Abstract— Biometric technologies are considered more secure with respect to other authentication techniques based on passwords and ID cards. Most reliable biometric technology in terms of identification and verification is based on iris. Iris recognition nevertheless is computationally very costly and refined system. Feature extraction is a significant task in the overall processing of iris authentication system. Almost distinguishing information present in an iris must be extorted to provide accurate authentication of people. A feature extraction procedure is considered valuable if it decreases the size of the feature template and computational speed as well as provides high accuracy. Now my objective is to study gradient based edge detectors- Roberts, Sobel and Prewitt operators and then enhance feature extraction process by clahe contrast stretching and canny edge detector & at the end Comparison of existing edge detectors with proposed technique i.e. Conversion of iris image into a constant dimension by normalization. So that two photographs of same iris will have same features.

Keywords: Biometrics, Iris Authentication, Feature Extraction, Canny Edge Detector

I. INTRODUCTION

With the increase in use of biometrics for human identification, control shifts to identifying the factors that affect the performance of biometric authentication systems. Biometric authentication systems use behavioural or physical Characteristics to authenticate a person. These systems have become more reliable sources of authentication as compared to the traditional means like passwords or hardware tokens such as smart cards. The Reliability of biometric authentication systems lies in the fact that unlike passwords and smart cards biometrics cannot easily be forged, shared, compromised or forgotten. Biometric is considered to be highly unique among all humans. Genetically, same identities including twins and irises of left and right eye of the same person represent different iris patterns. Another important property of biometric is its stability [1].

The iris is an externally visible and well protected organ whose unique epigenetic pattern remains stable throughout the life till death. These features make it very attractive for use as a biometric for identifying people. Image processing techniques can be employed to extract the unique iris pattern from a digitized image of eye and encode it in to biometric template that can be stored in a database. This biometric template contains an objective mathematical representation of unique information stored in iris, and allows comparisons to be made between templates. Whenever a subject wishes to be identified by iris authentication system their eye is first photographed and then a template created for their iris region. This template is then compared with other templates stored in database until either a matching template is found and the subject is identified or no match is found and the subject remains undefined [2].

FIGURE 1.1- HUMAN EYE PARTS
The iris is the most unique structure in the entire human body because a completely random process during fetal growth forms it. Even a person’s left and right eyes have a completely different iris patterns. The development process begins about 6 months after a child is conceived and is completed at about 18 months of age. The iris patterns then remain static until death. The iris authentication system performance is influenced by many parameters: the focus of eye images, orientation and environmental factors of iris image acquisition.

From past researches many techniques were suggested to overcome these problems. Beginning from 1987, automatic iris authentication systems have been proposed. Gabor filter is also employed to extract features and an improvement is suggested by using multi-channel frequencies to increase the matching accuracy of an iris recognition system even if the iris is not accurately localized [3].

II. RELATED STUDY

A number of journals and research papers have been studied. The many views of the problem were studied.

Steps For Iris Authentication System

2.1 Feature Selection

The iris is an externally visible and well protected organ whose unique epigenetic pattern remains stable throughout adult life. These characteristics make it very attractive for use as a biometric for describing individuals. Image processing techniques can be applied to extract the unique iris pattern from a digitalized image of eye and encoding it into a biometric template that can be stored in a database. That biometric template contains an objective mathematical representation of unique information stored in iris and allows comparisons between templates. If someone wants to be identified by iris authentication system their eye is first photographed and then a template generated for their iris region. This template is then compared with other templates stored in database until either a matching template is found and the subject is discovered & no match is found and the subject continues undefined [2].

Adhyana G. et al. (2014) Iris recognition system is the most reliable system for an individual authentication. At that time many applications have been carried out with this feature such as the time attendance system for high security environment etc. The established method applied on the security is not reliable such as the passwords may be forgotten or hacked and ID cards may be lost. Iris biometric authentication is gaining importance in recent times. In the overall working of iris biometric in an iris-based biometric authentication system feature selection is an important task. That approach is based on the iris and the retina of the eye. The iris and retinal patterns are photographed via a camera or video-based image acquisition system. The similarity between an human's iris and retinal patterns helps in identifying and verifying the user [4].

2.2 Image Segmentation

A good segmentation algorithm should involve two procedures: iris localization and noise reduction. The iris localization procedure takes the acquired image and finds both the boundary between the pupil and iris and also between the iris and the sclera. The noise reducing process refers to localizing the iris from the noise (non-iris parts) image. [5].

Yulin Si et al. Presented in this paper segmentation algorithm is the in efficiency of eyelash detection. Some real iris textures will be misclassified as eyelashe when there exists sharp contrast in the iris region. Based on directional filters, a new eyelash detection method is proposed with much fewer misclassifications. Second, in the iris feature extraction process a multi-scale and multi-direction data fusion strategy is introduced in this work, and the combination of adaptive scale selection and improved matching criteria will better explain the iris textures. Then Third, in order to increase the response time for the 1: N search in a huge iris database an iris listing method based on corner detection is presented [6].

