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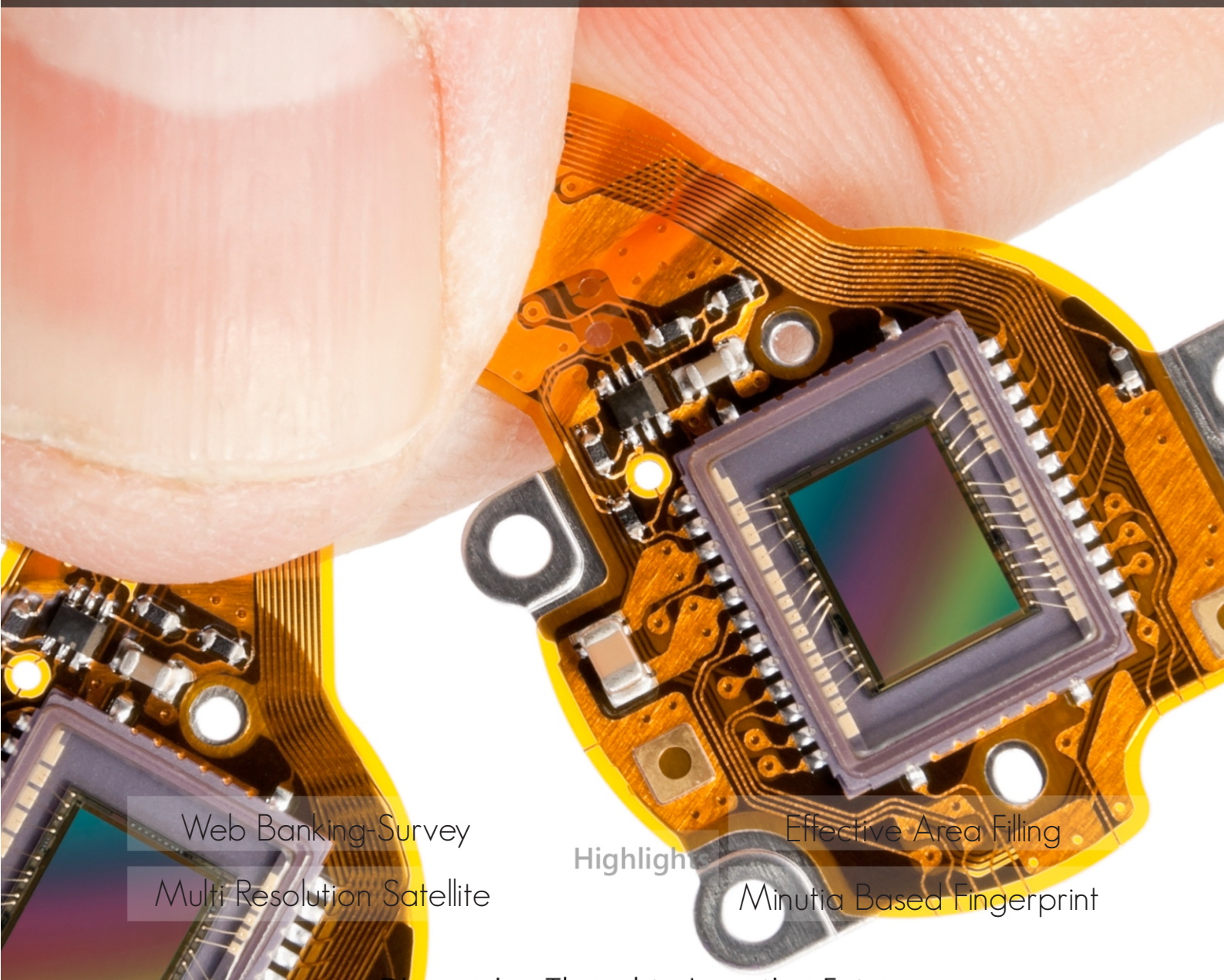

Highlights

Web Banking-Survey

Multi Resolution Satellite

Effective Area Filling

Minutia Based Fingerprint

Discovering Thoughts, Inventing Future

VOLUME 13 ISSUE 7 VERSION 1.0

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A Novel Approach for Image Steganography in Spatial Domain

By Fatema Akhter
Jatiya Kabi Kazi Nazrul Islam University, Bangladesh

Abstract - This paper presents a new approach for hiding information in digital image in spatial domain. In this approach three bits of message is embedded in a pixel using Lucas number system but only one bit plane is allowed for alternation. The experimental results show that the proposed method has the larger capacity of embedding data, high peak signal to noise ratio compared to existing methods and is hardly detectable for steganolysis algorithm.

Keywords : *steganography, steganolysis, cover image, stego image, lucas number.*

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I. Introduction

In recent year Steganography is considered as a promising way of safe electronic communication. Steganography is the art and science of hiding information such its presence cannot be detected and a communication is happening. The word steganography comes from the Greek words Steganos (covered) and graphia (writing) [1] and literally means covered writing[2]. Using steganography, information is embedded in a medium such as image, audio, video or text file called carrier in a way that it is not detectable by others [3].

There are two popular techniques regularly used for information hiding, the spatial domain and frequency domain. In spatial domain the information bit is inserted directly and embedded in the intensity of the cover image pixel while in frequency domain the cover image is first transformed to frequency domain and information is hidden in wavelet [4]. This paper focuses on digital image and spatial domain. When designing a steganogrphic algorithm, three properties are to be carefully considered, embedding capacity (payload), image distortion and undetectability. A proper trade off needed as larger information is embedded in cover image more detectable artifacts would be introduced in stegos and would cause more image distortion.

This paper proposes a new approach in spatial domain using Lucas number represenation where three bits of message is embedded without degrading the quality of image. Decomposition of image pixel using Lucas number allows higher bit plane for embedding information that increases the embedding capacity. Although three bits will be embedded in each pixel, only one bit plane have to be changed. The embedded bits can take any place among seven least significant bits which makes it hardly detectable for existing steganolysis algorithms. The rest of the paper is organized as follows: Section 2 presents some related works and algorithms of steganography. Section 3 introduces our proposed stenographic method. Section 4 describes the experimental results and presents comparisons with other works. Finally this paper is concluded with Section 5.

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II. Related Works

This section gives a brief overview of the typical spatial domain algorithms including LSB replacement [5], LSB matching [6], LSBM revisited [7] approaches. LSB replacement algorithm takes the advantage of human eye [8]. An image is consists of many pixels and each pixel can be expressed by a number between 0 to 255, in fact can be represented by 8 bits. It is been noticed that the LSB of a pixel contains no visual information and human eye never realizes a change in this bit. The information bit is simply overwrites the LSB i.e. the first bit plane. LSBM is very similar to LSB replacement algorithm. For LSBM, if the secret bit is not equal to the LSB of the given pixel then ± 1 is added randomly to the pixel while keeping the altered pixel value in the range of [0,255]. Using Pseudo Random Number Generator secret bits are scattered on the cover image.

In LSB only the LSB bit plane is altered as a result a structural asymmetry is easily visible to steganolysis algorithms [9] like Chi-Squared attack [10], Chen[11] and Regular/Singular(RS) groups analysis[12] and Sample pair analysis[13]. In LSBM the probability of increasing and decreasing for each modified pixel is same and so the asymmetry artifacts introduced by LSB replacement is avoided. So common approaches used to detect LSB replacement are totally ineffective at detecting the LSBM. But with time several steganolysis algorithms [14-16] have been proposed to analyze the LSBM.

Unlike LSB and LSBM, LSB matching revisited(LSBMR) uses a pair of pixels as an embedding unit in which the LSB of the first pixel carries one bit message and the relationship (odd - even combination) of the two consecutive pixels carries another bit of message. The modification rate of pixels is decreased from 0.5 to 0.375 bits/pixel. This can avoid the LSB replacement asymmetry and make the detection slightly more difficult than the LSBM approaches.

Based on the existing works and experimental results, the weakness of LSB, LSBM and LSBR is analyzed here and this paper proposes a new approach that is easy to implement, avoids asymmetry of LSB replacement, increases the embedding capacity 3 bits per pixel (bpp), decreases the modification rate to 1/8 = 0.125 and most of well-known steganolysis attacks are unable to detect the existence of secret message embedded using our algorithm. Figure 1 shows cover image and stego image using our method at 30% embedding rate.

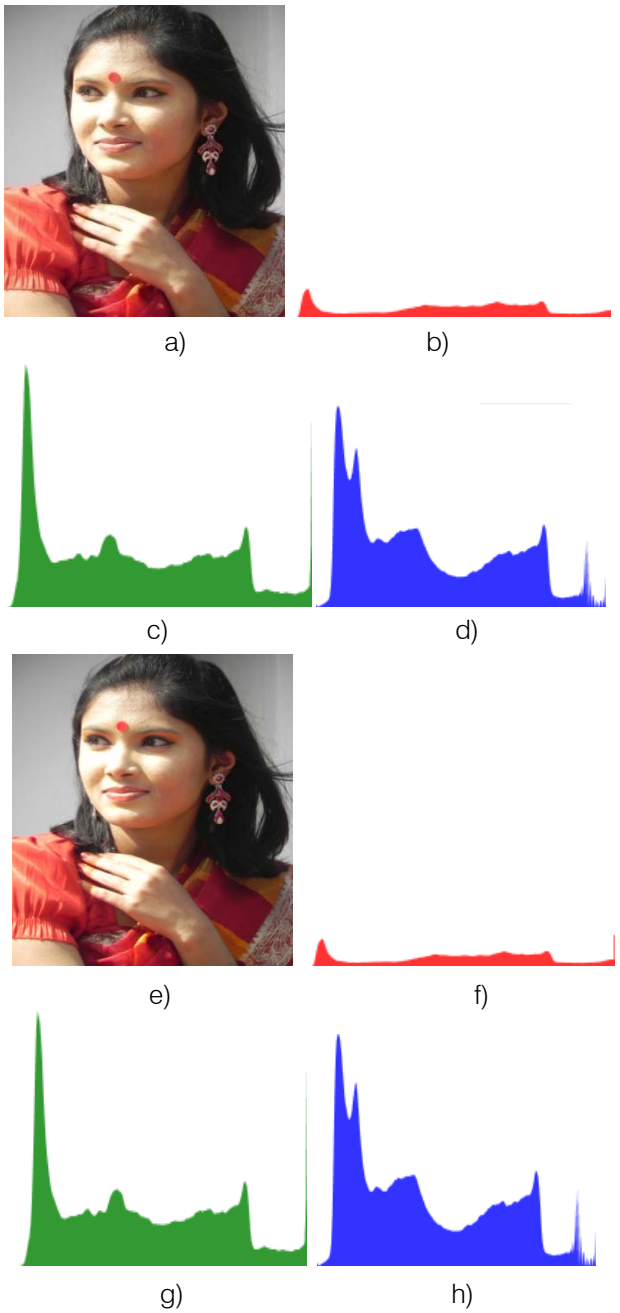

Figure 1 : Cover image and stego image with histogram for finding visual artifact introducing our method, a) Cover Image, b) Histogram of cover image red, c) Green, d) Blue, e) Stego image, f) Histogram of stego image red, f) Green and g) Blue

III. Proposed Approach

This section describes our proposed approach that embeds 3 bits in a pixel but alters only one bit plane. First the image pixel is decomposed using Lucas number [17] presentation. The Lucas number sequence is generated using the following formula

$$L_n = L_{n-1} + L_{n-2} \text{ where } L_1 = 2 \text{ and } L_2 = 1$$

To represent a number in the range [0,255] we need twelve Lucas numbers.

L12	L11	L10	L9	L8	L7	L6	L5	L4	L3	L2	L1
199	123	76	47	29	18	11	7	4	3	1	2

The image pixel value will be represented as sum of non consecutive Lucas numbers. For example binary and Lucas presentation of pixel value 26 is given below.

Binary representation 00011010
Lucas number representation 000001010010

The motivation behind using Lucas number is that Lucas bit is less significant than that of traditional binary bit. For example if the 5th bit of pixel value 26 is altered to 0 then it becomes 10 in binary representation while 19 in Lucas representation which is more close to the original value.

Binary representation 00001010
Lucas number representation 000001000010

A 7 bit encoder/decoder is proposed for generating stego image. It takes 7 bits (b_7, b_6, b_5, b_4, b_3, b_2, b_1) as inputs and produces 3 bits of outputs f_3, f_2, and f_1. Figure 2 shows the encoder/decoder generator.

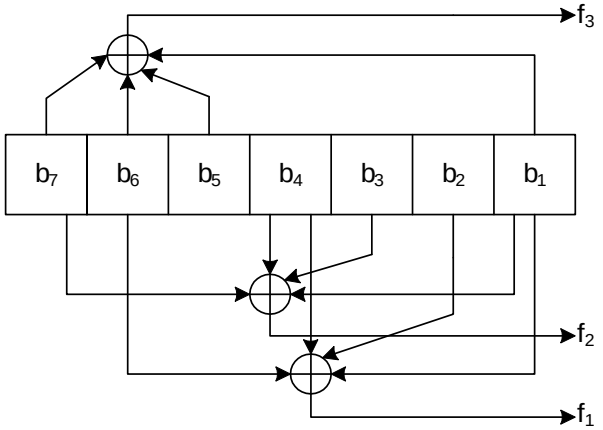

Figure 2 : Encoder/Decoder for stego image generation

Table 1 : The procedure of changing seven LSB of a pixel for three bits of message

Seven LSB bits	Encoder/ Decoder Output	Changes in cover image to match desired message	
		Message (3 bits)	Stego Pixel (7bits)
0000000	0 0 0	0 0 1	0 0 0 0 0 **1** 0
		0 1 0	0 0 0 0 **1** 0 0
		0 1 1	0 0 0 **1** 0 0 0
		1 0 0	0 0 **1** 0 0 0 0
		1 0 1	0 **1** 0 0 0 0 0
		1 1 0	**1** 0 0 0 0 0 0
		1 1 1	0 0 0 0 0 0 **1**
0000001	1 1 1	0 0 0	0 0 0 0 0 0 **0**
		0 0 1	**1** 0 0 0 0 0 1
		0 1 0	0 **1** 0 0 0 0 1
		0 1 1	0 0 **1** 0 0 0 1
		1 0 0	0 0 0 **1** 0 0 1
		1 0 1	0 0 0 0 **1** 0 1
		1 1 0	0 0 0 0 0 **1** 1
- - - - - - -	- - -	- - -	- - - - - - -
1111111	0 0 0	0 0 1	1 1 1 1 1 **0** 1
		0 1 0	1 1 1 1 **0** 1 1
		0 1 1	1 1 1 **0** 1 1 1
		1 0 0	1 1 **0** 1 1 1 1
		1 0 1	1 **0** 1 1 1 1 1
		1 1 0	**0** 1 1 1 1 1 1
		1 1 1	1 1 1 1 1 1 **0**

For each pixel the 7 least significant bits are applied to the encoder/decoder, three Exclusive OR operations create three outputs f_3, f_2 and f_1 where

$$f_3 = b1 \oplus b5 \oplus b6 \oplus b7$$
$$f_2 = b1 \oplus b3 \oplus b4 \oplus b7$$
$$f_1 = b1 \oplus b2 \oplus b4 \oplus b6$$

Suppose f_3, f_2, f_1 are the hidden message which is embedded in the pixel. If f_3, f_2, f_1 are the same as the hidden message then there is no need to alter the original image. If not, it is needed to change the original image in a way to cause the output of the encoder/decoder be equal to the hidden message. This paper allows alternation in only one bit plane that can be any of the seven bits to make the outputs of the encoder/decoder is equal to the hidden message. The procedure that changes only one bit is described in table I.

