International Journal of Recent Technology and Engineering (IJRTE)
ISSN: 2277-3878, Volume-8 Issue-4, November 2019

Secure Authentication with Iris using Hamming Distance

P.Vimala, C.Karthika Pragadeeswari

Abstract: ***Biometrics authentication is the automated recognition of physiological or behavioral characteristics of a person without any previous knowledge. It adds a unique identifier and it is extremely difficult to duplicate. One of the most unique biometric authentication structures is iris pattern. It is the most solid and exact distinguishing proof structure existing around. The exhibition of this acknowledgment framework can be estimated with quality and acknowledgment rate. In the proposed work, iris code were generated by the processing the iris image by applying preprocessing, gaber filter, normalization, feature encoding by Fast Fourier Transform and then Hamming distance was used for pattern matching. The overall success rate shows that iris recognition is a reliable and accurate biometric authentication.***

Keywords: ***Image processing, Iris, Normalization, Preprocessing, Segmentation, Feature Extraction, Hamming Distance.***

I. INTRODUCTION

In today's challenging world, security is the need of the hour. Swaroop Borukar *et. al* [1], done finger print recognition with enrolment processing, template generation followed by matching the templates. They got results with low cost implementation and portability benefits. Rakesh Rathi *et. al* [2] proposed some facial points and distances between them to recognize the face images. They provide solutions to some challenges during recognition like pose, illumination, facial expressions, image condition and face size. Among the human trademark, Iris example is considered as the most exact trademark for client confirmation since it has the upsides of being contactless and no past learning required for client's utilization this strategy [3,4,5]. The iris is a slight roundabout area, which lies between the cornea and the focal point of the human eye [6]. The iris in Fig.1 is punctured near its inside by a roundabout gap known as the pupil. Its capacity is to control the measure of light entering through the pupil. Its average diameter is 12mm. different iris pattern are existing between humans. Also twins have non similar iris. Blind person also has iris. If we get any injuries iris won't change its pattern.

Manuscript published on November 30, 2019.
* Correspondence Author
P.Vimala*, Assistant Professors, Department of Electronics and Communication Engineering, Facultyof Engineering and Technology, Annamalai University, Chidambaram, Tamil Nadu, India.
C.Karthika Pragadeeswari, Assistant Professors, Department of Electronics and Communication Engineering, Alagappa Chettiar Government College of Engineering and Technology, Karaikudi, Tamil Nadu, India.

In national border controls, driving license and other personal certificates also in the area of internet security iris recognition plays a more important authentication. Many applications such as in ATM, iris recognition can be used for credit or debit option and also as a means of secure biometric authentication in many reputed organizations and to maintain secure access to main confidentiality.

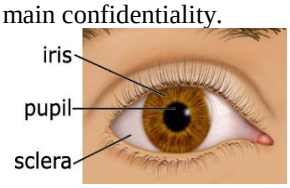

Fig.1 Iris and its parts

To login a computer, an iris can be treated as a living password. Dal Ho Cho *et. al* [7], utilized ongoing iris restriction for iris acknowledgment in mobile phone. They fail to get accuracy in recognition process. They use localization procedure and false solutions are obtained. Libor Masek [8] did various patterns of iris to recognize for biometric identification. They get some accurate results but for typical images the accuracy is minimum. Shubhika Ranjan *et. al* [9] proposed iris recognition system with image processing tools such as image acquisition, segmentation and preprocessing operations. They acquired image from the UBIRIS database and the CASIA [10,11] database. They run for hundreds of images and obtained the feature extraction result. In the proposed work, iris recognition performed by image processing using feature encoding with FFT and feature matching with Hamming distance for limited data set yields better results.

II. PROPOSED SYSTEM

The various stages of recognition techniques shown in fig. 2, of the proposed system are

- The picture of eye should be gained and is shot (Image procurement).
- A layout is created for eyes' iris area for biometric authentication.
- This layout is considered in respect with different formats for correlation until either a coordinating model is found or no match is identified.
- If a match is remembered, we can announced recognized and recognized
- If no match is remembered, we can stay unidentified and mysterious.

