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An Enhanced Bio-Chaotic Algorithm for Classifying Iris Image Extraction and Encryption

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Abstract
This paper gives a Implementation on Iris Biometric recognition technique using Enhanced Bio-Chaotic Algorithm . The classification of the iris image based on feature extraction, Recognition algorithms Scale-Invariant Feature(SIF) Transform. The SIF Transform algorithm support to retrieve macro features from the iris template. Then the iris images which are saved into the database undergoes feature extraction and Recognition technique so that they can be related with the input image provided to the user. The Iris images which accomplish the norm of best feature matching are retrieved and display. The input Iris image is then split into parts so as to implement the Enhanced Bio-Chaotic Algorithm. Firstly iris image is classified and then randomly one block is elected to hide secret message into it and encrypting the whole image using the same key. The chart of both original as well as encrypted iris image is achieved so that one can see the variations after the encryption process. Only empower user knows about the random block that's why raider fails to fraud attack. The decryption process is reversal of encryption process. Then, the encrypted image is send to the receiver via Voting Machine, so that at the receiver end decryption can be done securely. The Enhnaced bio-chaotic cipher algorithm helps to encrypt the Iris images and stored into database after when it need for verification it securely using key and enhanced biochaotic function. The vast progress in this field shows that iris biometric still needs fast, real time, reliable, and robust algorithms so as to have higher recognition rate and better accuracy. We hope that this paper will surely support to this area with new research opportunities and challenges.

Keywords
Biometric recognition; Iris recognition system; Iris database; Iris Encryption; Bio-Chaotic Algorithm; authentication; feature matching; normalization; localization; segmentation

I. Introduction

Biometric is the one of the best security authentication tool for all kind of digital and electrical systems wherever restrained the access to all physical products and devices is provided by identifying the particular either based on physical or behavioral characteristics. [1]. One of the most effective methods for the well-being of security is biometrics. The term biometrics is the combo of two words Bio & Metric. It is a most recent technologies for identifying the individual peoples based on their physical or observable attributes. The Real attributes are more reliable than observable attributes and has no risk of being used by anyone else or forgetting it or losing it and these attributes include fingerprint, hand geometry, handwriting, face, iris, voice, retina, vein etc. As far as security importance is treated, there is a need to guaranty that only recognized persons can enter to the restricted areas like bank, R&D etc. Biometric identification systems are valid alternatives to traditional identification systems such as showing identity cards, use of passwords, making signatures etc. The disadvantage of classical identification systems can be avoided by accommodating the biometric methods and with the help of these biometric methods, it is possible to identify an individuals based on who they are rather than what they acquire or what they recognize. Many biometric techniques that deal with automatic recognition of a person are hand geometry; face recognition fingerprint recognition, retina scanning and iris recognition. The iris recognition is based on iris biometrics.

Since biometrics is to a great degree hard to trend and can't be neglected or embezzled, Biometric verification offers a helpful, precise, vital and high secure option for a person, which makes it has points of interest over customary encryption-based confirmation plot [3]. It has turned into a hot interdisciplinary theme including biometric and encryption. Biometric information is close to home security data, which remarkably and for all time related with a man and can't be supplanted like passwords or keys. Once an enemy bargains the biometric information of a client, the information is lost everlastingly, which may prompt a colossal money related misfortune. Thus, one noteworthy concern is the means by which a man's biometric information, once gathered, can be secured [4]. More applications in iris biometrics concern to realize the affinity between entirely different topics, that classified iris images into many limited classes. For occurrence, in iris corporal property disclosure, one has to categories all iris images into two classes, real or fake iris pictures; in some

oratorical or technical applications, the genetic data of iris images could also be required, e.g. race classification of iris images into asian and non-asian subjects. Likewise, the allotment of all iris images within the essential information into multiple classes could expedite speed up large-scale iris recognition. To delight the need of these fundamental applications towards a protected, powerful and acceptable society, iris pictures classification ways are important to accredit an application definite category label to every iris images. Iris corporal property disclosure, race regulation, iris reorganization are common applications of iris image classification, so that they will be unified into a general framework.

