering is a branch in computer science that deals with developing applications. It covers the technical aspects of building software systems through designing, implementing, and modifying software. It also covers software management issues, such as directing programming teams, scheduling, and budgeting.

Software Testing: Software testing is the process of evaluation a software item to detect differences between given input and expected output. Also to assess the feature of A software item. Testing assesses the quality of the product. Software testing is a process that should be done during the development process. In other words software testing is a verification and validation process.

Why Software Testing is necessary?

Software testing is a process to determine the quality of the software developed by a developer or programmer. It is a methodological study intended to evaluate the quality-related information of the product. Understanding of the important features and advantages of software testing helps businesses in their day-to-day activities.

There are two basics of software testing: Blackbox testing and Whitebox testing.

Blackbox Testing

Black box testing is a testing technique that ignores the internal mechanism of the system and focuses on the output generated against any input and execution of the system. It is also called functional testing.

Whitebox Testing

White box testing is a testing technique that takes into account the internal mechanism of a system. It is also called structural testing and glass box testing. Black box testing is often used for validation and white box testing is often used for verification.

Types of testing

There are many types of testing like

Unit Testing

Unit testing is the testing of an individual unit or group of related units. It falls under the class of white box testing. It is often done by the programmer to test that the unit he/she has implemented is producing expected output against given input.

Integration Testing

Integration testing is testing in which a group of components are combined to produce output. Also, the interaction between software and hardware is tested in integration testing if software and hardware components have any relation. It may fall under both white box testing and black box testing.

Functional Testing

Functional testing is the testing to ensure that the specified functionality required in the system requirements works. It falls under the class of black box testing.

System Testing

System testing is the testing to ensure that by putting the software in different environments (e.g., Operating Systems) it still works. System testing is done with full system implementation and environment. It falls under the class of black box testing.

Stress Testing

Stress testing is the testing to evaluate how system behaves under unfavorable conditions. Testing is conducted at beyond limits of the specifications. It falls under the class of black box testing.

Performance Testing

Performance testing is the testing to assess the speed and effectiveness of the system and to make sure it is generating results within a specified time as in performance requirements. It falls under the class of black box testing.

Usability Testing

Usability testing is performed to the perspective of the client, to evaluate how the GUI is user-friendly? How easily can the client learn? After learning how to use, how proficiently can the client perform? How pleasing is it to use its design? This falls under the class of black box testing.

Acceptance Testing

Acceptance testing is often done by the customer to ensure that the delivered product meets the requirements and works as the customer expected. It falls under the class of black box testing.

Regression Testing

Regression testing is the testing after modification of a system, component, or a group of related units to ensure that the modification is working correctly and is not damaging or imposing other modules to produce unexpected results. It falls under the class of black box testing.

Beta Testing

Beta testing is the testing which is done by end users, a team outside development, or publicly releasing full pre-version of the product which is known as beta version. The aim of beta testing is to cover unexpected errors. It falls under the class of black box testing.

Web Testing: Tool, Challenges and Methods:

Issues such as the security of the web application, the basic functionality of the site, its accessibility to handicapped users and fully able users, as well as readiness for expected traffic and number of users and the ability to survive a massive spike in user traffic, both of which are related to load testing.

Section 2

WEB APPLICATION PERFORMANCE TOOL

A Web Application Performance Tool, also known as is used to test web applications and web related interfaces.

WAPT tends to simulate virtual users which will repeat either recorded URLs or specified URL and allows the users to specify number of times or iterations that the virtual users will have to repeat the recorded URLs.

WAPT is a web load and stress testing tool from softlogica having following specifications:

- Handles dynamic content and HTTPS/SSL; Easy to use; Support for redirects and all types of proxies; Clear reports and graphs.

CHALLENGES DURING WEB TESTING A WAPT faces various challenges during testing and should be able to conduct tests for: Browser compatibility

- Operating System compatibility
- Windows application compatibility where required WAPT allows a user to specify how virtual users are involved in the testing environment i.e. either increasing users or constant users or periodic users load.