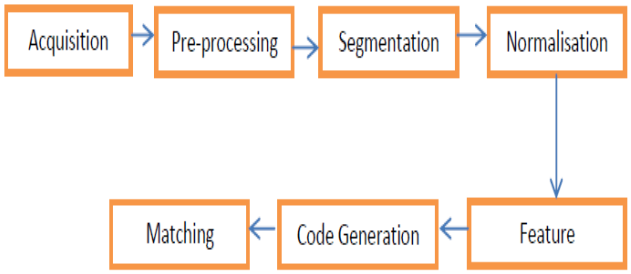

Fig.2 Proposed System

A. Image Acquisition

The picture is procured from an online database of eye pictures. Two open databases were picked to perform tests upon: the UBIRIS database and the CASIA database. Here we use the CASIA (Institute of Automation, Chinese Academy of Sciences) database images for obtaining good results because images in CASIA database are taken as close as proximity. CASIA images are open source purely for iris research only.

B. Image Preprocessing

The second module, preprocessing includes different advances, for example, iris liveness discovery, pupil and iris limit identification, eyelid recognition and expulsion and standardization. Iris liveness location separates live subject from a photo, a video playback, a glass eye or different antiques. It is conceivable that biometric highlights are manufactured and wrongfully utilized. The iris picture is first changed over into 160×260 size. There are different elements influencing iris acknowledgment are dark scale change, size, area and eyelashes. To defeat these we have changed over RGB pictures into Gray picture, at that point morphological administrators were applied by Mira and Mayer [12] to acquire iris limits. The inward limit is distinguished by applying edge, picture opening and shutting administrators. The external limit is distinguished by applying edge, shutting and opening administrators.

C. Segmentation

The head of the division procedure is to find the iris locale in the eye picture. This includes finding the inside fringe between the student, the little gap, and the iris district and the outside fringe between the iris and the sclera, the white hued some portion of the eye. In many models, these limits, which probably won't be consummately rounded, are demonstrated as two un-concentric circles. Iris, the pigmented locale of the eye, can be isolated from the sclera, the white zone of the eye, yet is lighter than the student. Division methods depend on this suspicion that is disentangling the procedure to a huge degree. The division is finished utilizing Sobel operator. The Sobel administrator, once in a while called the Sobel Feldman administrator or Sobel channel, is utilized in picture handling and PC vision, especially inside edge location calculations where it makes a picture accentuating edges. In fact, it is a discrete separation administrator, processing a guess of the angle of the picture force work. The administrator depends on convolving the picture with a little, distinguishable, and whole number esteemed channel in the flat and vertical ways and is along these lines moderately cheap as far as calculations. Then again, the slope estimation that it produces is moderately unrefined, specifically for high recurrence varieties in the picture Sobel channel is a straightforward guess to the idea of inclination with smoothing. The 3×3 convolution veil is generally used to distinguish slopes in X and Y bearings. The administrator comprises of a couple of 3×3 convolution pieces. One portion is just the other turned by 90. These pieces are intended to react maximally to edges running vertically and on a level plane comparative with the pixel lattice, one part for every one of the two opposite directions. The parts can be applied independently to the info picture, to deliver separate estimations of the angle segment in every direction (call these Gx and Gy). These would then be able to be joined together to locate the outright greatness of the slope at each point and the direction of that angle. The means are streamlined as pursue

1. Think about a lattice with size 4.
2. Give us a chance to think about the components in the window of size 3.
3. Discover the x-subordinate (Gx) by subtracting the primary line from third column utilizing the veil.
4. Discover the y-derivative (Gy) by subtracting the primary section from third segment utilizing the cover.
5. Discover the inclination and rehash the strategy for the entire picture framework.

D. Normalization

Normalization is done by Sobel power law transformation for darkening the specific region and then we fixing threshold values for the obtained image as 100. And then we transform the iris image into the unsigned integer for the feature matching. Then the images are unwrapped because in power law transformation an entire image is darkened and need to detect the iris region separately. So unwrapping of iris image is performed.