II. Review of Related Work

A number of researchers have worked on biometric identification in all the fields of behavioral aspects & the physiological aspects around the globe. In this section, only a small encyclopedic literature survey of the recent works done by various authors is being presented w.r.t. the work taken up in this exciting & application oriented research field. Iris recognition system is an accurate biometric system.

Many numbers of of the iris recognition system was developed to several kind of emerging area of research, such as Image compression, Image noise reduction, Image segmentation, Image Acquisition, Image restoration, Image quality assessment, Image

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feature extraction, Image normalization, iris code matching, Image Evaluation , applications, searching large database performance under changing situation and multi - biometrics.

In more number of the work completed by the different kind of researchers and authors granted in the earlier paragraphs, here lot of disadvantages and drawbacks. Some of these main disadvantages are going to be considered in our research work and new contributions are going to be produced in the due course of the research work, which will be authenticated by simulation results along with some real time experimentations.

Further an identification technique, which is invariant to tilt and scale variation has been proposed by V. Garagad et al [5], wherever, the Iris images region is radially find to extract the character feature. Property of discontinuity is used to crop the unwanted region in the image of an eye. To find the center coordinates of pupil, the segmented image is traced along diagonal coordinates with concentric circles of increasing radii. The coordinate that provides maximum ratio is considered as the center of pupil. The main part of Related normalization is helped where the ratio of more no of pupil radius of test picture to max pupil radius of reference picture is measured to normalize the test picture. The important gray signature code of 90*180 bytes is accessed to using Daugman's rubber sheet model. Then this image is code converted to binary signature code using a relative threshold. A bit by bit comparison of signature code of test image and the Iris images in the database is done to authenticate the user. The proposed work is conceptually simple as compared to integral- differential operators with the average recognition rate of 83.14%.

Jhon Paul *et al* [9] has Provided an advanced automatic segmentation algorithm helping the circular Hough transform to recognize the Iris pupil edges and linear Hough transform for catching the occluding eyelids. To discard the eyelashes and impressions thresholding is hired. The anecdotal region is assigned using the Daughman's rubber sheet model. The normalized Iris image is convolved with the 1D Log-Gabor wavelets and the resulting phase data is used to extract the feature from the Iris image. And finally for the template matching Hamming distance is employed. This recognition rate achieved a FAR of 0.005% and FRR of 0.238 % for CSISA images.

Yuan *et al* [7]and[28] has proposed feature extraction method which is invariant to illumination. The pre-processing of image is performed by using Hough transform to localize Iris and Daugman rubber sheet model to normalize the Iris image. The annular region containing eyelid and eyelashes are discarded (45° to 135° and 225° to 325°) and the rest annular region is normalized and converted to 64 X 256 modern rectangle. Phase partnerships depends on entire magnitude of signal producing it invariant to brightness changes. In the working flows of feature extraction, the normalized image is convoluted with the bank of 2D log-Gabor filters with different orientation and scales. Euclidean distance of feature vectors is calculated during matching. It is reported that the matching rate is about 98%.

Mohamed *et al* [11] has proposed a method that differs from the existing work in the Iris segmentation and feature extraction phase. The paper also provides a comparison between two Iris localization techniques, viz., Wildes' algorithm and morphological features. Wilde's algorithm (circular Hough transform) proved to be better at localization as compared to morphological method. Gabor wavelets are used for feature extraction. The normalized image is convolved with 1D Gabor wavelet and Iris information is encoded by binary encoding scheme. Hamming distance is used for feature matching. The paper proves that Circular Hough Transform is unaffected by noise and is better than morphological methods.

III. Proposed Approach Framework and Design

The Advanced Pattern identifying is the bilateral problem with the iris picture classifying and identifying. i.e Main Classification of iris image alter methods of predefined categories. The sole distinction is that the definition of sophistication labels at 106910691069 macro or small scale. For recognition, the category label is the identity of an individual (individual identity). Moreover Iris images properties classifying with category label that could be corresponded to a gaggle of information subjects Iris texture naturally has distinctive pattern for every subject therefore we will extract the severally specific options {to distinguish |to totally differentiate |to tell apart} different subjects. The important iris picture classification has to However, iris image classification has to recognize the balanced relationship of similar iris image texture opportunity between entirely different subjects.