IV. Experimental Results

In this section some experimental results are presented to demonstrate the effectiveness of the proposed method compared with existing relevant methods. USC–SIPI [18] and UCID [19] image datasets are used for the performance evaluation.

a) Embedding Capacity

As explained in the previous section, 3 bits of message can be embedded in this method. So the capacity of embedded data is increased up to 3 bits/pixel which is thrice the capacity of existing LSB replacement, LSB matching and LSBM revisited approaches. So our method outperforms all the existing algorithms in embedding capacity and payload.

b) Image Quality Analysis

The quality of the image is evaluated by Peak Signal to Noise Ratio (PSNR) [20] where it is defined as:

$$PSNR = 10log_{10}\frac{I_{MAX}^2}{MSE}$$

Where I_{MAX}^2 is equal to 255 as the maximum possible value of a pixel in the gray scale images or represents the maximum possible value of a color in the color images. Mean Square Error (MSE) for the gray scale images is computed as follows

$$MSE = \frac{1}{R * C}\sum_{i=1}^{R}\sum_{j=1}^{C}(|I_{i,j} - I'_{i,j}|)^2$$

For color image,

$$MSE = \frac{1}{R * C * L}\sum_{i=1}^{R}\sum_{j=1}^{C}\sum_{k=1}^{L}(|I_{i,j,k} - I'_{i,j,k}|)^2$$

Where $I_{i,\ j}$ (gray scale) and $I_{i,\ j,\ k}$ (color) are original image pixels and $I'_{i,\ j}$ and $I'_{i,\ j,\ k}$ are stego image pixels.

The comparisons of average PSNR and the average modification rate of our method with different steganographic algorithms are shown in Table II and in figure 3.

Table 2 : Comparisons of different Steganographic Algorithms using average PSNR

Embedding Rate	Steganographic Algorithms	PSNR	Avg. rate of modification
10%	LSBM	61.1	0.05
	LSBMR	**62.2**	0.0375
	Proposed	56.9	**0.0125**
30%	LSBM	56.4	0.15
	LSBMR	**57.4**	0.1115
	Proposed	54.6	**0.0375**
50%	LSBM	54.2	0.25
	LSBMR	**55.2**	0.1875
	Proposed	53.1	**0.0625**
80%	LSBM	53.0	0.4
	LSBMR	**53.1**	0.3
	Proposed	52.6	**0.1**
100%	LSBM	**52.2**	0.5.
	LSBMR	**52.2**	0.375
	Proposed	52.1	**0.125**

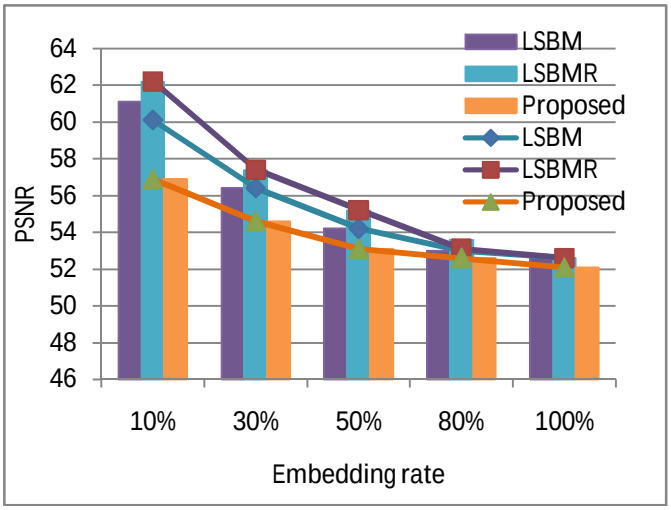

Figure 3 : Comparisons of PSNR of our methods with existing steganographic methods

The maximum gray level that can be altered in our method at maximum embedding rate is 18. So it is expected that PSNR of our algorithm will decrease comparing other algorithms. But the PSNR is still over 50 and the distortion can't be spotted in naked eyes. If we look the trend towards increasing embedding rate, PSNR our method is almost same as the best PSNR method. It indicates that our algorithm works better when embedding rate is high. The average rate of modification is less than all the existing algorithms at the same embedding rate which ensures the avoidance of asymmetry artifacts introduced in other algorithms.

c) Steganolysis Attack

To verify the undetectability of the proposed algorithm, two statistical steganolysis attacks are used, the Chi-Square attack and Chen steganolysis. These two algorithms generally perform very well in detecting hidden message embedded in spatial domain. Pseudo random pattern is generated before embedding message in every image in image datasets. Exactly same message is embedded using LSB, LSBMR and our proposed algorithm. For Chi-Square attack varying embedding rate from 10% to 100% is also tested to measure the risk of exposure of the hidden message. Figure 4 shows the experimental results for Chi-Square attack. The x-axis shows the embedding rate from 10% to 100%. The y-axis shows the Chi-Square index which estimates the probability of hidden message existing in the image.

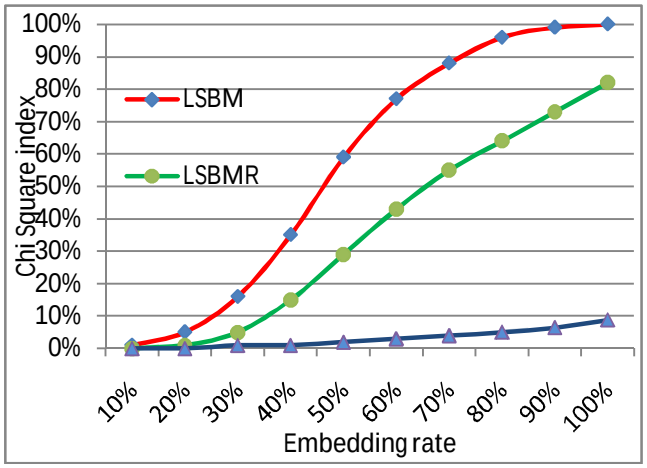

Figure 4 : Experimental result of Chi-Square attack on LSBM, LSBMR and our proposed method

In figure 4, using LSB and LSBMR method, the average Chi-square index is higher than 0.6 when the embedding rate is 80%. Using the proposed method the average Chi-square index value is always below 0.08 no matter what the embedding rate is chosen.

Figure 5 and figure 6 shows the experimental results for Chen steganolysis attack for embedding rate 30% and 60%. The x-axis shows the False Positive Rate (FPR) and y-axis shows the True Positive Rate (TPR) [21].

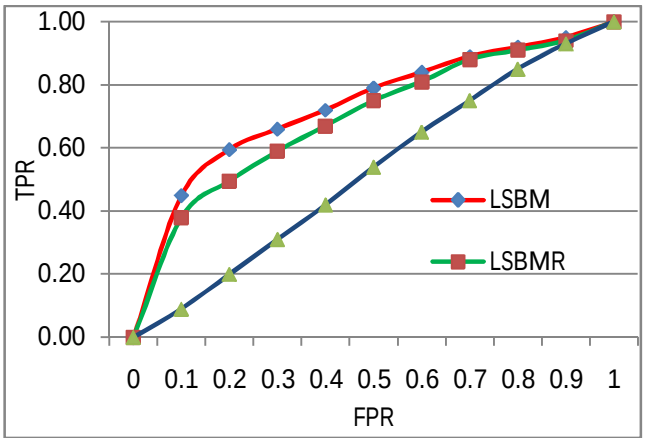

Figure 5 : Experimental results of Chen steganolysis algorithm at embedding rate 30%

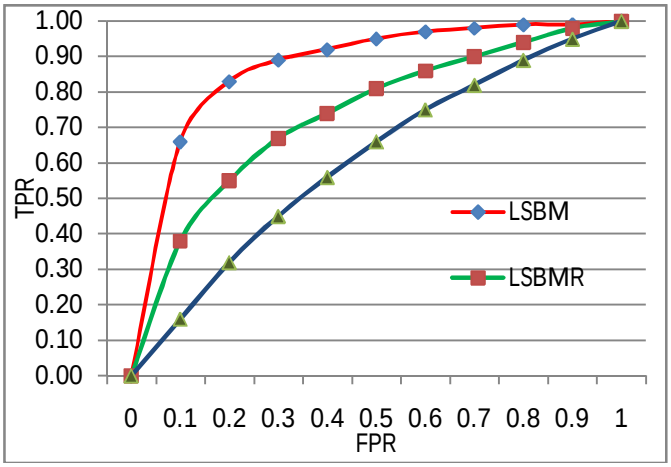

Figure 6 : Experimental results of Chen steganolysis algorithm at embedding rate 60%

It can be clearly observed that both steganolysis algorithms would fail in detecting embedded message in our method even when the embedding rate is high.

V. Conclusion

In this paper existing steganographic methods in spatial domain are studied and weaknesses of existing methods are theoretically analyzed. Then this paper proposed a new data hiding method using Lucas number representation that increased the embedding capacity without degrading the quality of image. Appropriate theorems and algorithms are presented to clarify the proposed method. The experimental results are evaluated on images from well known datasets using different kinds of steganolysis algorithms. Comparisons with the existing methods show that embedding capacity, visual quality and security of stego images are improved significantly.

VI. Acknowledgment

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References Références Referencias

1. El Safy, R. O., H. H. Zayed, and A. El Dessouki. (2009). "An adaptive steganographic technique based on integer wavelet transform." Networking and Media Convergence.
2. AL-Shatnawi, Atallah M., and Bader M. AlFawwaz. (2013). "An Integrated Image Steganography System with Improved Image Quality". 3545-3553.
3. Javad Mohammadi Rad. (2013). "Intensity Adaptive LSB Method Applying a Revised Matching. International Journal of Computer Applications". 20-26.
4. Bhattacharyya, Souvik, and Gautam Sanyal. (2010). "Data Hiding in Images in Discrete Wavelet Domain Using PMM." World Academy of Science, Engineering & Technology. 597-605.
5. Chan, Chi-Kwong, and Lee-Ming Cheng. (2004). "Hiding data in images by simple LSB substitution." Pattern recognition. 469-474.
6. Li, Xiaolong, et al. (2009). "A generalization of LSB matching." Signal Processing Letters, IEEE. 69-72.
7. Mielikainen, Jarno. (2006). "LSB matching revisited." Signal Processing Letters, IEEE. 285-287.
8. Daneshkhah, Ali, Hassan Aghaeinia, and Seyed Hamed Seyedi. (2011). "A More Secure Steganography Method in Spatial Domain." Intelligent Systems, Modelling and Simulation (ISMS).
9. Luo, Weiqi, Fangjun Huang, and Jiwu Huang. (2010). "Edge adaptive image steganography based on LSB matching revisited." Information Forensics and Security, IEEE Transactions. 201-214.
10. A. Westfield and A. Pfitzmann. (1999). "Attacks on Steganographic Systems", in Proc, 3rd Int. Workshop on Information Hiding, *1768,* 61-76.
11. Xiaochuan Chen, Yunhong Wang, Tieniu Tan and Guo, L. (2006). "Blind Image Steganalysis Based on Statistical Analysis of Empirical Matrix". *3*, 1107-1110.
12. Fridrich, Jessica, Miroslav Goljan, and Rui Du. (2001). "Detecting LSB steganography in color, and gray-scale images". 22-28.
13. Dumitrescu, Sorina, Xiaolin Wu, and Zhe Wang. (2003). "Detection of LSB steganography via sample pair analysis." Signal Processing, IEEE Transactions. 1995-2007.
14. Ker, Andrew D. (2005). "Steganalysis of LSB matching in grayscale images." Signal Processing Letters, IEEE. 441-444.
15. Huang, Fangjun, Bin Li, and Jiwu Huang. (2007). "Attack LSB matching steganography by counting alteration rate of the number of neighbourhood gray levels". *1*.
16. Li, Xiaolong, Tieyong Zeng, and Bin Yang. (2008). "Detecting LSB matching by applying calibration technique for difference image".
17. Dickson, L. E. (2005). "Recurring Series; Lucas' Un, Vn." History of the Theory of Numbers: Divisibility and Primality. 393-411.
18. USC-SIPI image database, http://sipi.usc.edu/database/, accessed June, 2013.
19. Schaefer, Gerald, and Michal Stich. (2004). "UCID: an uncompressed color image database".
20. Neeta, Deshpande, Kamalapur Snehal, and Daisy Jacobs. (2006). "Implementation of LSB steganography and its evaluation for various bits".
21. Lee, Kwangsoo, Andreas Westfeld, and Sangjin Lee. (2006). "Category attack for LSB steganalysis of JPEG images." 35-48.

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A Minutia based Fingerprint Recognition - A Survey Paper

By Kakde Sachin, V. Anandam, S. M. Riazoddin & M. Janga Reddy
CMR Institute of Technology, India

Abstract - Today, because of the vulnerability of standard authentication system, law-breaking has accumulated within the past few years. Identity authentication that relies on biometric feature like face, iris, voice, hand pure mathematics, handwriting, retina, fingerprints will considerably decrease the fraud. so that they square measure being replaced by identity verification mechanisms. Among bioscience, fingerprint systems are one amongst most generally researched and used. it\'s fashionable due to their easy accessibility. during this paper we tend to discuss the elaborated study of various gift implementation define strategies together with their comparative measures and result analysis thus as realize a brand new constructive technique for fingerprint recognition.

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Abstract - Today, because of the vulnerability of standard authentication system, law-breaking has accumulated within the past few years. Identity authentication that relies on biometric feature like face, iris, voice, hand pure mathematics, handwriting, retina, fingerprints will considerably decrease the fraud. so that they square measure being replaced by identity verification mechanisms. Among bioscience, fingerprint systems are one amongst most generally researched and used. it\'s fashionable due to their easy accessibility. during this paper we tend to discuss the elaborated study of various gift implementation define strategies together with their comparative measures and result analysis thus as realize a brand new constructive technique for fingerprint recognition.

I. Introduction

Humans have used body characteristics like face, voce, finger prints, Iris, etc. to acknowledge one another. Automatic recognition of those characteristics referred to as a biometrics; currently days it\'s become a full of life analysis space in pattern recognition. Over a decade\'s fingerprint is one amongst the oldest style of identification due to their individuality, consistency, the intrinsic ease in acquisition, distinctiveness, persistence and high matching accuracy rate. As we know, No 2 folks have an equivalent set of fingerprints even identical twins fingerprints. Finger ridge patterns don\'t amendment throughout the lifetime of a personal. This property makes fingerprint a wonderful biometric symbol and can also be used as rhetorical proof. it\'s received a lot of and a lot of attention throughout the last amount because of the necessity for society in a very big selection of applications. Among the biometric options, the fingerprint is taken into account one amongst the foremost sensible ones. Fingerprint recognition needs a lowest effort from the user and provides comparatively sensible performance. Fingerprint recognition refers to the machine-controlled technique of corroborative a match between 2 human fingerprints. Fingerprints square measure one amongst several kinds of bioscience accustomed establish people and verify their identity.