E. Feature Encoding

Using Fast Fourier Transform iris picture is encoded. Fourier change gives a ground-breaking option in contrast to straight spatial sifting. For a huge channel it would be increasingly proficient to utilize Fourier change. Fourier change permit to seclude and process specific picture frequencies and along these lines to perform low-pass separating with an extraordinary level of exactness. Fourier change expresses that any capacity that intermittently rehashes itself can be communicated as the total of sine and cosine of various frequencies and various amplitudes. Y = FFT(X) in Matlab restores the Discrete Fourier Transform (DFT) of vector X, figured with a Fast Fourier change calculation.

F. Feature Matching

This is last advance in Iris acknowledgment framework. In this progression, include coordinating is characterizes the honesty match score dependent on the two encoded Iris pictures. It has a few procedures to characterize the match score. The element encoding procedures are hamming separation.

III. HAMMING DISTANCE

In light of two Iris formats, ascertain coordinating score by utilizing the Hamming Distance which gives a proportion of what number of bits opposes this idea. Hamming separation is determined by utilizing two Iris layouts, Iris format bits are moved one move right and one move left to decide rotational irregularities. Two iris pictures of a similar eye will be dictated by rotational irregularities with the distinction of most extreme point between same iris pictures.

Retrieval Number: D7447118419/2019©BEIESP
DOI:10.35940/ijrteD7447.118419
Journal Website: www.ijrte.org

Published By:
Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP)

Bit move idea is applied to get estimated coordinating score by moving one piece left and one piece right. The hamming distance is calculated by

$$HD = \frac{1}{N}\sum_{j=1}^{N} C_A(j) XOR C_B(j)$$

where C_A and C_B are the two bit-wise component vectors to compare, N is the size of the component vector and are the coefficients of iris picture.

Each iris region will produce a bit pattern with high degrees of freedom which is independent to the bit pattern that is produced by another iris. The bit patterns produced by same iris are highly correlated and the Hamming distance between them is close to 0. If two bits patterns generated from different irises are completely independent, the Hamming distance between them is equal to 0.5. The Hamming distance is the matching metric employed with bit patterns that are generated from the actual iris region. The Hamming distance between two bit patterns is the number of corresponding bit positions that differ. This can be found by using XOR logic on corresponding bits or by adding corresponding bits with without a carry.

IV. RESULTS AND DISCUSSION

The assessment techniques for pictures were performed as below. For thresholding, the picture is required to be changed over to Gray scale. The picture is then moved to capacity called thresholding. Based shading distinction of iris from sclera, iris can be portioned utilizing the strategy dependent on thresholding. The little area of associated pixels are expelled which are redundant for activity. Some piece of pixels may have been evacuated that has left a gap in the picture, is repaid to maintain a strategic distance from any openings in the picture. This will restore the edge picture to the fundamental program. For division, associated part is determined for the picture. Figure 3 is the info unique picture which is acquired from CASIA database. This picture is utilized as contribution for iris acknowledgment framework. The information picture is given to RGB - dark transformation and the yield of the RGB to GRAY changed over picture is appeared in Fig.4.The RGB to GRAY converted image is to fix the values as preprocessing and the output is shown in Fig.5.

The preprocessed image is used to detect the pupil. The pupil detected image is shown in fig.6. The pupil detected image is used as input as to gaber filter to remove unwanted portions. Fig.7 shows the filtered Image. In normalisation image (Fig.8), eye lids and unwanted portions are removed. This has to be unwrapped. Unwrapped image is shown in fig.9. This has to be fed as input to code generator. the code generated image (Fig.10) is used for recognition with the stored database of the iris. Accordingly matched and not matched results are displayed.