2.3 Image Compression

John D. et.al (2008) We investigate three schemes for severe compression of iris images in order to assess what their impact would be on recognition performance of the algorithms deployed today for identifying people by this biometric feature.

Now a days standard iris images are 600 times larger than the Iris Code templates computed from them for database reposition and search. But it is administratively demand that iris data should be stored, transmitted & embedded in media in the form of images rather than as templates computed with proprietary algorithmic program. To adapt that goal with its meanings for bandwidth & storage we present strategies that combine region-of-interest (ROI) isolation with JPEG and JPEG2000 compression at serious levels and we test them using a publicly available database of the iris images. [7].
2.4 Iris Localization

Iris localization mainly involves two basic procedures one is to detect eye lids and the other is boundary detection. The first step carries extraction of circular shaped iris rim by removing the noisy areas. Eyelids & eyelashes block upper and lower parts of the iris. Thus these regions must be segmented. Then second step is to detect the inner and outer boundaries of iris i.e. at the transition part of iris and sclera & the other is at the iris and pupil.

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Canny edge detection is performed both in vertical direction & horizontal directions. The iris images in CASIA database having iris radius 80 to 150 and pupil radius from 30 to 75 pixels. Canny edge detection is utilized to create edges in horizontal direction and then Hough transform is applied on it. When the maximum Hough space is less than the threshold it represents non occlusion of eyelids. For insulating eyelashes it is easier by using thresholding because they are darker when compared with other elements in eye [8].

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(a) Iris After Boundaries Observed  (b) Iris Image Following Noise Removal

FIGURE 2.2 - IRIS LOCALIZATION

2.5 Feature Extraction & Matching

Somnath Dey et al (2010) In this we address this issue and present an approach to feature extraction and feature matching technique. We used Daubechies D4 wavelet with 4 levels to extract features from iris figures. These characteristics are encoded with 2 bits by quantizing into 4 quantization levels. With the help of our proposed approach it is possible to represent an iris template with only 304 bits but existing approaches require as many as 1024 bits. In addition, we assign different weights to different iris region to compare two iris templates which significantly increases the exactness. Then we match the iris template based on a weighted similarity amount. Experimental results on several iris databases substantiate the efficacy from our technique [9].

L. Ma et al.

Constructed a bank of spatial filters whose kernels are suitable for iris authentication to represent local texture features of the iris and thus achieved much better solutions. The 1-dimensional continuous wavelet transform is used to decompose iris image in [10].

Lim et al. and Ali et al.

Decomposition of an iris image into four stages using 2D Haar wavelet transform and quantized the fourth-level high-frequency information to form an 87-bit code [10].

III. PROPOSED WORK

When a person wishes to be authorized by an iris recognition system these five steps are required for iris authentication process. Firstly, an Eye image is captured and enrolled into the database i.e. CASIA database. After that Segmentation of the iris from other parts of the eye image. So that iris is separated from other parts of the eye like eyelids, eyelashes etc. or we also can say that the noise reduction process. Then Conversion of iris image into a constant dimension by normalization. So that two photographs of same iris will have same features and also remove inconsistency problem with the help of normalization.
After the completion of the normalization process we have done the Encoding or Feature Extraction procedure. And we have several methods for feature extraction process i.e. sobel, prewitt and canny edge detectors. But we choose the best one method among those which is canny edge detection. Canny edge detection algorithm runs in many steps.

IV. RESULTS AND DISCUSSION

In this we have basically the results obtained by using the MATLAB 7.5.0 (R2007b) tool. The following are the snapshots or outputs after implementation.

FIGURE 4.1 - IMAGES TAKEN FROM CASIA DATABASE

FIGURE 4.2 - SEGMENTED IRIS IMAGE

FIGURE 4.3 - NORMALIZED IRIS IMAGE

FIGURE 4.4 - NOISY IRIS IMAGE
FIGURE 4.5 - IRIS IMAGES TAKING FOR MATCHING

FIGURE 4.6 - APPLY CANNY EDGE DETECTION

FIGURE 4.7 - TWO IRIS IMAGES ARE MATCHED

FIGURE 4.8 - IMAGE WITHOUT CLAHE

FIGURE 4.9 - CONTRAST OF IMAGE IMPROVED BY USING CLAHE TRANSFORMATION
V. CONCLUSION

In this paper we basically give focus on enhancing the performance of Iris Authentication System by using the CASIA (Chinese Academy Of Sciences’ Institute Of Automation) iris image database as a reference database. We are using the normalization method for dimension reductioning so that features of two images are matched with each other. This is a highly sophisticated technology that needs proper training. Few times glasses with strong lenses can impact the performance of the system. In Iris based authentication system operations are highly reliable and hands free. Hence the characteristic remain stable over a lifetime. In this we have done the feature selection, image segmentation, image compression, iris localization and feature extraction & matching techniques to enhance the performance of iris authentication system.

REFERENCES