Figure 1 : Sample Finger Prints

Basically Skin of human fingertips consists of ridges and valleys and that they compounding along type the distinctive patterns. A fingerprint is that the composition of the many ridges and furrows. Fingerprints largely aren't distinguished by their ridges and furrows however square measure distinguished by point that square measure some abnormal points on the ridges. point is split in to 2 elements such as: termination and bifurcation. Termination is additionally referred to as ending and bifurcation is additionally referred to as branch. There are more point consists of ridges and furrows natural depression is additionally referred as follows:

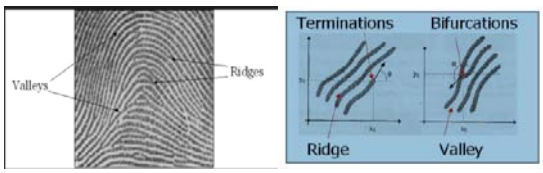

Figure 2 : Pictures Showing Ridges and Valleys with Termination and Bifurcations

The human fingerprint is comprised of varied varieties of ridge patterns, historically classified in step with The decades-old Henry system: left loop, right loop, arch, whorl, and tented arch.

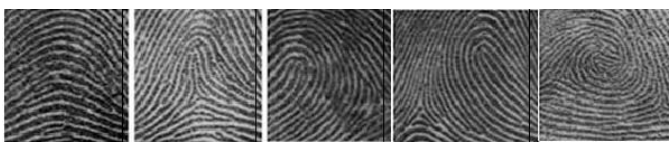

Figure 3 : Left loop, right loop, arch, whorl, and tented arch of a fingerprint

Fingerprint recognition system has been triple-crown for several application areas like laptop login, checking account recovery and cheque process. however the fingerprint recognition system still faces with defect in accuracy rate. the first objectives of the projected system can perform a lot of accuracy rate.

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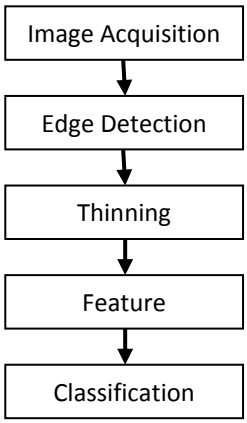

Figure 4 : Fingerprint Identification

a) Image Acquisition

In any vision system the primary stage is that the image acquisition stage that is hardware dependent. Variety of strategies square measure accustomed acquire fingerprints. Among them, the inked impression technique remains the foremost fashionable one. Inkless fingerprint scanners also are gift eliminating the intermediate digitization method. During this method we tend to usually use trivia extraction algorithmic program achieved by Binarization technique.

b) Edge Detection

An edge is that the boundary between 2 regions with comparatively distinct grey level properties. The set of pixels obtained from the sting detection algorithmic program rarely characterizes a boundary fully due to noise, breaks within the boundary and alternative effects that introduce spurious intensity discontinuities. Thus, edge detection algorithms usually square measure followed by linking and alternative boundary detection procedures designed to assemble edge pixels into meaning boundaries.

c) Thinning

Generally this technique is employed to neutralize all the constituent by examining the neighborhood of every constituent within the binary image and supported a specific set of pixel-deletion criteria. It conjointly checks whether or not the constituent is deleted or not. These sub-iterations continue till no a lot of pixels is deleted. The applying of the cutting algorithmic program to a fingerprint image preserves the property of the ridge structures whereas forming the binary image skeleton. This skeleton image is then utilized in the following extraction of trivia. Specially the cutting algorithmic program is employed to represent the structural form of a plane region is to scale back it to a graph. This reduction could also be accomplished by getting the skeleton of the region via cutting algorithmic program. However in broad spectrum the cutting algorithmic program is employed for edge detection. The cutting algorithmic program whereas deleting unwanted edge points ought to not:

- Take away finish points.
- Break Connectedness.
- Cause excessive erosion of the region.

d) Feature Extraction

Extraction of applicable options is one amongst the foremost necessary tasks for a recognition system. we tend to square measure exploitation back propagation algorithmic program to try to to this feature extraction. Feature Extraction is performed by following techniques.

1) Gauss Network technique.
2) Gradient Technique.
3) Numerical Technique.
4) Directive adaptive strategies.

Feature extraction cares with the quantification of texture characteristics in terms of a set of descriptors or quantitative feature measurements typically stated as a feature vector. it\'s fascinating to get representations for fingerprints that square measure scale, translation, and rotation invariant. Scale unchangingness isn't a major drawback since most fingerprint pictures may be scaled as per the dpi specification of the sensors. the current implementation of feature extraction assumes that the fingerprints square measure vertically bound. In reality, the fingerprints in our info aren't precisely vertically bound; the fingerprints could also be oriented up to removed from the assumed vertical orientation. This image rotation is part handled by a cyclic rotation of the feature values within the Finger Code within the matching stage.

e) Classification

RBF Neural Network classifier have a capability to be told from their expertise is that the key part within the drawback finding strategy of a pattern recognition task. A neural networks system is seen as Associate in nursing {information process information science |informatics| IP |science| scientific discipline} system composed of an outsized range of interconnected processing components. Every process part conjointly referred to as node, vegetative cell calculates its activity domestically on the idea of the activities of the cells to that it\'s connected. The strengths of its connections square measure modified in step with some transfer perform that expressly determines the cell's output, given its input. the educational algorithmic program determines the performance of the neural networks system. It ought to be noted that this network configuration is meant to just accept the load values that square measure obtained by protruding a take a look at pictures into image-space.

II. Literature Survey

Masayoshi et al. (1993) projected is Associate in Nursing ANN primarily based approach wherever a neural network for the classification of fingerprint

pictures is made which may classify the difficult fingerprint pictures. It uses a ballroom dancing learning technique to coach the four bedded neural network that has one sub-network for every class. It carries out the principal element analysis (PCA) with relevance the unit values of the second hidden layer and conjointly studies the fingerprint classification state depicted by the interior state of the network. Consequently, the strategy confirms that the fingerprint patterns square measure roughly classified into every class within the second hidden layer and also the effectiveness of the ballroom dancing learning method. However, just in case of larger knowledge sets this technique is found to convey restricted results.

Karu et al. (1996) projected Associate in Nursing approach wherever it ab initio finds the ridge direction at every constituent of Associate in Nursing input fingerprint image. Then the algorithmic program extracts international options specified singular points i.e. cores and deltas within the fingerprint image and performs the classification supported the quantity and locations of the detected singular points. Here, the singular point(s) detection is Associate in Nursing reiterative regularization method till the valid singular points square measure detected. If {the pictures|the pictures the photographs} square measure of poor quality the algorithmic program classifies those images as unknown varieties supported some threshold values. However, the algorithmic program will discover the labeled pictures with top quality solely.

Ballan et al. (1998) printed a quick machine-controlled feature-based technique for classifying fingerprints. The technique extracts the singular points i.e. deltas and cores within the fingerprints supported the directional histograms. It finds the directional pictures by checking the orientations of individual pixels, computes directional histograms exploitation overlapping blocks within the directional image, and classifies the fingerprint into the Wirbel categories whorl and twin loop or the Lasso categories (arch, tented arch, right loop, or left loop). The complexness of the technique is that the order of the quantity of pixels within the fingerprint image. However, it takes abundant time for classification.

Prabhakar et al. (1999) mentioned a classification technique for fingerprint wherever the fingerprint pictures square measure classified into 5 categories: whorl, right loop, left loop, arch, and tented arch. The algorithmic program uses a completely unique illustration (Finger Code) and relies on a 2 stage classifier to create a classification. The two-stage classifier uses a k-nearest neighbor classifier in its 1st stage and a group of neural network classifiers in its second stage to classify a feature vector into one amongst the 5 fingerprint categories. This algorithmic program suffers from the necessity that the region of interest be properly settled requiring the correct detection of center purpose within the fingerprint image. Otherwise, the algorithmic program is found to be terribly effective.

Cho, Kim et al. (2000) projected a fingerprint classification algorithmic program that uses solely the data associated with the core points. The algorithmic program detects core point(s) candidates roughly from the directional image and analyzes the close to space of every core candidate. During this core analysis, false core points created by noise square measure eliminated and also the sort and also the orientation of core point(s) square measure extracted for the classification step. Exploitation this info, classification was performed. However, it is found to be terribly tough to eliminate the false singular point(s) that has been used for sophistication call. It demands for a lot of refined strategies to eliminate those false core points towards a noise-tolerant arrangement.

Rajharia et al. (2012) projected a technique during which they used feed forward back propagation neural network for finger print recognition. Here, every image is split into four equal elements and their bar chart values square measure obtained. Then feed forward BP neural network are accustomed train, take a look at and validate the network for every a part of the image. However there square measure a number of the processes that are done manually ought to be machine-controlled.

Basha et al. (2008) projected a technique during which they used spectral trivia fingerprint recognition. They introduce 2 feature reduction algorithms: the Column Principal element Analysis and also the Line separate Fourier rework feature reductions. The spectral trivia fingerprint recognition may be a technique to represent a trivia set as a set length feature vector, that is invariant to translation, and during which rotation and scaling become translations, so they will be simply paid. This quick operation renders our system appropriate for a large-scale fingerprint identification system, therefore considerably reducing the time to perform matching. However the spectral trivia algorithmic program isn\'t strong to the caliber fingerprints. The fingerprint outliers can degrade the popularity accuracy that limits the applying of the spectral trivia algorithmic program.

Min et al.(2008) developed a brand new technique during which they used Fingerprint Recognition System which mixes each the options extraction by applying a applied mathematics and pure mathematics approach system illustrates the process by considering elementary geometric terms, applied mathematics computation and conjointly it checks all of the options for input fingerprint image to attain higher accuracy share and to provide the connected info of input image properly from info. This technique takes less time for recognition of input image. But by exploitation non-minutiae primarily based algorithmic program this

technique will any be improved with a lot of authentications and fewer area memory usage.

Qijun Zhao et al.(2009) projected pore matching technique that with success avoids the dependency of pore matching on point matching. Such dependency limits the pore matching performance and impairs the effectiveness of the fusion of point and pore match scores. so as to match the pores on 2 fingerprint pictures, {they square measure they\'re} 1st pair-wise compared and initial correspondences between them are established supported their native options. The initial pore correspondences square measure then refined by exploitation the RANSAC (Random Sample Consensus) algorithmic program to convey the ultimate pore matching results. A pore match score is finally calculated for the 2 fingerprint pictures supported each the initial and final pore correspondences. Thus, the fusion of the point and pore match scores more practical in rising the fingerprint recognition accuracy. However this technique is its complexness in describing the pores.

Dayashanka Singh et al.(2010) projected a completely unique technique of fingerprint matching supported embedded Hidden Andrei Markov Model (HMM) that\'s used for modeling the fingerprint's orientation field. This HMM primarily based fingerprint matching approach exploitation solely orientation angle parameters. It includes 2 kinds of random finite method. One may be a Mark off process of finite state that describes the transfer from one state to another; the opposite describes the chances between states and observation knowledge. what\'s necessary to statistically characterize a HMM may be a state transition likelihood matrix, Associate in Nursing initial state likelihood distribution, and a group of likelihood density functions related to the observations for every state. Usually a HMM may be a 1-D structure appropriate for analyzing 1-D random signals. The embedded HMM includes 3 super states that represent 3 elements of a finger print from the highest to bottom. Every super state consists of 5 sub states (embedded states) horizontally. The performance is nice and strong. it\'s less sensitive to the noise and distortions of a fingerprint image than the traditional approaches during which the dependent parameters embody a lot of fingerprint details. However this approach skipped the processes of cutting the ridge image and choosing trivia which can facilitate any noise reduction.

Chander Immanuel Kant et al. (2010) developed a brand new technique during which they used minutiae-based and correlation primarily based approach. during this method fingerprint image is obtained within the enrollment section. at that time verification method takes place by a inputting the sample of the user's fingerprint at detector. This approach has been given for fingerprint matching in an efficient thanks to cut back time. However as we all know it\'s terribly tough to extract the trivia points accurately once the fingerprint is of caliber. Conjointly this technique doesn\'t take under consideration the world pattern of ridges and furrows therefore this correlation primarily based system won\'t work if we tend to try and match fingerprint of finger or pinky.

H.B. Kekre et al. (2011) projected a technique in that they used texture-based fingerprint matching approach and Walsh rework which may be a powerful tool of linear system analysis for separate signals. This technique deals with fingerprint identification within the rework domain and also the main focus is on the reduction of the time interval. during this approach 1st the mean of rows (or columns) of the fingerprint image is computed, this converts a 2 dimensional image signal into one dimension. Then one dimensional Walsh rework of the row (or column) vector is generated and is distributed in a very complicated plane that is subjected to sectorization to get the feature vector. The feature vector of a given take a look at image is compared to those gifts within the info. The scores from row and column rework strategies square measure united exploitation OR and Georgia home boy functions. Technique is computationally terribly easy and quick because it relies on 1-D rework instead of 2-D rework. it\'s conjointly significantly freelance of shift and rotation of fingerprint pictures.

Arjun V Mane et al.(2011) developed a filter bank primarily based technique during which they used technique of score level fusion exploitation multiple enrollment and multiple testing impressions to attain higher accuracy. They mix matching score of multiple instance of same finger collected by same fingerprint detector, as a result of use of 2 completely different completely different} sensors and different biometric traits will increase system verification time and inconvenience to the user and discovered that the fusion of multiple impressions of same finger at enrollment or testing level increase the system performance. However this method take long-standing so as to perform all the steps multiple times.

Shashi Kumar D R et al.(2011) projected a brand new technique during which they used DWT primarily based Fingerprint Recognition exploitation Non trivia (DWTFR). During this three level DWT is applied on fingerprint pictures.

1. The Directional info options like Coherence and Dominant native orientation angle θ.
2. Centre space options and Canny's Edge parameters square measure computed from DWT sub bands.
3. The euclidian Distance is employed to verify the take a look at Fingerprint with knowledge base fingerprint.

Then the fingerprint image is rotten into multi resolution illustration exploitation DWT. The 3 level

Daubechies ripple is applied and options square measure extracted from LL, LH, hectoliter and HH sub bands for the verification of fingerprint. Simple to form a info for security purpose. However an equivalent algorithmic program could also be used for abstraction domain and alternative rework domains.