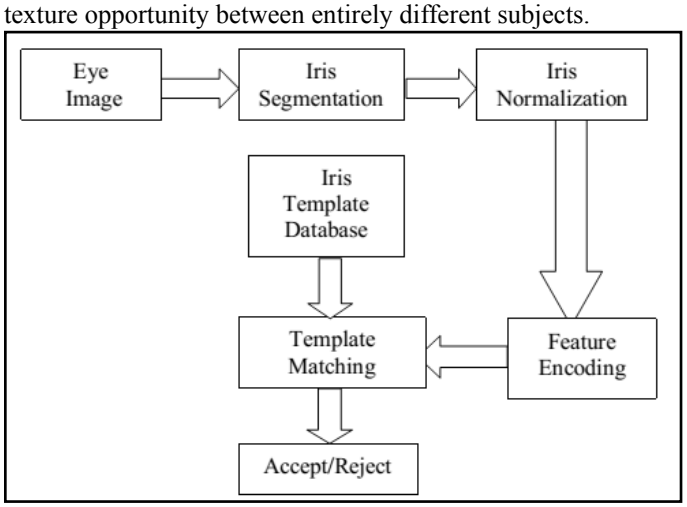

Fig.1: Block diagram of iris recognition system

The iris Image recognition system is mainly a five steps process as follows.

1. Iris Segmentation
2. Iris Normalization
3. Feature Encoding
4. Template Matching
5. Human Identification

1. Iris Segmentation

Captured eye image will act as an input for this stage. Iris segmentation is related to segment the iris part from the eye image for further processing. The Iris image regions will be extracted by analysing the boundary between the pupil and iris, and the, and the all edges between the iris and the sclera.

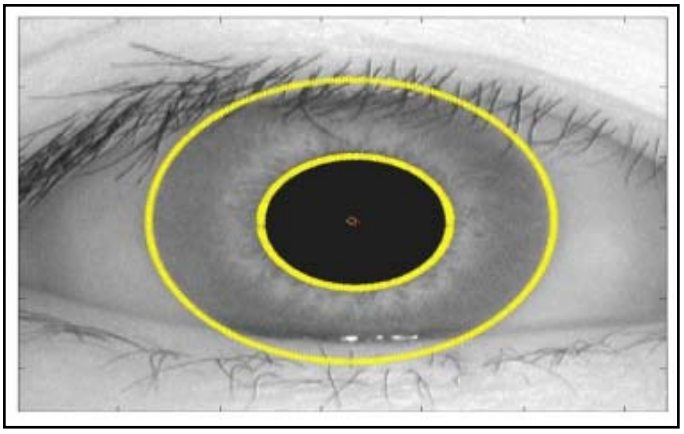

Fig. 2: Iris Segmentation

2. Iris normalization

Iris normalization process deals with transforming the segmented iris image into fixed size rectangular image so that all the images of same size are processed for better comparison .Thus this process gives the iris images of constant dimensions so that two images of same iris will have features at same spatial location. Following figure could be represented Daugmans rubber sheet model in carried out of Iris normalization.

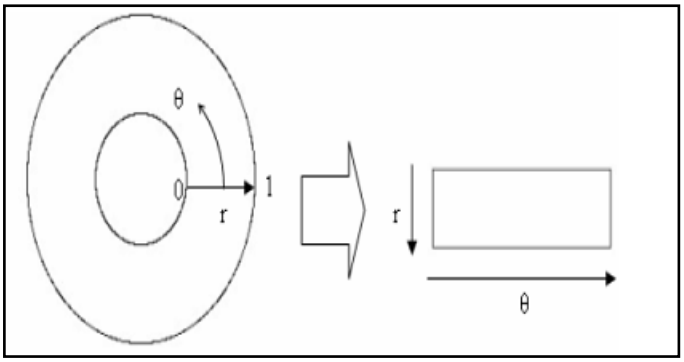

Fig. 3: Iris Normalization

3. Feature Encoding

An iris code or template is generated with the help of feature encoding process. Basically a template in the recognition process represents the information of a biometric sample in the binary form.