- Increasing user load, step by step is called Ramp where virtual users are increased from 0 to hundreds, where, Ramp test is the test which uses escalating numbers of users over a given time frame to determine the maximum number of users the web server can accommodate before producing error messages.
- Constant user load maintains specified user load at all time.
- Periodic user load tends to increase and decrease the user load from time to time. When new technology is used to make web applications perform well and scalable, new testing methodologies have to be created along with those technologies. Performance is critical, and based on a study from the Newport Group, more than half the recently deployed transaction-based web applications did not meet expectations for how many simultaneous users their applications could handle.

WEB TESTING METHODS

Functional Testing:

Test for all the links in web pages, database connection, forms used in the web pages for submitting or getting information from user, Cookie testing.

- Test links used to send the email to admin or other users from web pages. Forms are used to get information from users and to keep interaction with them. Cookies testing: Cookies are small files stored on user machine. These are basically used to maintain login sessions. Test if the cookies are encrypted before writing to user machine. If you are testing the session cookies check for login sessions and user starts after session end. Usability Testing: Test for navigation: Navigation means how the user surfs the web pages, different controls like buttons, boxes or how user using the links on the pages to surf different pages. You can follow some standards that are used for web page and content building.

- Check what happens if user interrupts any transaction in-between?
- Check what happens if connection to web server is reset in between?

A Comparative Study of Performance Testing Tools:

Performance parameters results generated by these performance testing tools have been evaluated and analyzed.

The same web site has been tested for performance under these performance testing tools then differences in results of various performance parameters like throughput, response time, number of hit pages, error rate, memory and CPU utilization etc. The same website has been put under load test for a number of virtual user sand results have been analyzed.

I. INTRODUCTION

Now days, various business critical applications are tested for performance before launching to satisfy their customer needs. Therefore there is need to do performance testing of systems. Performance testing is used to determine the time required performing a task by the system and it provides stability of system under different load conditions.= Performance testing is a non-functional type of testing to determine the speed, stability, reliability and scalability of the system. Various types of performance tests are done to check the system's behavior and to determine the part that performs poorly. To find out the source of performance problem, various tests are done. There are number of challenges with performance testing such as test environment setup, collection & analysis of data and obtaining accurate results. There are different types of

performance testing: Stress test, Load test, Strength test. Load testing is used to check the changes in system performance with increase in load to system. Stress testing is used to determine stability of system. Stress tests examine the system with the maximum load and help to identify system blockage.

Strength test is long time load test or stress test. Strength test should be done for few hours or even days. Different testing tools are used to test the load of server. Testing tools simulate multiple user access of web server. Load generation is an important component in performance testing. There is need to select the testing tool and to analyze the testing result. Tools have many issues to conduct performance testing such as tools compatibility with system under test, tools installation, tools setup and flexibility in doing test both for client and server side.

Section 3. Literature Review

Most previous work on performance testing tools comparison ignored different results reported by each tool. In the research paper "**Performance evaluation and comparison of Software Testing Tools**" by Sneha Khorla and Pragati Upadhyay , [1]some specific performance testing tools have been compared for their usability and effectiveness. Different attributes, their ability to compare the results, test cases documentation ability and regression testing performance ability have been compared. In the research paper "**Web services testing tools: A Comparative Study**" [2] byShariq Hussain, Zhaoshun Wang, Ibrahima Kalil Toure and Abdoulaye Diop ,three popular open source web service testing tools have been compared in terms of features, usability, performance and software requirements.

In "**Web Application-A Study on Comparing Software Testing Tools**" [3] by Dr. S.M. Afroz, N. Elezabeth Rani and N. Indira Priyadarshini , Dart and Apollossoftware web tools have been compared in terms of their dynamic test generation ability. A survey has been presented on static and dynamic testing analysis. In the paper "**A comparison of Open Source Load Testing tools**" by IDS Australia, open source load testing tools have been compared on basics of selection criteria like protocol level, emulation of complex business.

In the paper "**Open Source & Commercial process and emulation of multiple concurrent users. Performance Testing Tools**" by Vinod P , performance testing tools have been compared based on factors including accuracy, cost and other features.

In the paper "**Performance Testing Tool Comparison**" by Smith , [4] HP, Load Runner, Load Test, loadUI and Grinder performance testing tools have been compared in terms of cost, market place skill set, scalability, result reporting etc. In the paper "**Comparison between HP, IBM and APACHE -Performance Testing Tools**" [5] by Kualitatem , HP, IBM and APACHE performance testing tools have been compared in terms of features like supported protocols, script playback monitoring, IP spoofing caching, reporting etc. In the paper "Stress, Load, Volume, Performance, Baseline Testing Tool Evaluation and Comparison" by VCAA , stress, load, volume, performance , benchmarking and base line testing tools have been compared in terms of all features and price. In our research paper, differences in performance parameters resulting indifferent browsers of different performance testing tools have been analyzed.

Section 4-OVERVIEW OF PERFORMANCE TESTING TOOLS : [6]

Performance tools are used for different types of performance testing including load test, stress test, volume test and endurance test. WAPT WAPT provides load, stress and performance testing of web sites and web applications with web interface. This tool is having modules for ASP.NET testing, ADOBE FLASH tests and JSDN format testing. Loadster : Loadster is a load and stress testing tool for testing dynamic web application, websites and HTTP web services. Multiple user flows are tested at the same time with a large population of virtual users.

WEB APPLICATION TESTING CHALLENGES

Testing of web application employing new technologies is an area that has not been investigated so far. Challenges of web testing because of embedded features of current web technologies are as follows: State Navigation State navigation was prime concern at the time of web testing.

Code coverage based testing follows primarily two testing methods- object based data flow testing and Control flow model based testing. Control flow based testing uses reverse engineering and web crawling techniques to build a test model of a web application. Session based testing are merely focused on synchronous requests to the server and lack of complete state information required in AJAX testing. Black Box Testing Black box testing is to generate test cases on the basis of mentioned functionality of the system under test. Main issue with black box testing is the use of suitable model for specifying the behavior of the web application to be tested. Black box testing approach proposed by Andrew is Finite State Machine for generating test cases from web application.

Rew proposed a system-level testing technique that combines Test Generation based on Finite State Machines with constraints. The approach builds hierarchies of Finite State Machines that model subsystems of the Web applications, and then generates test requirements as subsequences of states in the FSMs. Several methods for deriving tests from FSMs have also been proposed. User session based testing collect user interaction and transforms them in to test cases. User session based testing having many advantages over white box testing technique.

Advantages are as follows:

User session based testing generates test cases without analyzing the internal structure of the web application that reduce cost and time of finding inputs, less dependent on heterogeneous and distributed web application technologies ,user session based testing depends on data collected.

WEB APPLICATION TESTING TOOLS [7]

This section presents an overview of the current web application testing. Web application testing tools are able to automate test case generation, test case execution, and evaluation of test case results.

Existing web testing tools can be used to support nonfunctional testing ,navigation of web site.

Js Unit is a tool to test java script on a functional level but this tool is notable to cope with heterogeneous nature of web applications i.e. will not test all technologies used to develop web applications.

STATE OF ART OF WEB TESTING

To bridge the gap between existing web testing techniques and main new feature provided by web application. The server side can be tested using any conventional testing technique. So today's need is a testing tool which can test user session and generate test cases on the basis of expected UI behavior as per event fired by user.

State Based Testing:

Marchetto proposed a state based testing technique. Idea is that the states of client side components of an AJAX application need to be taken into account during testing phase. Sequences of semantically interacting events in the model are used to generate test cases once the model is refined by the tester.

Conclusion

After reviewing various tools for load testing and web based testing, it is found that still some challenges are not achieved with certain tools. In future work automated testing will be covered for various domains.

References

1. VSRD International Journal of Computer Science & Information Technology, Vol. 2
2. Volume 3, Issue 5 May 2013 ISSN: 2277 128X International Journal of Advanced Research in Computer Science and Software Engineering
3. International Journal of Computer Science and Telecommunications [Volume 2, Issue 3, June 2011]
4. <http://www.shooter-smith.co.uk/performance-testing-tool-comparison>
5. <http://www.ibm.com/developerworks/rational/library/integrate-clm-hp-alm-atlassian-jira-git/>
6. www.softwaretestinghelp.com/performance-testing-tools-load
7. http://en.wikipedia.org/wiki/List_of_web_testing_tools