Zin Mar Win et al. (2012) projected a hybrid fingerprint matching algorithmic program by combining orientation options and also the native texture pattern obtained employing a bank of physicist filters for caliber pictures and revolved pictures with low computation time. Here 1st the input fingerprint is preprocessed to get rid of noise. Then the core purpose of the fingerprint is detected from orientation image and keeping the core purpose because the center purpose, the image of size w×w is cropped. The orientation options of the fingerprint square measure extracted and compared with all the fingerprints within the info. The minimum matching score is calculated that is any utilized in hard final matching supported the euclidian distance between the Finger Codes Effective and economical for each high and caliber fingerprints. However this filterbank-based matching algorithmic program isn\'t strong to spot the caliber fingerprints like fingerprints from NRC cards and it\'s not rotation-invariant

Subrat Kumar Sahu et al. (2012) projected a brand new technique for fingerprint image improvement yet as matching algorithmic program supported directional curvature technique (DCT) of native ridges and a changed Tree primarily based matching approach. During this technique in preprocessing stage, the Fingerprint is De-noised, Binarized, cut and also the approximate core points square measure calculated by DCT algorithmic program. The trivia points square measure extracted by guide filtering over the image. Characteristic all the trivia accurately yet as rejecting false trivia. Here they focused on the cutting and matching algorithmic program for the identification method wherever cutting method uses a changed approach of reiterative Rotation Invariant cutting algorithmic program (RITA) that is ensures the properly characteristic the trivia purpose.

Madhuri et al.(2012) printed a SURF (Speeded up strong Features) primarily based technique during which they used native strong options for fingerprint illustration and matching as SURF (Speeded up strong Features) are reported to be strong and distinctive in representing native image info and located to be rotation-invariant interest purpose detector and descriptor. This approach perform person recognition in presence of revolved and partial fingerprint pictures and would be expeditiously able to differentiate between real and shammer matches of accuracy and speed. However fails once we image with the less quality is taken.

III. Conclusion

This survey paper gives the detail survey of the work carried out in fingerprint recognition in biometric security or personal identification. It is found after analysis that there is need of some constructive, robust secured method of fingerprint recognition in adverse situation where we may have partial images or environmentally affected images which we would be trying in future course of our dissertation work.

References Références Referencias

1. Masayoshi Kamijo, (1993). "Classifying Fingerprint pictures using Neural Network: account the Classification State". *3*, 1932-1937.
2. K Karu., and A. K. Jain, (1996). "Fingerprint Classification,". *29*, 389-404.
3. Meltem Ballan, Ayhan Sakarya, and Brian Evans, (1998). "A Fingerprint Classification Technique exploitation Directional pictures," . 91-97.
4. Anil religion, Salil Prabhakar, and sculpturer Hong, (1999). "A Multichannel Approach to Fingerprint Classification". *21*, 348-359.
5. Byoung-Ho Cho, Jeung-Seop Kim, Jae-Hyung Bae, In-Gu Bae, and Kee-Young Yoo. (2000). "Fingerprint Image Classification by Core Analysis," .
6. Rajharia Jyoti, Gupta P.C (2012). "A New and Effective Approach for Fingerprint Recognition by exploitation Feed Forward Back Propagation Neural Network". *International Journal of laptop Applications , 52*.
7. Shanawaz Basha. S, Musrat Sultana N (2008). "Spectral trivia Fingerprint Recognition System". *3* (1).
8. Min Mar Mar and Thein Yadana (2008). "Intelligent Fingerprint Recognition System With applied mathematics And Geometrical Approach" .
9. Zhao Qijun, Zhang Lei, Zhang David, Luo Nan, (2009). "Direct Pore Matching for Fingerprint Recognition". 597–606.
10. Singh Dayashankar, Dr. Singh P.K. and Dr. Shukla R.K (2010). "Fingerprint Recognition System supported Mapping". *International Journal of laptop Applications 0975–8887, 5*.
11. Immanuel Kant Chander and Nath Rajender (2010). "Reducing Process-Time for Fingerprint Identification System". *International Journals of Biometric and Bioinformatics, 3* (1).
12. Kekre. H. B, Sarode Tanuja, and Vig Rekha (2011). "machine-controlled Fingerprint Identification System supported Sectorized complicated Walsh Plane". *International Journal of laptop Applications* .
13. Mane Arjun V, Rode Yogesh S, Kale K. V (2011). "Novel Multiple Impression primarily based Multimodal". *International Journal of laptop Applications 0975 – 8887, 27*.

14. D R Shashi Kumar, Raja K B, Chhotaray R K and Sabyasachi Pattanaik (2011). "DWT primarily based Fingerprint Recognition exploitation Non trivia options". *IJCSI International Journal of computing problems, 8* (2).
15. Win Zin Mar and Sein Myint Myint (2012). "strong Fingerprint Recognition System exploitation Orientation and Texture options". 28-29.
16. Sahu Subrat Kumar, Sahani Sruti (2012). "Fingerprint Identification System exploitation Tree primarily based Matching". *International Journal of laptop Applications 0975–8887, 53*.
17. Madhuri and Mishra Richa (2012). "Fingerprint Recognition exploitation strong native options". *International Journal of Advanced analysis in computing and code Engineering, 2* (6).

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A New Classification Performance Aware Multisensor, Multi Resolution Satellite Image Compression Technique

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Abstract - Effective utilization of bandwidth and storage space is important in imaging applications including remote sensing. Remote sensing applications use multi-sensory, multi-band, multi resolution images. Usually, remote sensing applications uses image classification results for their analysis and decision making. In this paper we propose a new JPEG based image compression algorithm based on zooming-shrinking technique. Proposed algorithm performance is evaluated in relation to standard JPEG algorithm. In order to envisage the effect of compression on classification performance, Maximum Likelihood, Mahalanobis and Minimum distance classifiers performance is evaluated with original image data, standard JPEG compressed data and the compressed image data with the proposed method. Experiments are carried out with multi-band images with various resolutions. Our experiments supports that the classification accuracies of compressed images are at par with original image data.

Keywords : *peak signal to noise ratio (PSNR), zooming, shrinking, maximum likelihood, mahalanobis, confusion matrix, kappa coefficient, cross validation.*

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A New Classification Performance Aware Multisensor, Multi Resolution Satellite Image Compression Technique

Ch. Ramesh [α], Dr. N.B. Venkateswarlu [σ] & Dr. J.V.R. Murthy [ρ]

Abstract - Effective utilization of bandwidth and storage space is important in imaging applications including remote sensing. Remote sensing applications use multi-sensory, multi-band, multi resolution images. Usually, remote sensing applications uses image classification results for their analysis and decision making. In this paper we propose a new JPEG based image compression algorithm based on zooming-shrinking technique. Proposed algorithm performance is evaluated in relation to standard JPEG algorithm. In order to envisage the effect of compression on classification performance, Maximum Likelihood, Mahalanobis and Minimum distance classifiers performance is evaluated with original image data, standard JPEG compressed data and the compressed image data with the proposed method. Experiments are carried out with multi-band images with various resolutions. Our experiments supports that the classification accuracies of compressed images are at par with original image data.

Keywords : peak signal to noise ratio (PSNR), zooming, shrinking, maximum likelihood, mahalanobis, confusion matrix, kappa coefficient, cross validation.

I. Introduction

In the recent years use of remote sensing satellite data, air borne sensor data for urban monitoring, traffic monitoring, automatic navigation in driverless cars, disaster warning systems, monitoring the movements of terrorists has increased by many fold in addition to conventional applications such as natural resources management .These applications involves acquisition, communication, storage and processing of horrendous number of images of earth surface.

This situation is becoming more aggravated because of increased pixel resolution, gray level resolution, band resolutions and reduced repetition cycle of satellite. All of these development demands more band width for downlink lines of satellite in addition to more disk space for storage.

In communications, data compression techniques under the name hood of image coding are widely used to reduce the communication bandwidth bottlenecks during data communication. For instance, JPEG standard is used for still image compression [1], MPEG is used for video compression [2]. Also, while communicating data from satellites to ground stations some compression methods are used [3].

A typical image processing system is as shown in Figure 1 that is commonly employed for remote sensing applications. It is very common that most of the application scientists using original image data for their processing. In majority of remote sensing applications, results of classification are the ultimate interest [4].

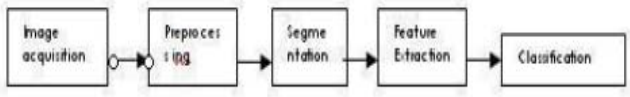

Figure 1 : A Typical Image Processing System

In this study, we propose to study how the classification results will vary if we use compressed image data instead of original image data. Usually applications such as land use classifications assumes samples of a group will be having small random variations in their pixel values while samples of different groups to be having contrastingly different pixel values. Because of the increased pixel and gray level resolutions, samples of a group may be having similar pixel values. Moreover, they will be having high level of spatial auto correlation. Evidently, majority of compression methods exploits this auto correlation to achieve high compression ratios with acceptable PSNR (Peak Signal to Noise Ratio) values [5]. For instance MPEG coding that employs DCT based video compression is widely used for real time surveillance [2].

Our proposed Algorithm is based on Zooming-Shrinking concept. In this Algorithm instead of sending the original image, we send the shrinked image and the difference image between the original image and zoomed image. The size of the shrinked image is very less as compared to the original image that's why it requires less number of bits for communication. The size of the difference image is equals to the original image but the magnitude of the pixel values in the difference image is very low as compared to the magnitude of the pixel values in the original image, that's why it also requires very less number of bits for communication. Therefore the total no of bits required for communicating the shrinked image and the difference image is less than original image. Thus we are achieving compression benefit. We have compared the compression performance of our algorithm with

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standard JPEG algorithm with variety of images, especially from remote sensing applications.

Also in this study, we evaluate the classification performance of popular classification algorithms like Maximum Likelihood, Mahalanobis and Minimum distance by taking original image data, JPEG compressed image data, compressed data that is compressed by our zooming-shrinking based JPEG image compression method.

Our paper work is organized as follows. Section II introduces the standard JPEG algorithm. Section III explains proposed compression algorithm. Selected classification algorithms are illustrated in section IV. Section V includes details about our experimentations and results. Section VI contains conclusions about our research work.

II. Brief Overview of JPEG Encoding / Decoding System

JPEG is a well known standardized image compression technique. JPEG loses information so the decompressed picture is not the same as the original one. The main reason for use of JPEG is to reduce the size of image files. Reducing image files is an important procedure for transmitting files across networks or archiving libraries. Usually JPEG can remove the less important data before the compression; hence JPEG is able to compress images meaningfully, which produces a huge difference in the transmission time and the disk space. Figure 2 shows the basic Architecture of JPEG compression system. Here is a brief overview of the JPEG compression system. [5]

The image is first subdivided into pixel blocks of size 8X8, which are processed left to right, top to bottom. As each 8X8 block or sub image is encountered, its 64 pixels are level shifted by subtracting the quantity L/2, where L is the Gray level resolution of the image . The 2-D Forward Discrete Cosine Transform (FDCT) (Eq-1)[5]of the block is then computed, quantized using 64 corresponding step size values from the quantization table in Figure 3[6]. After quantization the DCT coefficients are rearranged in a zigzag sequence order as shown in the Figure 4. [6]

Since the one-dimensional reordered array generated under the zigzag pattern of Figure 3 is qualitatively arranged according to increasing spatial frequency, the JPEG coding procedure is designed to take the advantage of the long runs of zeros that normally result from the reordering. In particular, the nonzero AC coefficients (the term AC denotes all transform coefficients with the exception of the zeroth or DC coefficient) are coded using a variable-length code that defines the coefficient's value and number of preceding zeros. The DC coefficient is difference coded relative to the DC coefficient of the previous sub image.

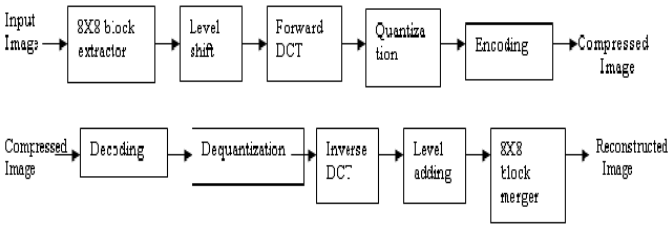

Figure 2 : Basic Architecture of JPEG Compresssion

The 2-D DCT is

$$C(u,v) = \alpha(u)\alpha(v)\sum_{x=0}^{N-1}\sum_{y=0}^{N-1} f(x,y)\cos\left[\frac{(2x+1)u\pi}{2N}\right]\cos\left[\frac{(2y+1)v\pi}{2N}\right] \quad (1)$$

for u, v = 0, 1, 2, ... , N -1

$$\alpha(u) = \begin{cases} \sqrt{1/N} & for \quad u = 0 \\ \sqrt{2/N} & for \quad u > 0 \end{cases} \quad (2)$$

$$\alpha(v) = \begin{cases} \sqrt{1/N} & for \quad v = 0 \\ \sqrt{2/N} & for \quad v > 0 \end{cases} \quad (3)$$

16	11	10	16	24	40	51	61
12	12	14	19	26	58	60	55
14	13	16	24	40	57	69	56
14	17	22	29	51	87	80	62
18	22	37	56	68	109	103	77
24	35	55	64	81	104	113	92
49	64	78	87	103	121	120	101
72	92	95	98	112	100	103	99

Figure 3 : Quantization Matrix [6]

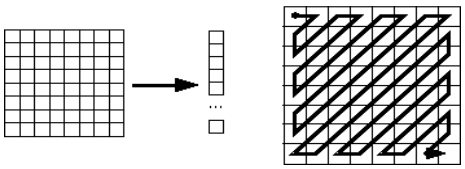

Figure 4 : Zigzag Séquencé [6]

The decompression process performs an inverse procedure. It decodes the Huffman codes. Then, it makes the inversion of the Quantization step. In this stage, the decoder raises the small numbers by multiplying them by the quantization coefficients. The results are not accurate, but they are close to the original numbers of the DCT coefficients. An Inverse Discrete Cosine Transform (IDCT) (Eq.4) [6] is performed on the data received from the previous step. Finally add L/2 to each sub image. Place the sub images in their correct positions.

$$\hat{f}(x,y) = \sum_{u=0}^{N-1}\sum_{v=0}^{N-1}\alpha(u)\alpha(v)C(u,v)\cos\left[\frac{(2x+1)u\pi}{2N}\right]\cos\left[\frac{(2y+1)v\pi}{2N}\right] \quad (4)$$

The error between the original image and reconstructed image is calculated in terms of Peak signal to noise ratio

$$PSNR = 10 \log_{10} (L^2/MSE) \quad (5)$$

$$MSE = \frac{\sum_{x=0}^{m-1}\sum_{y=0}^{n-1}\left[\hat{f}(x,y) - f(x,y)\right]^2}{mXn} \quad (6)$$

MSE – Mean Squared Error

$\hat{f}$(x, y) - Reconstructed Image

f (x, y) – Original Image

m x n – Size of the Image

III. Zooming-Shrinking based JPEG Algorithm

Zooming is a method of increasing the size of a given image. Zooming can be viewed as oversampling or up sampling of a given image. Zooming requires two steps: the creation of new pixel locations, and the assignment of gray levels to those new locations. Shrinking is a method of decreasing the size of a given image. Shrinking can be viewed as under sampling or down sampling. Interpolation is a basic tool used extensively in zooming and shrinking tasks interpolation is the process of using known data to estimate values at unknown locations. Widely used interpolation algorithms are nearest neighborhood, bilinear and bicubic. The bicubic method is more accurate than nearest neighborhood and bilinear interpolation [6]. The proposed algorithm uses the bicubic interpolation. The Proposed Algorithm is described in four stages. The same is illustrated in Figures 5(a)&(b), 6(a)&(b), 7(a)&(b), 8(a)&(b).