4. Template Matching

In this step, comparison of two iris codes or two templates is carried out using Hamming distance. That recognizing system taking the decision of template matching process depending upon the value of humming distance.

A. System Architecture

The Iris picture is classified using feature enhanced matching technique. The SIF Transform is used for feature extraction whereas canny edge detector is used to detect the boundary of the image. The every features of matching images percentages is always adjustable performance. Now we focused our proposed technique of Enhanced bio-chaotic algorithm help to encrypt the iris images after extraction and it will be stored into database. Here iris image is used in the form of binary pattern then this binary data is divided into the block. One block is chosen randomly to use as the secrete encryption key.

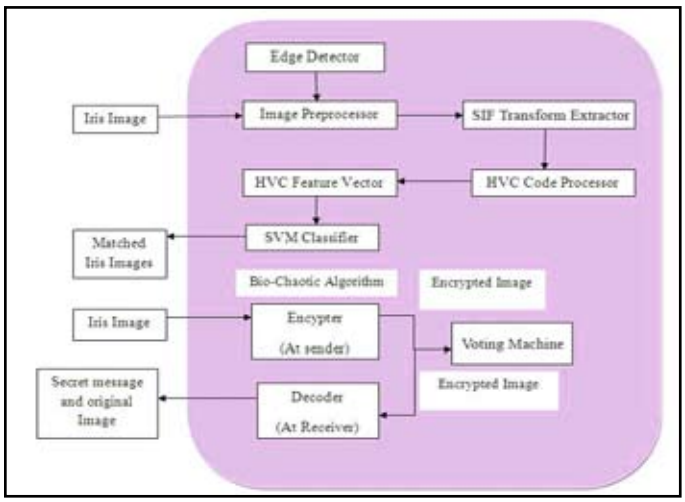

Fig. 4: Iris Normalization

This key in return also encrypted using quantum cryptographic algorithm. Now this encrypted secrete key is used to encrypt the other blocks.IN this working process important one of decryption reverse process has been applied in this encryption process.

Enhanced Bio-Chaotic Algorithm:

An Enhanced Bio-chaotic algorithm will be used for encrypt the iris image. In this research use following steps for encrypting process.

Initial Condition= 2n-1 ; n=1,2,3..so on.

Finally this process given some output for like key and others. That key names call Biometric key then Xored in other blocks. It is a Iris picture template (Divided in 256bits/blocks). The Main advantage of this algorithm encrypting the image in that way infiltrator or attackers always easily decrypt the image.
In this process we using first condition of LFSR method for create more advanced secret key generation.. An LFSR of length n over a finite field P q consist of n stages (an-1,an-2,an-3,……,a0) with ai Є of Pq, and a polynomial.

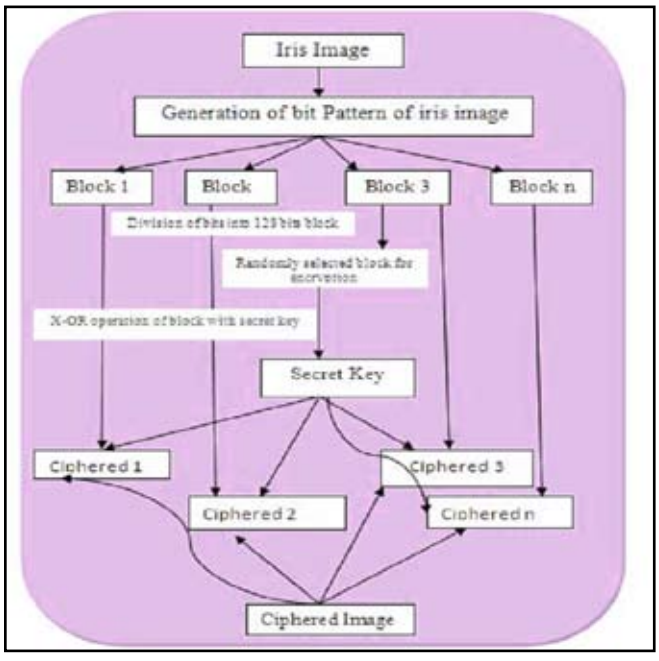

Fig. 5: Block Diagram of Bio-Chaotic Algorithm

B(x)=1+c1x1+c2x2+….+cnxn over Pq

The X-oring of the secret key and iris template simultaneously to generate the biometric key by using the equation,