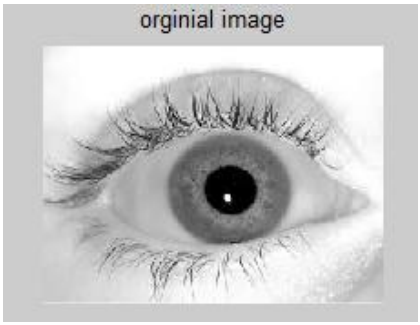

Fig.3 Input Image

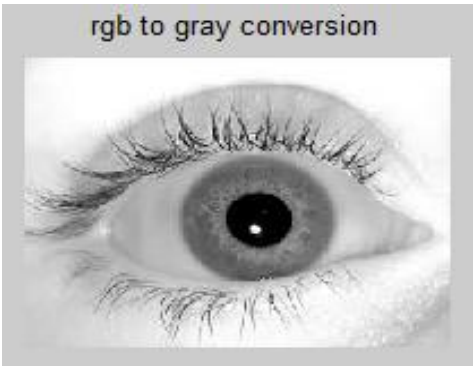

Fig.4 RGB to GRAY Image

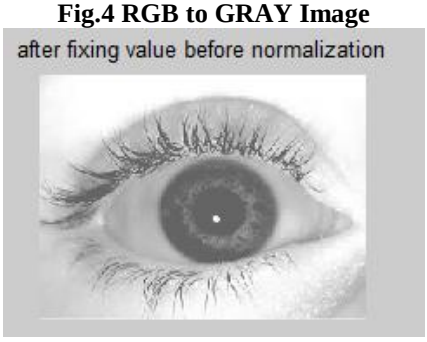

Fig.5 Fixed Value Image

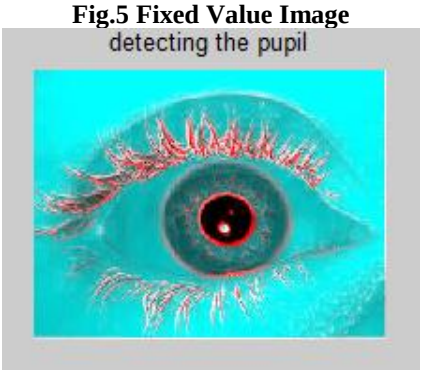

Fig.6. Pupil Detected Image

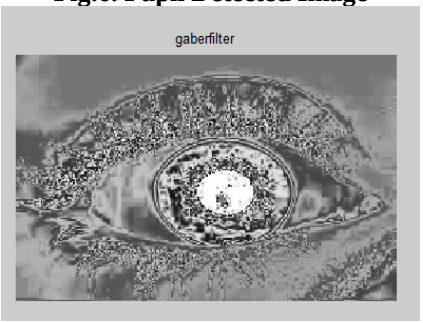

Fig.7. Filtered Image

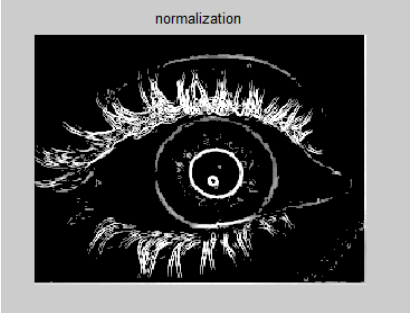

Fig.8 Normalised Image

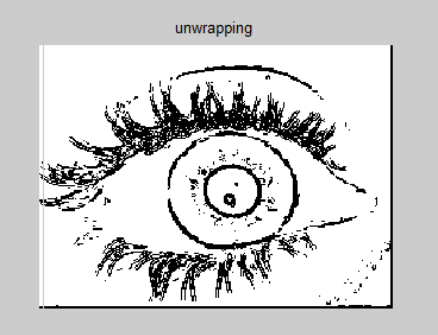

Fig. 9 Unwrapped Image

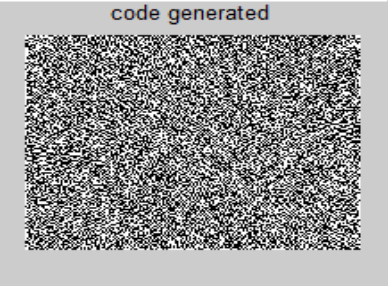

Fig.10 Code Generated Image

V. CONCLUSION

The some of the physiological qualities are generally unique to a person. One of such to deal with solid visual acknowledgment of people is accomplished by iris designs. Iris acknowledgment is viewed as the most solid and precise biometric authentication framework accessible. An effective and novel calculation is created in this work by utilizing Fast Fourier Transform and figuring every single imaginable arrangement of normalized moment. FFT changing over picture to recurrence space and sifting clamor, at that point minutes are determined which are invariant to revolution and scale change. Finally Hamming distance is utilized for coordinating. In any case, results have been delivered under great conditions, and there have been no autonomous preliminaries of the technique.