Algorithm:

Stage 1

1. Shrink the input image M (Shrinking factor) times, the resulting image is called shrinked image.
2. Zoom the shrinked image M (Zooming factor) times, the resulting image is called Zoomed image.
3. Find the difference image between the Zoomed image and the input image, the resulting image is called the Difference image.

Figure 5(a)

Figure 5(b)

Stage 2

1. The shrinked image is first subdivided into pixel blocks of size 8x8 which are processed from left to right, top to bottom.
2. For each block its 64 pixels are level shifted by subtracting the quantity L/2 where L is the gray level resolution.
3. The 2D-DCT of each block is computed.
4. Quantize the DCT blocks by standard quantization matrix.
5. Form a 1-D sequence of Quantized Coefficients by using Zigzag pattern.
6. Coding the coefficients using JPEG Huffman tables.
7. The receiver decodes the received codes and forms the reconstructed shrinked image.
8. Zoom the reconstructed shrinked image M times

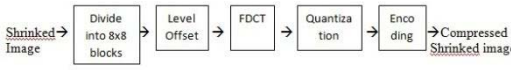

Figure 6(a) : Encoding

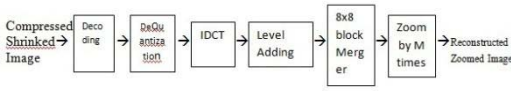

Figure 6(b) : Decoding

Stage 3

1. The difference image is first subdivided into pixel blocks of size 8x8 which are processed from left to right, top to bottom.
2. For each block its 64 pixels are level shifted by subtracting the quantity L/2 where L is the gray level resolution.
3. The 2D-DCT of each block is computed.
4. Quantize the DCT blocks by standard quantization matrix.
5. Form a 1-D sequence of Quantized Coefficients by using Zigzag pattern.
6. Coding the coefficients using JPEG Huffman tables.
7. The receiver decodes the received codes and forms the reconstructed difference Image.

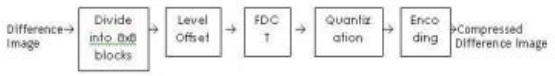

Figure 7(a) : Encoding

Figure 7(b) : Decoding

Stage 4

1. Add the reconstructed zoomed image obtained at stage 2 and the reconstructed difference image obtained at stage 3 and the resulting image is called output image.
2. Compute the error (in terms of PSNR) between the input image and output image.

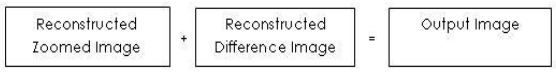

Figure 8(a)

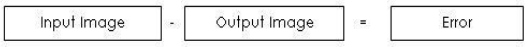

Figure 8(b)

In this algorithm instead of sending the original image, we send the shrinked image and the difference image between the original image and zoomed image. The size of the shrinked image is very less as compared to the original image that's why it requires less number of bits for communication. The size of the difference image is equals to the original image but the magnitude of the pixel values in the difference image is very low as compared to the magnitude of the pixel values in the original image, that's why it also requires very less number of bits for communication. Therefore the total no of bits required for communicating the shrinked image and the difference image is less than original image. Thus we are achieving perceivable compression benefit.

IV. Popular Classification Algorithms

a) Maximum Likelihood Classifier

Let $w_1, w_2, . ., w_m$ denote m distinct populations (classes) with known d-dimensional probability density functions $p_1(X), p_2(X), ...p_m(X),$ respectively. The a priori probabilities that an observation is selected from populations $w_1, w_2, . . . ,$ wm are denoted by $q_l, q_2, ..., q_m,$ respectively[7]. According to the Bayesian ML classification rule, assuming equal costs for misclassifications, a random d dimensional pixel vector X is classified as class wk if

$$q_k p_k(X) = max\{q_i P_i(X)\} \text{ for } i = 1, 2 . . . . ., m. \quad (7)$$

Assuming equal a priori probabilities for all the classes, decision rule (7) becomes:

$$X \in w_k \text{ if}$$

$$p_k(X) = \max\{p_i(X)\}, i = 1, 2 , . . . , m. \quad (8)$$

In Equations (7) and (8), the probability density $p_k(X)$ will be given as:

$$p_k(X) = \frac{1}{(2\pi)^{d/2}\left|\sum_k^{1/2}\right|}$$

$$X \exp[-1/2.(X - M_k)^T \sum_k^{-1}(X - M_k)]. \quad (9)$$

Here, M_k and Σ_k, are the mean vector and covariance matrices of the k^{th} class, and are calculated from the training data. Σ_k is a symmetric positive definite matrix. $\sum_k^{-1}, \left|\sum_k\right|$ are the inverse and determinant of the covariance matrix Σ_k.

b) Mahalanobis Classifier

According to this classifier a d-dimensional random pixel vector (X) will be assigned to the group to which it is nearest [8]. Each group is characterized by its mean vector, which is calculated from training data. Nearness is determined by the Mahalanobis distance between the group mean and X. In mathematical terms, the same classification rule can be represented as:

$$X \in w_i \quad (10)$$

Where i = (1, 2, . . . C) groups if $d_i(X) < d_j(X)$ for all $j \neq i$ where

$$d_i(X) = (X-M_i)^T \Sigma^{-1}(X-M_i) \quad (11)$$

and Mi is mean vector of i^{th} group indicates vector should be transposed. Σ^{-1} is the inverse of the pooled covariance matrix Σ.

c) Minimum Distance Classifier

According to this classifier a random ddimensional pixel vector (X) will be assigned to the group to which it is nearest [9]. Each group is characterized by its mean vector, which is calculated from training data. Nearness is determined by the Euclidean distance between the group mean and X. In mathematical terms, the same classification rule can be represented as:

$$X \in w_i \quad (12)$$

Where i = (1, 2, . . . C) groups if $d_i(X) < d_j(X)$ for all $j \neq i$ where

$$d_i(X) = (X-M_i)^T(X-M_i) \quad (13)$$

and M_i is mean vector of i^{th} group. T indicates vector should be transposed.

V. Experimentations and Results

For the purpose of experimental work, Landsat TM data from USGS data base "www.usgs.gov" is used. Experiments are carried out under MS Windows XP version 2002, SP3 edition. The experimental system is equipped with Intel core 2 Duo 2.60 GHz processor with 1 GB RAM. Using ERDAS Imagine 8.6 (copy rights©1991-2002, Lieca Geo systems) Training sites are labeled. Programs are written in C language under Microsoft Visual Studio 2005 version 8.0.

We have carried out extensive simulations with the selected images and proposed algorithm with different M values. M=2 results the better PSNR. Table 1 shows the Compression Benefit and PSNR loss of proposed algorithm with M=2 as compared to the standard JPEG compression. With all the images we found that proposed algorithm have better compression ratios as compared to standard JPEG coding. The PSNR loss in proposed algorithm is very small as compared to standard JPEG compression. Figure 9 shows the sample (Mono_lake image) Original image, JPEG compressed image, Proposed compressed image.

Original Image JPEG compressed image Proposed compressed image

Figure 9

Table 1 : Compression benefit and PSNR loss of proposed algorithm compared to standard JPEG

Image	Size	No. of bits required for standard approach	No. of bits required for our approach	% of Saving	PSNR standard approach	PSNR for our approach	% loss in PSNR
Mono_lake-band1	1040 X 1040	410486	260010	36.65	39.871	36.463	8.547
Mono_lake-band2		306006	215852	29.46	42.237	39.111	7.401
Mono_lake-band3		399635	250777	37.24	40.435	37.001	8.492
Mono_lake-band4		366063	244232	33.28	41.097	37.443	8.891
Mono_lake-band5		578965	339670	41.33	37.724	33.517	11.152
Mono_lake-band6		249582	221937	11.07	46.608	39.658	14.911
Mono_lake-band7		439079	270574	38.37	39.828	36.139	9.262
		2749816	**1803052**	**34.430**	**41.114**	**37.047**	**9.892**
P143r49_5t19921106_nn1	8139 X 7186	22276827	13753318	38.261	38.468	35.335	8.144
P143r49_5t19921106_nn2		17114083	11508975	32.751	41.309	38.536	6.712
P143r49_5t19921106_nn3		26101868	15407693	40.970	37.970	34.533	9.051
P143r49_5t19921106_nn4		31070502	18600285	40.135	36.534	32.674	10.565
P143r49_5t19921106_nn5		38128640	23225187	39.087	34.765	30.755	11.534
P143r49_5t19921106_nn6		13264142	10952351	17.428	44.396	40.921	7.827
P143r49_5t19921106_nn7		33122366	19806016	40.203	36.005	33.694	6.418
		181078428	**113253825**	**37.445**	**38.492**	**35.206**	**8.536**
P143r51_5t19910410_nn1	8145 X 7183	21219663	12918117	39.12	39.182	35.892	8.396
P143r51_5t19910410_nn2		17565849	11399598	35.103	41.166	38.561	6.328
P143r51_5t19910410_nn3		29131208	15999585	45.077	37.159	33.756	9.157
P143r51_5t19910410_nn4		24843914	14065386	43.384	38.445	35.267	8.266
P143r51_5t19910410_nn5		43468415	26278257	39.546	33.615	29.571	12.030
P143r51_5t19910410_nn6		12195837	10505203	13.862	44.915	41.235	8.193
P143r51_5t19910410_nn7		33544993	18554992	44.686	36.176	32.449	10.302
		181969879	**109721138**	**39.703**	**38.665**	**35.247**	**8.840**

P140r46_5t19880208_nn1	8178 X 7151	14793591	10608198	28.29	42.065	39.639	5.76
P140r46_5t19880208_nn2		13350037	10127580	24.16	43.495	37.394	14.02
P140r46_5t19880208_nn3		21234274	12859193	39.44	39.864	36.615	8.150
P140r46_5t19880208_nn4		22309343	13073208	41.40	39.264	36.036	8.221
P140r46_5t19880208_nn5		35437610	21362439	39.71	35.418	31.302	11.621
P140r46_5t19880208_nn6		11308640	10254401	9.32	47.351	44.571	5.871
P140r46_5t19880208_nn7		26388369	25408107	41.61	38.161	34.446	9.735
		144821864	**93690126**	**35.306**	**40.802**	**37.143**	**8.967**
P144r47_5t19891121_nn1	7846 X 7541	13872181	10274014	25.938	42.924	40.701	5.178
P144r47_5t19891121_nn2		11778466	9605687	18.447	44.576	42.689	4.233
P144r47_5t19891121_nn3		18816517	11785964	37.363	41.407	38.666	6.619
P144r47_5t19891121_nn4		23465669	13434090	42.750	39.503	36.253	8.227
P144r47_5t19891121_nn5		36037459	20180377	44.001	36.158	32.144	12.096
P144r47_5t19891121_nn6		10426827	9889660	5.151	45.715	41.893	8.360
P144r47_5t19891121_nn7		24729780	14079133	43.068	39.462	36.008	8.752
		139126899	**89248925**	**35.850**	**41.392**	**38.336**	**7.383**
P144r45_5t19891105_nn1	7847 X 7542	12983325	9892694	23.804	43.225	41.154	4.791
P144r45_5t19891105_nn2		11400907	9381796	17.710	44.673	42.888	3.995
P144r45_5t19891105_nn3		17921821	11343323	36.706	41.651	39.026	6.302
P144r45_5t19891105_nn4		23216508	13125777	43.463	39.505	36.259	8.216
P144r45_5t19891105_nn5		33533336	18107385	46.001	36.826	32.976	10.454
P144r45_5t19891105_nn6		10791798	9938137	7.910	45.520	41.813	8.143
P144r45_5t19891105_nn7		22611428	13110128	42.019	40.058	36.879	7.935
		132459123	**84899240**	**35.905**	**41.636**	**38.713**	**7.020**
P145r51_5t19910102_nn1	8086 X 7106	18103143	12332599	31.87	40.092	36.987	7.744
P145r51_5t19910102_nn2		15133043	10855756	28.264	42.196	39.442	6.526
P145r51_5t19910102_nn3		23414160	14099923	39.780	38.802	35.433	8.682
P145r51_5t19910102_nn4		27502878	15112472	45.051	37.313	33.998	8.911
P145r51_5t19910102_nn5		39769184	24570078	38.218	34.363	30.417	11.483
P145r51_5t19910102_nn6		12714010	10631922	16.376	44.640	41.259	7.573
P145r51_5t19910102_nn7		28090692	16180854	42.397	37.581	33.976	9.592
		164727110	**103783604**	**36.996**	**274.987**	**251.512**	**8.536**

Confusion matrix [11] is used to assess the accuracy of an image classification. The strength of a confusion matrix is that it identifies the nature of the classification errors, as well as their quantities. In confusion matrix rows correspond to classes in the test set, columns correspond to classes in the classification result. The diagonal elements in the matrix represent the number of correctly classified pixels of each class. The off-diagonal elements represent misclassified pixels. The overall accuracy is calculated as the total number of correctly classified pixels divided by the total number of test pixels.

Another measure which can be extracted from a confusion matrix is the kappa coefficient [10] which is a popular measure to estimate agreement in categorical data. The motivation of this measure is to extract from the correctly classified percentage the actual percentage expected by chance. Thus, this coefficient is calculated as

$$K = \frac{P_0 - P_e}{1 - P_e} \tag{14}$$

P_e is the Expected agreement =

$$\left[\frac{\frac{cm^1 xrm^1}{n} + \frac{cm^2 xrm^2}{n} + \ldots\ldots\ldots \frac{cm^n xrm^n}{n}}{n}\right]$$

cm^1,, cm^2, ... cm^n are the column 1, 2 .....n marginals

rm^1, rm^2, ... rm^n are the row 1, 2---------n marginals

n is the total number of test pixels.

The higher the value of kappa, the better the classification performance. If all information classes are correctly identified, kappa takes the value 1. As the off-diagonal entries increase, the value of kappa decreases.

Cross-Validation [12] is a statistical method of evaluating and comparing learning algorithms. The basic form of cross-validation is k-fold cross-validation. In k-fold cross-validation the data is randomly partitioned into *k* equally (or nearly equally) sized segments or folds. Each time, one of the k subsets is used as the training set and the other *k-1* subsets are put together to form a test set. Then the average error across all *k* trials is computed. The advantage of this method is that all observations are used for both training and testing.

For classification two data sets were used. One was a 1040 X 1040 (Mono_lake image)b Landsat TM with all 7 bands. The second data set contained 500 samples of four ground types, barren land, vegetation, forest and rock of the same scene. This second data set is used to observe the classification accuracy. All the 2000 set patterns were classified simultaneously with the Maximum Likelihood, Mahalanobis and Minimum distance classifiers. Classification performance of all the classifiers is displayed in tables 2, 3 & 4. Figure 10 shows the Overall accuracy of all the classifiers. Classification performance by cross validation with different k's is calculated. Tables 5, 6 &7 displays the classification performance with k=4. Figure 11 shows the Overall accuracy of all the classifiers with cross validation of k=4. It is observed that classification performance on proposed compression images is same as JPEG standard compression images and original images. It is also observed that classification performance of Maximum Likelihood classifier> Mahalanobis classifier>Minimum distance classifier.

Table 2 : Confusion Matrix for Maximum Likelihood classifier

Original Image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	100	500	500	0	0	0
2. Vegetation	91	500	0	455	42	3
3. Forest	99.8	500	0	1	499	0
4. Rock	99.8	500	0	1	0	499
Misclassification= 2.35%	Overall accuracy= 97.65%		Kappa coefficient=0.9686			
Standard JPEG Compression image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	99.8	500	499	0	0	1
2. Vegetation	89	500	0	445	53	2
3. Forest	99	500	0	5	495	0
4. Rock	100	500	0	0	0	500
Misclassification= 3.05%	Overall accuracy= 96.95%		Kappa coefficient=0.9593			
Proposed compressed image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	100	500	500	0	0	0
2. Vegetation	91.2	500	0	448	36	16
3. Forest	99	500	0	5	490	5
4. Rock	100	500	0	0	02	448
Misclassification= 2.45%	Overall accuracy= 94.33%		Kappa coefficient=0.9244			

Table 3 : Confusion matrix for Mahalanobis classifier Original Image

Original Image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	99	500	495	5	0	0
2. Vegetation	96.2	500	0	481	19	0
3. Forest	97.4	500	10	3	487	0
4. Rock	84.8	500	13	63	0	424
Misclassification= 5.65%	Overall accuracy= 94.35%		Kappa coefficient=0.9246			
Standard JPEG Compression image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	99.6	500	498	2	0	0
2. Vegetation	92.6	500	8	463	29	0
3. Forest	95.4	500	11	12	477	0
4. Rock	80.6	500	14	82	1	403
Misclassification= 7.95%	Overall accuracy=92.05%		Kappa coefficient=0.894			
proposed compression image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	97	500	485	7	6	2
2. Vegetation	90.2	500	18	451	27	04
3. Forest	91.8	500	14	20	459	7
4. Rock	88.2	500	13	39	7	441
Misclassification= 9.2%	Overall accuracy= 91.8%		Kappa coefficient=0.8906			

Table 4 : Confusion matrix for Minimum distance classifier

Original Image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	99.6	500	498	0	0	2
2. Vegetation	77.2	500	0	386	114	0
3. Forest	92.2	500	0	39	461	0
4. Rock	43.4	500	222	60	1	217
Misclassification= 21.9	Overall accuracy= 78.1%		Kappa coefficient=0.708			
Standard JPEG compression image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	98.6	500	493	0	0	7
2. Vegetation	76	500	0	380	119	1
3. Forest	93.6	500	0	29	468	3
4. Rock	43.8	500	235	45	1	219
Misclassification= 22%	Overall accuracy= 78%		Kappa coefficient=0.706			
proposed compression image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	97	500	485	0	0	15
2. Vegetation	78	500	0	390	103	7

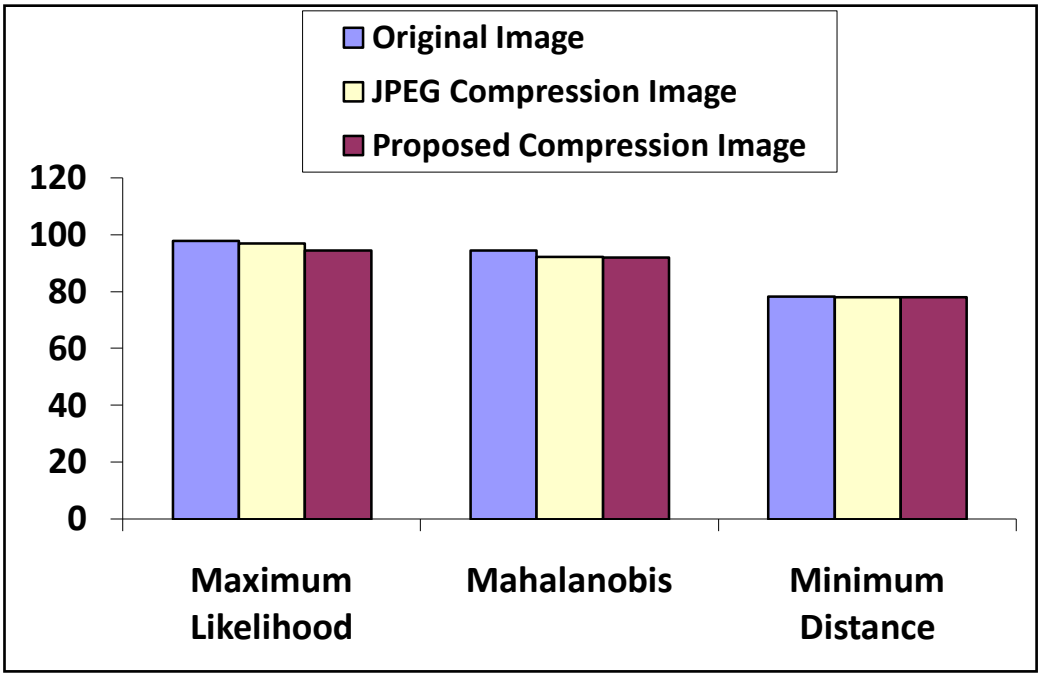

Figure 10 : Overall Accuracy of Classifiers

Table 5 : Average Confusion matrix with cross validation (k=4) of Maximum Likelihood classifier

original image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	99.86	750	749	1	0	0
2. Vegetation	96.4	750	6	723	20	1
3. Forest	96.8	750	2	20	726	2
4. Rock	92.53	750	20	35	1	694
Misclassification= 3.6%	Overall accuracy=96.4%		Kappa coefficient=0.952			
Standard JPEG compression image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	99.6%	750	747	3	0	0
2. Vegetation	96.13%	750	6	721	20	3
3. Forest	96.93%	750	2	19	727	2
4. Rock	92.26%	750	20	35	3	692
Misclassification= 3.77%	Overall accuracy= 96.23%		Kappa coefficient=0.9497			
proposed compression image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	99.6%	750	747	3	0	0
2. Vegetation	96%	750	6	720	21	3
3. Forest	96.53%	750	3	19	724	4
4. Rock	92%	750	20	36	4	690
Misclassification =3.97%	Overall accuracy=96.03 %		Kappa coefficient=0.9470			

Table 6 : Average Confusion matrix with cross validation(k=4) for Mahalanobis classifier

original image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	99.46	750	746	4	0	0
2. Vegetation	94.26	750	12	707	30	1
3. Forest	94.26	750	5	36	707	2
4. Rock	88.80	750	26	54	4	666
Misclassification= 5.8%	Overall accuracy= 94.2%		Kappa coefficient=0.9226			
Standard JPEG compression image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	99.60	750	747	3	0	0
2. Vegetation	94.26	750	18	707	25	0
3. Forest	90.93	750	6	54	682	8
4. Rock	86.26	750	31	64	8	647
Misclassification= 7.24%	Overall accuracy= 92.76%		Kappa coefficient=0.9034			
proposed compression image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	99.46	750	746	4	0	0
2. Vegetation	93.46	750	21	701	23	5
3. Forest	91.06	750	13	42	683	12
4. Rock	86.8	750	39	46	14	651
Misclassification= 7.3%	Overall accuracy= 92.7%		Kappa coefficient=0.902			

Table 7 : Average Confusion matrix with cross validation (k=4) for Minimum distance classifier

original image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	99.73	750	748	0	0	2
2. Vegetation	86.13	750	1	646	103	0
3. Forest	67.6	750	0	242	507	1
4. Rock	67.2	750	157	77	12	504
Misclassification= 19.84%	Overall accuracy= 80.16%		Kappa coefficient=0.7354			
standard JPEG compression image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	99.73	750	748	0	0	2
2. Vegetation	86.13	750	4	646	100	0
3. Forest	67.86	750	0	240	509	10
4. Rock	66.67	750	176	65	9	500
Misclassification= 19.9%	Overall accuracy= 80.1%		Kappa coefficient=0.7346			
proposed compression image						
Spectral Class	Correct Classification (%)	Number of Samples used	Classified as group			
			1	2	3	4
1. barren land	100	750	750	0	0	0
2. Vegetation	86.93	750	3	652	95	0
3. Forest	69.2	750	0	231	519	0
4. Rock	69.2	750	183	43	5	519
Misclassification= 18.67%	Overall accuracy= 81.33%		Kappa coefficient=0.751			

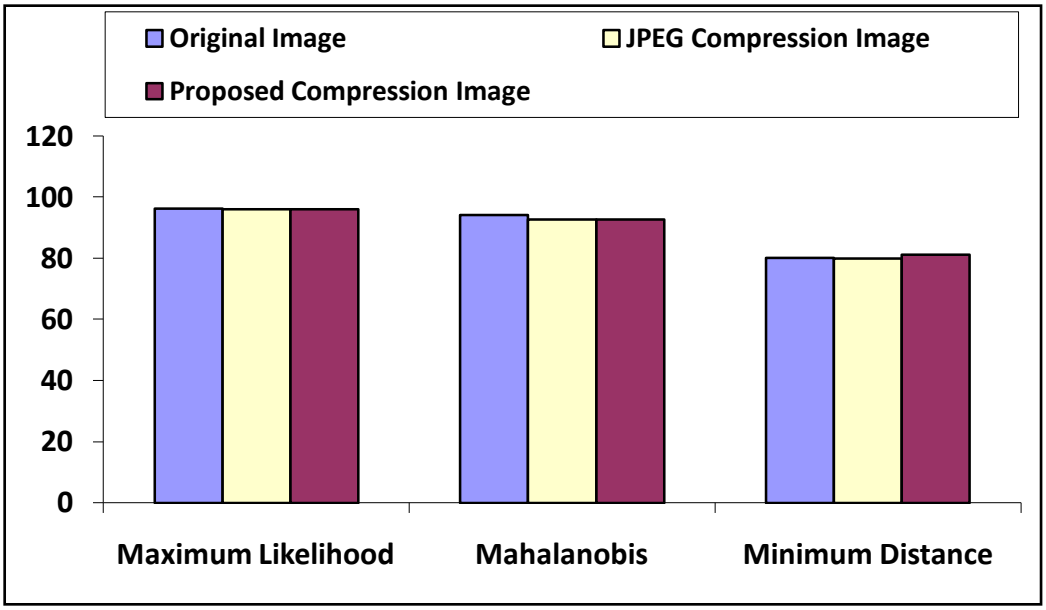

Figure 11 : Overall Accuracy of Classifiers with Cross Validation (K=4)

VI. Conclusions

In this paper, a new Zooming-Shrinking based JPEG compression algorithm is proposed. We have compared our proposed algorithm with Standard JPEG compression. From our experiments it is evident that our approach gives better compression ratios compared to Standard JPEG. The PSNR resulting from our approach is slightly less than Standard JPEG approach. Also the Classification accuracy of original images, Standard JPEG compression images and proposed compression images are almost same.

If a typical satellite mission goal is classification only, then we can send compressed images from satellite which saves bandwidth requirements of a satellite mission. Also, storage requirement reduces by many folds as we will be storing compressed images only. This indirectly reduces power requirement needs of the storage system. In addition, loading and storing of images takes less time compared to original images, thus response times of imaging systems increases.

References Références Referencias

1. Darrel Hankerson, Greg A. Harris, Peter, D. Johnson Jr, "Introduction to information theory and data compression" second edition. A CRC press company.
2. John Watkinson (2004). "MPEG Handbook".
3. Bormin Huang, Antonlo J. Plaza, Joan Serra-Sagrista, Chulhee Lee, Younsong LI, Shen-En Qlan (2010, August). "Satellite Data compression, communications and Processing VI". 3-5.
4. John R. Jensen (n.d.). "Introductory Digital Image Processing A Remote Sensing Perspective" Second Edition, Prentice Hall.
5. Cung Nguyen (n.d.). "Detecting Computer–Induced Errors in Remote-Sensing JPEG Compression Algorithms".
6. R.C. Gonzalez and R.E. Woods (1993). "Digital Image Processing", 2nd Edition Addison Wesley.
7. NB Venkateswarlu & PSVSK Raju, (1991). "Three Stage ML Classifier",. *24*, 1113-1116.
8. NB Venkateswarlu & PSVSK Raju. (1994). "Winograd's method: a perspective for some pattern recognition problems". 105-109.
9. NB Venkateswarlu & PSVSK Raju. (1993). "A new fast classifier for remotely sensed imagery,. *International Journal of Remote Sensing, 14*, 383-389.
10. Anthony J. Viera, MD; Joanne M. Garrett, (2005, May). "Understanding Interobserver Agreement: The Kappa Statistic".
11. Morton. J. Canty, "Image Analysis, Classification and Change Detection in Remote Sensing: With Algorithms for ENVI/IDL", A CRC press company.
12. Kim H. Esbensen, "Multivariate Data Analysis-In Practice", Aalborg University, Esbjerg.

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FPR a Secure and Secured Biometric in Web Banking-Survey

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Abstract - Today, attributable to the vulnerability of normal authentication system, crime has accumulated among the past few years. Identity authentication in web banking depends on biometric feature like face, iris, voice, hand mathematics, handwriting, retina; fingerprints can significantly decrease the fraud. in order that they unit being replaced by biometric authentication mechanisms. Among natural science, fingerprint systems square measure one among most typically researched and used. Its trendy attributable to their simple accessibility. Throughout this paper we tend to tend to debate the elaborate study of varied finger implementation techniques therefore on determine the problems associated in FPR and outline innovative constructive technique for fingerprint recognition.

Keywords : *biometrics, fingerprint recognition, web banking, etc.*

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Abstract - **Today, attributable to the vulnerability of normal authentication system, crime has accumulated among the past few years. Identity authentication in web banking depends on biometric feature like face, iris, voice, hand mathematics, handwriting, retina; fingerprints can significantly decrease the fraud. in order that they unit being replaced by biometric authentication mechanisms. Among natural science, fingerprint systems square measure one among most typically researched and used. Its trendy attributable to their simple accessibility. Throughout this paper we tend to tend to debate the elaborate study of varied finger implementation techniques therefore on determine the problems associated in FPR and outline innovative constructive technique for fingerprint recognition.**

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I. Introduction

Human beings use physical characteristics like face, voice, gait, etc. to acknowledge one another from their birth itself. With new advances in technology, bioscience has become associate rising technology for recognizing people victimization their biological traits. This technology makes use of the very fact that every person has specific distinctive physical traits that square measure one's characteristics that can't be lost, borrowed or taken. By victimization bioscience it's attainable to verify or establish identity supported "who the individual is", instead of by "what the individual possesses" (e.g., associate ID card) or "what the individual remembers" (e.g., a password).

Passwords verify identity through user data, if somebody is aware of the countersign, then that person will get access to some restricted areas or resources of an exact system. The disadvantage is that a countersign has nothing to try to to with the particular person victimization it. Passwords are often taken, and users will provide their passwords to others, leading to systems that square measure at risk of unauthorized individuals. There are no foolproof thanks to create password-protected systems safe from unauthorized users. There's no approach for password-based systems to work out user identity definitely. The initial intent of such schemes is, however, to confirm that the provided services square measure accessed solely by a licensed user, and not anyone else. Many systems need authenticating someone before giving access to their resources. Bioscience is long celebrated to acknowledge persons supported their physical and activity characteristics. Samples of completely different biometric systems embody fingerprint recognition, Fingerprint Recognition, iris recognition, membrane recognition, hand pure mathematics, voice recognition, biometric authentication, etc. Fingerprint Recognition especially, has received a substantial attention in recent years each from the trade and also the analysis communities. The real-life challenge here is that the identification of people in everyday settings, like offices or living-rooms. The dynamic, rackety information concerned during this variety of task is extremely completely different thereto utilized in typical laptop vision analysis, wherever specific constraints square measure won't to limit variations. Traditionally, such limitations are essential so as to limit the procedure burden needed to method, store and analyze visual information. However, monumental enhancements in computers in terms of speed of process and size of storage media, in the course of progress in applied math techniques, is creating it attainable to understand such advanced systems.

II. Motivation

With this advances in technology, bioscience is turning into a part of day to day life, wherever someone is recognized by his/her personal biological characteristics. Bioscience permits variety of applications, which might be divided into the subsequent 3 main groups:

1. Industrial applications like network login, electronic information security, e-commerce, web access, ATM, master-card, physical access management, mobile phone, PDA, medical records management, distance learning, etc.,
2. Government applications like national ID card, punitory facilities, driver's license, Social Security, welfare-disbursement, border management, passport management, etc., and
3. Forensic applications like remains identification, criminal investigation, terrorist identification, parentage determination, missing kids, etc.

Fingerprint Recognition has received extensive interest as a wide accepted biometric, attributable to the convenience in assembling Fingerprint pictures of persons. Fingerprint Recognition is being employed in

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varied applications like web banking, crowd police investigation, and criminal identification, and list, access to entry etc. Fingerprint Recognition developers; but, have to be compelled to contemplate variety of major problems before Fingerprint Recognition systems become commonplace systems. Following figure shows that the human fingerprint is comprised of assorted forms of ridge patterns, traditionally classified in step with the decades-old Henry system: left loop, right loop, arch, whorl, and tented arch.

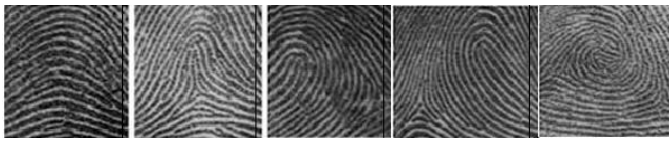

Figure 1 : Left loop, right loop, arch, whorl, and tented arch of a fingerprint

The requirements for a helpful industrial Fingerprint Recognition and identity work system for little teams of celebrated people in busy free environments like web banking, domestic living rooms or offices square measure.

1. General needs that require being glad by all parts of the system,
2. Acquisitions needs involved with watching and extraction,
3. Fingerprint Recognition needs for the popularity stage, and
4. Identity needs that square measure involved with however the popularity output is employed.

Fingerprint recognition remains as associate unresolved downside and a demanded technology. In fact, the earliest works on this subject were created within the 1950's in science. They came hooked up to different problems like poor quality, broken or tampered for perception of gestures. Engineering began to show interest in Fingerprint recognition within the 1960's. Historical perspective of this work started however during this paper we tend to tried to mention a number of the problems in FPR.

Zsolt et.al. (2000) projected a effective fingerprint verification system. During this technique they tried to validate the identity of a individual by exploit on-line fingerprints and trivialities matching by getting the reference image by filtering and careful trivialities extraction procedures. The trivialities correspondences square measure found employing a triangular matching algorithmic rule to address the robust deformation of fingerprint pictures attributable to static friction or finger rolling and also the final verification uses Dynamic Time warp. Triangular matching is quick and overcomes the relative nonlinear deformation gift within the fingerprint image pairs. In fact, triangular matching saves native regularities and compensates for world distortion. The Dynamic Time warp permits a really low false positive rate to be obtained. Thus claiming high accuracy and matching rate. However once assembling the image there square measure probabilities of losing the data associated resulting in the poor classification.

Shlomo et. al. (2000) projected 2 ways for fingerprint image improvement i.e. first, victimization native bar graph feat, Wiener filtering, and image binarization. The second methodology uses a distinctive eolotropic filter for direct grayscale improvement. They use native bar graph feat for distinction growth and Wiener filtering for noise reduction. The binarization method is applied by adaptational thresholding primarily based on the native intensity mean. Dilution is then dole out that provides sensible results on fingerprints. Finally morphological filtering is applied to eliminate artifacts in rackety regions and to fill some gaps in valid ridgelines. The second methodology use a distinctive eolotropic filter for direct grayscale improvement that need binarization and dilution as intermediate steps acting quicker and economical.

Jim et.al.(2003) projected a partial dilution theme for fingerprint recognition system to scale back the computation within the dilution method. during this method the entire fingerprint image are often avoided if enough trivialities are extracted from the partial weakened space of a fingerprint image. The recognition system consists of 4 stages: preprocessing (image acquisition and background removal), image improvement (direction detection, binarization and thinning), trivialities extraction, and trivialities matching. Here they verify and use the core purpose (reference point) of a fingerprint image because the center of dilution method, and five hundredth of the fingerprint image is weakened at first. If extracted trivialities of weakened space don't seem to be enough for matching, more dilution is performed. The fingerprint recognition system victimization the partial dilution has the higher performance in terms of recognition rate and computing time as incontestable by the experimental results. additionally, associate adaptational methodology is bestowed to notice block direction. This adaptational methodology chooses eight pixels of a block to work out its block direction, and so a compensation method is employed to correct some wrong block directions. But,the partial dilution theme can be applied to different stages of the fingerprint recognition system, particularly in image binarization, which needs intensive computations.

Takahiro et.al. (2004) projected the parallel ridge filtering methodology which might powerfully suppress non-parallel noise lines by utilizing the correspondence of ridges. The substantial improvement in elimination of noise that's achieved by this methodology helps within the reduction of matching errors in poor-quality fingerprint pictures. However still this work have to be compelled to be extended with

regions that Contain very little ridge correspondence and parallel noise lines.

Guorong et.al. (2005) projected associate internet-based personality verification system victimization lossless information concealing and fingerprint recognition technologies. Here at the shopper aspect, the SHA-256 hash of the initial fingerprint image and sensitive personal info square measure encrypted and embedded into the fingerprint image victimization a complicated lossless information concealing theme and at the service supplier aspect, once the hidden information square measure extracted out, the fingerprint image are often recovered with none distortion attributable to the usage of the lossless information concealing theme. Hence, the originality of the fingerprint image is ensured via hash check. However in image watermarking the information recovery could be a challenge task in period of time situations.

Jan Lukas et.al.(2005) during this work they projected to use the sensor's pattern noise for camera identification from pictures. Here the pattern noise is extracted from the pictures employing a wavelet-based denoising filter. for every camera underneath investigation initial its reference pattern noise as a high-frequency unfold spectrum watermark, whose presence within the image is established employing a correlation detector is decided that is a singular identification fingerprint. For this they tried victimization the method of flat-fielding if the camera in possession or by averaging the noise obtained from multiple pictures. to spot the camera from a given image, we tend to contemplate the reference pattern noise as a high-frequency unfold spectrum watermark, whose presence within the image is established employing a correlation detector. however once malicious meddling happens then finding the meddling space could be a tough job and identification becomes tough.

Jinwei et.al.(2006) projected a framework for fingerprint recognition by combining the world structure (the model-based orientation field) and also the native cues (minutiae). So, during this work associate intuitive illustration for fingerprints that preserves the entire orientation field within the templet besides trivialities and different options. On average, it wants but 420 bytes to store all the data, and have extraction and matching are often wiped out concerning zero.30 s per fingerprint, that makes it appropriate for large-scale on-line process..Based on this illustration, fingerprint matching is performed by combining the world structure (orientation field) and also the native cues (minutiae).Thus representing fingerprints with a whole set of complementary options isn't solely necessary for storing however additionally terribly useful for recognition. however this world-and-local illustration framework are often extended more by together with another global or native options obtainable within the fingerprint pictures like the ridge density map.

Gorka et.al.(2007) in their thesis report examinationed varied approaches supported binzatiarion, skeltonization and trivialities matching algorithmic rule. Once through analysis they tried to boost these ways to present higher performances in adverse things. To mitigate this issue, during this work they urged a increased binarization methodology within the frequency domain to enhance quality of the fingerprint recognition systems with the conception of ridges and their orientations. Similarly, Skeletonization is required as a preprocessing step with the aim of getting the trivialities from the fingerprint. Because it could be a reality that the prime quality skeleton is associate emphatic think about the fingerprint recognition. thus guaranteed that a strong skeletoned image can ensure a reliable extraction of options. And finally they projected trivialities matching algorithms explore tho' many variations of the geometric hashing methodology to get associate effectiveness operate.

Ahmet et.al. (2008) projected introduced a brand new supply DSLR (Digital single lens reflex) camera identification theme supported sensing element mud traces. during this methodology the mud spots within the image square measure detected supported a (Gaussian) intensity loss model and form properties. the placement and form of mud specks before of the imaging sensing element and their persistence create mud spots a helpful fingerprint for DSLR cameras. Although several DSLR cameras escort intrinsical mud removal mechanisms, these hardware-based removal solutions don't seem to be as effective as they claim to be. However biggest challenge during this analysis direction is that the detection of mud spots in terribly advanced regions and lo -numbers.

Stephen et.al. (2009) projected a concavity and convexity improvement methodology of binarization for preprocessing the fingerprint pictures of non-uniform brightness for fingerprint authentication. This methodology isn't involved with the orientations of the ridges/valleys however solely depends on the native pixels info. Here they compared preprocessing results with the discriminate analysis and native threshold ways. Though the discriminant analysis and native threshold ways turn out sensible ends up in some pictures, they unsuccessful in most of {the pictures the pictures the photographs} attributable to high variety of ridge bursts The projected concavity and convexity improvement methodology overcomes the ridge burst downside and produces sensible results even in poor quality images. Conventionally, shadow compensation is dole out throughout preprocessing like noise removal. In shadow removal, brightness compensation is achieved if the illumination influence is understood. during this work, by skipping this method, process speed was improved. however in future this methodology are often improved

by combining templet matching and easy principal element analysis.

Ravi et.al. (2009) projected a methodology a way a technique for fingerprint Recognition victimization detail Score Matching method (FRMSM).In this methodology for fingerprint dilution the Block Filter is employed that scans the image at the boundary to preserves the standard of the image and extract the trivialities from the weakened image. The pre-processing the initial fingerprint involves image binarization, ridge dilution, and noise removal. Fingerprint Recognition victimization detail Score Matching methodology is employed for matching the detail points. The false matching quantitative relation is best compared to the present algorithmic rule. But extracting the detail in caliber pictures could be a major issue and will cause misclassification.

Neeta et.al.(2010) projected alignment-based elastic matching algorithmic rule is capable of finding the correspondences between trivialities while not resorting to complete analysis. during this work relies on the conception of segmentation victimization Morphological operations, detail marking by specially considering the triple branch reckoning, detail unification by moldering a branch into 3 terminations and matching within the unified x-y system. once a 2-step transformation so as to extend the preciseness of the detail localization method and elimination of spurious detail with higher accuracy. there's a scope of more improvement in terms of potency and accuracy which might be achieved by up the hardware to capture the image or by up the image improvement techniques. in order that the input image to the dilution stage can be created higher this might improve the long run stages and also the final outcome.

Shashi et.al.(2010) projected Fingerprint Verification supported fusion of trivialities and Ridges victimization Strength Factors within which the trivialities and ridge ways square measure combined. In FVMRSF methodology within the preprocessing stage the Fingerprint is Binarised and weakened. The trivialities Matching Score is decided victimization Block Filter and Ridge matching score is calculable victimization Hough rework. The strength factors Alpha (α) and Beta (β) square measure wont to generate Hybrid matching score for matching of fingerprints. Then the trivialities and also the ridge parameters square measure amalgamate victimization the Strength Factors to enhance the performance. However the performance might are improved by adding the rippling rework because it helps in compact fingerprint recognition.

Kazuya et.al. (2010) projected a technique to pick out pixels used for camera identification in keeping with the feel complexness to enhance the accuracy of camera identification. During this methodology camera identification accuracy is reduced by the image process engine like motion blur correction, distinction improvement, and noise reduction. Additionally urged {a methodology a way a technique} for up the identification accuracy by the image restoration method. In this paper, we've got shown the improved camera identification methodology. The identification accuracy is improved by choosing pixels used for correlation calculation in keeping with the feel complexness. And also the identification accuracy is additionally improved by the image restoration that restores the PNU noise varied by the image process engine. however still there's huge concern to own a systematic methodology to properly estimate the restoration operate. is left to the long run work.

Miroslav et.al.(2010) developed a quick algorithms for locating if a given fingerprint already resides within the info and for decisive whether or not a given image was taken by a camera whose fingerprint is within the info. Here they accomplished that in worst-case complexness remains proportional to the info size however doesn't rely on the sensing element resolution. The algorithmic rule works by extracting a digest of the question fingerprint fashioned by the foremost extreme ten,000 fingerprint values and so some matches their positions with the positions of pixels within the digests of all info fingerprints. The algorithmic rule needs a distributed arrangement that must be updated with each new fingerprint enclosed within the info. The algorithmic rule is meant to create certain that the likelihood of a match and warning for the quick search is a twin of the corresponding error possibilities of the direct brute-force search. at that time they additionally claim that the quick algorithmic rule doesn't believe any structure or special properties of the fingerprints within the info. thus it are often utilized in any application wherever a info contains n-dimensional components and n could be a fastened sizable amount. The sole demand is that the weather carries with it real numbers or integers from an outsized vary. However integers from a tiny low vary would cause ill-defined ranks. Associate extreme case once the rank correlation and consequently, the quick search algorithmic rule can't be used, square measure binary vectors.

Sara et.al.(2010) urged a reliable authentication mechanism that isn't keen about a series of characters, however rather on a technology that's distinctive and solely possessed by the individual known as FingerID. this method is aims to market the convenience for the net user since he/she won't have to be compelled to bear in mind multiple passwords for a multiple variety of accounts. The accessibility, usability and security tips are tested on the FingerID web site and browser by suggests that of diverse activities and located that the online accounts a safer, accessible and usable one. However this will increase the price of the system.

Chandra et.al.(2011) projected a technique a way to get a noise-free fingerprint image they projected the finger print classifications, characteristics and

preprocessing techniques. Wherever they applied the bar graph on 256 grey scale finger print image with the default threshold value; then the histogram-equalized image is obtained. Next, histogram-equalized image is given underneath the binarization method. Finally the binarized fingerprint image is filtered with the implementation of the Median filtering technique so as to provide the noise free image. The comparison of the median filtered image with the initial rackety image shows the depth of the noise unfold within the original image. Their experimental result shows the noise rate that was eliminated within the input fingerprint image and quality of the filtered image victimization the applied math –Correlation tool.

Bayram et.al. (2012) projected a technique to represent sensing element fingerprints in binary-quantized type because the massive size and random nature of sensing element fingerprints makes them inconvenient to store. In their work they analyzed the modification within the performance caused attributable to loss of data attributable to binarization. Hence, binarization of sensing element fingerprints is a good methodology that provides extensive storage gain and complexness reduction whiles not a big reduction in fingerprint matching accuracy. However this may not be effective for rackety or info lost fingerprints resulting in the misclassification.

Yoon et.al.(2012) projected a algorithmic rule supported the options extracted from the orientation field and trivialities satisfies the 3 essential needs for alteration detection algorithm:1) quick operational time, 2) high true positive rate at low false positive rate, and 3) easy integration into AFIS. The projected algorithmic rule and also the NFIQ criterion were tested on an outsized property right fingerprint info (NIST SD14) as natural fingerprints associated an altered fingerprint info provided by a enforcement agency.

Romany et.al.(2012) projected a brand new technique to fingerprint recognition primarily based a window that contain core purpose this window are input ANN system to be model. This methodology could be a adaptation singular purpose detection methodology that will increase the accuracy of the algorithmic rule. This sturdy methodology for locating the core purpose of a fingerprint. The world threshold reduces probabilities of incorrectly locating a core purpose attributable to presence of discontinuities like scars or wrinkles, which can occur within the existing processes. Since the detection relies on a world threshold, the strategy solely offers America associate approximate location of the core purpose. For precise detection of the core purpose, we tend to use the pure mathematics of region technique over a smaller search window victimization ANN. They show that as image size window that contain core purpose in center decreases the system performance additionally decrease however not the dimensions however additionally the quantity of trivialities.

III. Conclusion

Fingerprint recognition system has been triple-crown for many application areas like web Banking, portable computer login, bank account recovery and cheque method. but the fingerprint recognition system still faces with defect in accuracy rate. the primary objectives of the projected system will perform plenty of accuracy rate. This survey paper offers the detail analysis of FPR techniques to have a strong constructive methodology for authentication or determine a personal in industrial areas like web banking in adverse state of affairs like poor quality pictures that we'd be attempting in future course of our treatise work.

References Références Referencias

1. Miklos Zsolt Kova cs-Vajna, (2000). "A Fingerprint Verification System supported Triangular Matching and Dynamic Time Warping" in IEEE Transactions on Pattern Analysis and Machine Intelligence,. *22*.
2. Linguist Shlomo, Mayer Aladjem, Daniel Kogan and Itshak Dimitrov (2000). Ben-Gurion University of the desert, Beer-Sheva, Israel "Fingerprint Image improvement victimization Filtering Techniques" IEEE Trans. Pattern Analysis and Machine Intelligence,. *8*.
3. Jim Z. C. Lai, and Shih-Chia Kuo, (2000). Department of data Engineering by "An Improved Fingerprint Recognition System supported Partial Thinning" in sixteenth IPPR Conference on laptop Vision, Graphics and Image process.
4. Takahiro Nakamura, Miwako Hirooka, Hideto Fujiwara, Kazuhiko Sumi (2004). "Fingerprint Image improvement employing a Parallel Ridge Filter".
5. Guorong Xuan, Junxiang Zheng, Chengyun rule, Yun Q. Shi, Dekun Zou, Liu Liansheng and Bai Weichao (2005). "A Secure Internet-Based personality Verification System victimization lossless Watermarking and Fingerprint Recognition". 55–65.
6. J. Lukáš, J. Fridrich, and M. Goljan, (2005). "Determining digital image origin victimization sensing element imperfections". *5685*. http://www.ws.binghamton.edu/fridrich/Research/ EI5685-29 _ Forensic.pdf.
7. Jinwei Gu, Jie Zhou, (2006). "Fingerprint Recognition by Combining world Structure and native Cues". *15*.
8. Gorka Treceño Fontecha, Beatriz Mora Barbero (2007). "Examination of varied Approaches to presumably Improve the present Algorithms Applied in Fingerprint Recognition Systems".

9. A. E. Dirik, H. T. Sencar, and N. Memon, H. T. (2008, Sep.). "Digital single lens camera identification from traces of sensing element mud". 539–552,.
10. Karungaru, Keiji Fukuda, Minoru Fukumi and Norio Akamastu (2009). "Fingerprint pictures improvement employing a Concavity and Convexity method" in medical specialty Soft Computing and Human Sciences. *14*, 39-46.
11. Ravi. J, K. B. Raja, Venugopal. K. R (2009). "Fingerprint Recognition victimization detail Score Matching". *International Journal of field and Technology, 1*, 35-42.
12. Neeta Murmu and Abha Otti (2010). "Fingerprint Recognition" in Department of applied science National Institute of Technology Rourkela.
13. Shashi Kumar D. R, R. K. Chhotaray, K.B. Raja, Sabyasachi Pattanaik "Fingerprint Verification supported Fusion of trivialities and Ridges victimization Strength Factors". *International Journal of laptop Applications, 4*, 2010.
14. Kazuya Matsushita and Hitoshi Kitazawa (2010). "An Improved Camera Identification methodology supported the feel complexness and also the Image Restoration". *International Journal of Hybrid info Technology, 3*.
15. M. Goljan, J. J. Fridrich, and T. Filler, (2010). "Managing an outsized info of camera fingerprints".
16. Sara Jeza Alotaibi, Mike Wald, David Argles (2010). "Using Fingerprint Recognition in an exceedingly New Security Model for Accessing Distributed Systems". *International Journal of Intelligent Computing analysis, 1* (4).
17. Dr. E. Chandra, K. Kanagalakshmi, (2011). "Noise Elimination in Fingerprint Image victimization Median Filter". *Int. J. Advanced Networking and Applications, 2* (6), 950-955.
18. Sevinç Bay ram, Hüsrev Taha Sencar, and Nasir Memon (2012). "Efficient sensing element Fingerprint Matching through Fingerprint Binarization". *7*.
19. Romany F. Mansour, AbdulSamad, A. Marghilani (2012). "A New Technique to Fingerprint Recognition supported Partial Window". *3*.
20. Soweon Yoon, Jianjiang Feng, Anil K. Jain, (2012). "Altered Fingerprints: Analysis and Detection", IEEE Transactions on Pattern Analysis and Machine Intelligence,. *34*, 451-464.

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Content base Image Retrieval by using Bayesian Algorithm to Improve the Quality on the bases of Color, Texture and Density

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Abstract - Content Based Image Retrieval in Medical (CBIRM) a technique for retrieving image on the basis of automatically derived features such as color, texture and shape to index images with minimal human intervention. This document is based on the research work done in the field of Content based image retrieval. Color, texture and shape information have been the primitive image descriptors in content based image retrieval systems CBIRM consists of retrieving the most visually similar images to a given query image from a database of medical images Various algorithm are define in CBIR but we can use Bayesian algorithm to reduce the noise from an image.

Keywords : *medical informatics, content based image retrieval in medical (CBIRM), bayesian algorithm.*

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Content base Image Retrieval by using Bayesian Algorithm to Improve the Quality on the bases of Color, Texture and Density

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Abstract - Content Based Image Retrieval in Medical (CBIRM) a technique for retrieving image on the basis of automatically derived features such as color, texture and shape to index images with minimal human intervention. This document is based on the research work done in the field of Content based image retrieval. Color, texture and shape information have been the primitive image descriptors in content based image retrieval systems CBIRM consists of retrieving the most visually similar images to a given query image from a database of medical images Various algorithm are define in CBIR but we can use Bayesian algorithm to reduce the noise from an image.

Keywords : medical informatics, content based image retrieval in medical (CBIRM), bayesian algorithm.

I. Introduction

Medical informatics is the sub-discipline of health informatics that directly impacts the patient physician relationship. It focuses on the information technology that enables the effective collection of data using technology tools to develop medical knowledge and to facilitate the delivery of patient medical care. The goal of medical informatics is to ensure access to critical patient medical information at the precise time and place it is needed to make medical decisions. Medical informatics also focuses on the management of medical data for research and education. CBIR Content based image retrieval Content based image retrieval (CBIR), also known as query by image content (QBIC) and content-based visual information retrieval (CBVIR) is the application of computer vision techniques to the image retrieval problem, that is, the problem of searching for digital images in large databases. Content based image retrieval is opposed to concept based approached. "Content-based" means that the search will analyze the actual contents of the image rather than the metadata such as keywords, tags, and/or descriptions associated with the image.

'Content' in this context might refer to colors, shapes, textures, or any other information that can be derived from the image itself. Thus a system that can filter images based on their content would provide better indexing and return more accurate results. The term Content-Based Image Retrieval (CBIR) seems to have originated in 1992, when it was used by T. Kato to describe experiments into automatic retrieval of images from a database, based on the colors and shapes present. Since then, the term has been used to describe the process of retrieving desired images from a large collection on the basis of syntactical image features. The techniques, tools and algorithms that are used originate from fields such as statistics, pattern recognition, signal processing, and computer vision.

A better way to search is Content-based Image Retrieval.

1. CBIR consists of two elements:
   a. A feature extraction algorithm that describes the content of each image.
   b. A retrieval algorithm that uses the features to retrieve images according to a query.
2. Successful retrieval algorithms always work interactively with the user by a process called relevance feedback.

Feature Extraction 1

1. A computer extracts features of an image, to do with colour, texture, location and shape of objects.
2. These features (hopefully) describe well the content (or semantics) of the image.
3. This can be done off-line and needs to be done only once.
4. Searching the database is based on these features and a "similarity measure" between them.
5. This is a decreasing function of a distance between their features.

Feature Extraction 2

1. An image X is a matrix {Xij | i = 1, . . . ,n1; j = 1, . . ., n2};
2. Xij is colour of pixel (i, j); colour is a 3-vector, for example in RGB-space Xij = (Rij, Gij, Bij)∈ {0..255} ^ 3.
3. Feature vector of length d is f (X) ∈ Rd;
4. Distance between images X1 and X2 is d(X1, X2) = k f (X1) − f (X2) k;
5. Similarity measure s(X1, X2) = exp{d(X1, X2)) or d(X1, X2) −1 etc.

a) Bayesian Algorithm The Bayesian Classification represents a supervised learning method as well as a statistical method for classification. It can solve

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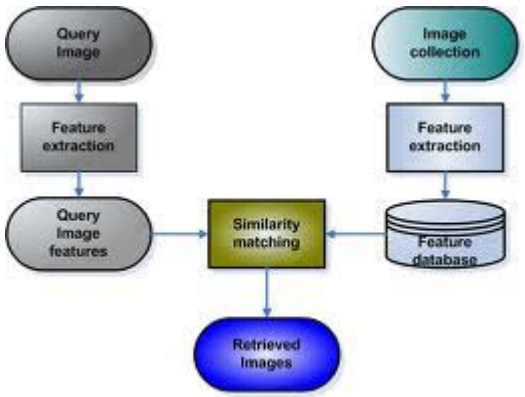
diagnostic and predictive problems. This Classification is named after Thomas Bayes (1702-1761), who proposed the Bayes Theorem. Bayesian classification provides practical learning algorithms and prior knowledge and observed data can be combined. Bayesian Classification provides a useful perspective for understanding and evaluating many learning algorithms. It calculates explicit probabilities for hypothesis and it is robust to noise in input data. Bayesian algorithm is used to reduce the noise from an image.

Block Diagram



II. Methodology

The content-based image retrieval (CBIR), relevance feedback has been put on many efforts for the past few years, a new relevance feedback approach with progressive leaning capability. It is based on a Bayesian classifier and treats positive and negative feedback with different strategies. According to the Bayesian algorithm firstly we take the image and applying the thresholding technique on that image .After the thresholding technique the given size of the image is changed or we can say that input data. Bayesian algorithm is used to reduce the noise from an image.

III. Conclusion

Analysis and improvement in CBIR using Bayesian approach by analyzing on the basis of texture, histogram equalization, edge and color. We have proposed a Bayesian method for image retrieval using color, texture and shape features within a multiresolution multigrid framework. Features drawn from conditional co-occurrence histograms computed by using image and its complement in RGB color space, serve as color and texture descriptors Improving the quality and reduce the noise of retrieved image. The Bayesian algorithm provide the better result as compare to all other CBIR algorithm. In the future we can also work on DICOM images to improve the quality.

References Références Referencias

1. P. S. Hiremath and Jagadeesh Pujari "Content Based Image Retrieval based on Color, Texture and Shape features using Image and its complement",. *International Journal of Computer Science and Security, 1* (4).
2. Nidhi Singhai and prof. Shishkir K. Shandilya (2010). "Content Based image retrieval System". *4*.
3. Linnjun yang and Bo Geng, (2011). "object reterival using visual query context". *13*.
4. Derven Zhuang and Shoujue Wang. (2010). "Context based image retrieval based on integrating region segmentation and relevance feedback".
5. Gulfishan Firdose Ahmed, Raju Barskar, Jyoti Bharti and Nitin Singh Rajput, (2010). "content base image retrieval using Fast phong Shading".
6. Katherine A. Heller and Zoubin Ghahraman (2006). "A simple Bayesian framework for content based image retrieval",.
7. Rajshree S. Dubey, Rajnish Choubey and joy Bhattacharjee, (2010). "Multifeature Content Based Image Retrieval". *2*.
8. Sh. Akbarpour, (2013). "A review on content based image retrieval in medical diagnosis". *5*.

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3. Think Like Evaluators: If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

4. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

5. Ask your Guides: If you are having any difficulty in your research, then do not hesitate to share your difficulty to your guide (if you have any). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work then ask the supervisor to help you with the alternative. He might also provide you the list of essential readings.

6. Use of computer is recommended: As you are doing research in the field of Computer Science, then this point is quite obvious.

7. Use right software: Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

8. Use the Internet for help: An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

9. Use and get big pictures: Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

10. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

11. Revise what you wrote: When you write anything, always read it, summarize it and then finalize it.

12. Make all efforts: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

13. Have backups: When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

14. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

15. Use of direct quotes: When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

16. Use proper verb tense: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

17. Never use online paper: If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

18. Pick a good study spot: To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. Think technically: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

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Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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