Biometric key=a1 xor b1, a2 xor b2,…,an xor bn

Finally this works given some main output for like key and others. That key names call Biometric key then Xored in other blocks. It is a Iris picture template (Divided in 256bits/blocks). The Main advantage of this algorithm encrypting the image in that way infiltrator or attackers always easily decrypt the image.
To make the this Enhanced Bio-Chaotic algorithm more stronger and more secure addition of the chaotic function to the biometric key will be constructive and it could be encrypt advanced secure fashion way it apply over the iris image. The image decryption process could be determined that used image will be reversal process. That image carried same fashion methodology could be used for this encryption process but in reversed direction.

Plain image= Ciphered image x-or key

IV. Implemenation And Results

In this area this research performing the practical environment, scenarios, performance metrics used etc.

1. Input

In the Iris picture template could be used for an input of the practical session experiments apply to all online database like CASIA, MongoDB and other.

2. Iris Image pre-processing and Classification

Image Pre-processing and Classification The normalization of iris image is done. The Gaussian blur is used to remove the noise from the image for detecting the features of the iris image. The Experiments given normalized image used for feature extraction, it will get after the pre-processing technique. The SIF Transform algorithm support to retrieve macro features from the iris template. Then the iris images which are saved into the database undergoes undergoes feature extraction and Recognition technique so that they can be related with the input image provided to the user.
Then the clustering of these extracted features is done the closely related features will be grouped into the same cluster. After that pooling is done using SPM to acquire the HVC feature vector. Depending upon that SVM classifier works on classifying the image into fake or genuine. For securing these iris templates BCA is used which is nothing but the encrypting image by partitioning it and secrete key.

3. Output

Our Research output given encrypted image as well as original image, which showing some little change into the image done by hacker can change (Ex. flipped bit into a single bit) powerful output.

4. Results

The results compared here are time graph between existing and proposed system is shown in below figure

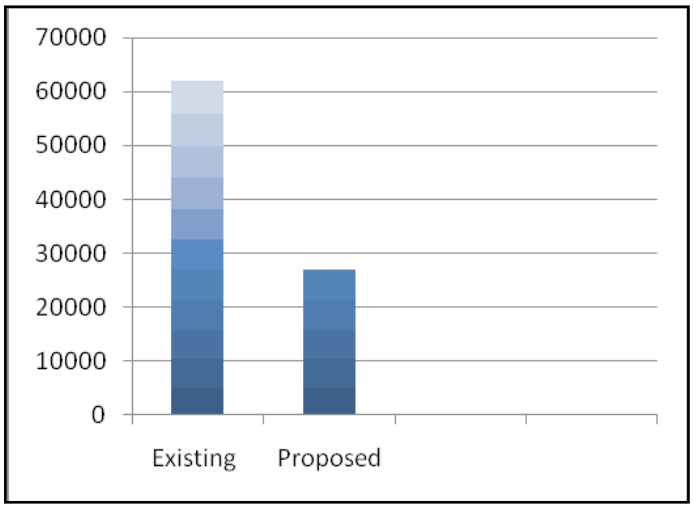

Fig. 6: Time Comparison Graph

X-axis: Existing system and Proposed System
Y-axis: Response Time (ms)
The existing system and proposed system against response time is plotted. The response time is in milliseconds. In this proposed system we get best output of less time of execution process than the existing system.

V. Conclusion

The research work that is undertaken by me under the guidance of my supervisor / guide was aimed to develop sophisticated biomedical biometric image processing algorithms for the identification of human beings through the IRIS part of the human eye. Extensive literature survey was carried out in this exciting field, the problem was identified & well defined. In the research work considered, a sincere attempt is made to develop a simple and efficient method for iris recognition using Enhanced Bio-Chaotic Algorithm by developing a GUI system for the Iris Based Voting Machine integrated with IRIS recognition concept. Software tool 'Matlab' was used to solve the identified problem using suitable novel algorithms after running the developed code.

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