REFERENCES

1. Swaroop Borukar, Kinjal Patel, K.T. Talele, and Sardar Patel, Fingerprint Security using Image Processing, Project, Sardar Patel Institute of Technology, Mumbai, India, 2012.
2. Rakesh Rathi, Manish Choudhay, Bhuwan Chandra, An Application of Face Recognition System using Image Processing and Neural Networks, International Journal of Computer Technology and Applications, 3 (1), 45-49, 2012.
3. K Roy, Iris recognition using support vector machine, M.S. thesis, Department of CS., Concordia University, Montreal, Quebec, Canada, 2006.
4. Hugo Proenca, Iris Recognition: On the Segmentation of Degraded Images, Acquired in the Visible Wavelength, IEEE Transactions on Pattern Analysis and Machine Intelligence, 32(8), pp.1502 –1516, 2010.
5. Aalaa Albadarneh, Israa Albadarneh, and Ja'far Alqatawna, Iris Recognition System for Secure Authentication Based on Texture and Shape Features, Proceedings of IEEE Jordan Conference on Applied Electrical Engineering and Computing Technologies (AEECT), 3-5 Nov. 2015, **Added to IEEE *Xplore*:** 21 December 2015.
6. John G. Daugman, How Iris Recognition Works, IEEE Transactions on Circuits and Systems for Video Technology 14(1), pp.21 – 30, February 2004.
7. Dal Ho Cho, Kang Ryoung Park, and Dae Woong Rhee, Real-Time Iris Localization for Iris Recognition in Cellular Phone, Proceeding of 6th International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/ Distributed Computing and First ACIS International Workshop on Self-Assembling Wireless Network, 23rd -25th May 2005, **Added to IEEE *Xplore*:** 06 June 2005.
8. Libor Masek, Recognition of Human Iris Patterns for Biometric Identification, B.Sc. Thesis, University of Western Australia, 2003.
9. Shubhika Ranjan, S.Prabu, P. Swarnalatha, G. Magesh, Ravee Sundararajan, Iris Recognition System, International Research Journal of Engineering and Technology (IRJET), 4(12), pp.864-868, 2017.
10. Casia iris image database. http://www.sinobiometrics.com.
11. C. Barry, N. Ritter, Database of 120 Greyscale Eye Images, Lions Eye Institute, Perth Western Australia.
12. J. De Mira and J. Mayer, Image Feature Extraction for Application of Biometric Identification of Iris: A Morphological Approach, Proceeding of IEEE 16th Brazilian Symposium on Computer Graphics and Image Processing (SIBGRAPI 2003), Added to IEEE Xplore: 27th Oct. 2003.

AUTHORS PROFILE

Dr. P. Vimala received her B.E. in Electronics and Communication Engineering from Jayaram College of Engineering, Trichy, Tamil Nadu, India in 2000 and M.E. in Process Control and Instrumentation Engineering in 2010 and P.hD. in 2018 from Annamalai University, Chidambaram, Tamil Nadu, India. She is currently working as an Assistant Professor, the Department of Electronics and Communication Engineering, Faculty of Engineering and Technology, Annamalai University. Her current research areas include digital signal processing, sparse signal processing, digital communication and wireless communication.

C. Karthika Pragadeeswari received her under graduate in Electronics and Communicaton Engineering from Vinayaga Mission Kirubananda Variar Engineering College, Salem, Tamil Nadu in 2001 and obtained her Masters in Computer Science and Engineering from Annamalai University in 2008 and she is doing her research in Video Surveillance. Currently she is an Assistant professor of Dept. of Electronics and Communication Engineering at Alagappa Chettiar Government college of Engineering and Technology, Karaikudi. Her research interest are Video processing areas in the academic environments. she is a life time member of Indian society of Technical Education.

Retrieval Number: D7447118419/2019©BEIESP
DOI:10.35940/ijrteD7447.118419
Journal Website: www.ijrte.org

Published By:
Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP)