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A COMPARATIVELY STUDY AMONG THE DIFFER BIOMETRIC SYSTEM USING DIGITAL IMAGE PROCESSING

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ABSTRACT

A biometric identification system provides automatic recognition of an individual based on some sort of unique feature or characteristic possessed by the individual. Biometric information is used in computer science to authenticate some kind of access control. Most of biometric systems have been developed based on fingerprints, facial features, hand geometry, handwriting, voice and retina pattern etc. This technology makes use of physiological or behavioral characteristics to establish identify of an individual. A biometric system is a pattern recognition system that includes acquiring the biometric feature from an individual ,extracting its feature vector from the raw data and comparing this feature vector with another feature vector stored in the database. We are living in an age in which demands increased security levels are increasing day by day. Consequently, biometric recognition came in to existence, which is a safe, reliable and convenient technology for personal recognition. In this thesis the iris pattern has been investigated to design biometric identification systems that work similar to that of voice recognition system or face identification system, in which sound signal or facial image is captured and then recognition is processed.

1.1 Introduction

In recent year, biometric features have received great Attention for many applications, such as face, voice, Fingerprints, palm print, retina, iris, and so on. Among of this biometrics, iris has achieved highest recognition accuracy, because it is has many properties that make it a wonderful biometric identification technology: (i) the textures of iris are unique to each subject all over the world; (ii) The textures of iris are essentially stable and reliable throughout ones' life; (iii) Genetic independence; irises not only differ between identical twins, but also between the left and right eye. After Flom and Safir presented the first relevant methodology in 1987, many other methods have been proposed. In the segmentation stage, Daugman introduced an integro-differential operator in 1993 to find both the iris inner and outer borders, this process proved to be very effective on images with clear intensity reparability between iris, pupil and sclera regions. Integra-differential operator was proposed with some differences in 2004 by Nishino and Nayar .Two stages of the iris segmentation methods were proposed by Wildes : a gradient based binary edge mapis first constructed from the intensity image, and next the inner / outer boundaries are detected using Hough transform. Other

famous iris localization algorithms are based on using Hough transform with combination of Canny edge detection in , also with integro differential operator in , and with Haar wavelet transform in . Liam et al. have proposed a simple method on the basis of threshold and function maximization in order to obtain two ring parameters corresponding to the iris inner and outer borders. Although these methods have promising performance, they need to search the iris boundaries overlarge parameter space exhaustively, which takes more computational time. Moreover, they may results in circle detection failure, because some chosen threshold values used for edge detection cause critical edge points being removed. Du et al have proposed an iris detection method the basis of prior pupil identification. The image is then transformed into polar coordinates, and the iris outer border is identified as the largest horizontal edge result from Sobel Filtering. This approach may fail in the case of non-concentric iris and pupil, as well as in very dark iris textures . Ghassan et al. has been developed the angular integral projection function as a general function to perform integral projection along angular directions .There is attributes (contrast, brightness and existing noise)are highly sensitive to the specific characteristics of each image. This high sensitivity was the main motivation behind proposing an accurate and fast iris segmentation method that less constrained image capture environments. Each biometric feature has its own strengths and weaknesses and the choice typically depends on the application. The better biometric characteristic has five qualities: robustness, distinctiveness, availability, accessibility and acceptability. Fingerprints are unique and it is most widely used to identify the person. Its matching accuracy was very high. Iris is the ideal part of the eye in human body. It contains many distinctive features such as furrows, ridges and rings etc . Iris technology provides greater unique identification. According to the above features fingerprint and iris are taken to develop the proposed system. A Multi biometric system combines characteristics from different biometric traits .A reliable and successful multimodal biometric system needs an effective fusion scheme to combine biometric characteristics derived from one or modalities. It also improves the template security by combining the feature sets from different biometric sources using appropriate fusion scheme .The concept of multimodal biometric system has been proposed by Ross and Jain where apart from fusion strategies various levels of integration are also presented .In fusion of iris and face biometrics has been proposed .The score level fusion in multimodal biometrics system is proposed in . A novel fusion at feature level for face and palm print has been presented in . The purpose in is to investigate whether the integration of face and palm print biometrics can achieve higher performance that may not be possible using an single biometric indicator alone. Both Principal Component Analysis (PCA) and Independent Component Analysis (ICA) are considered in this feature vector fusion context. It is found that the performance has improved significantly.

THECHNIQUE USED IN BIOMETRIC DETECTION

Fingerprint Biometrics

The use of fingerprints as a biometric is both the oldest mode of computer-aided, personal identification and the most prevalent in use today .

In the world today, fingerprint is one of the essential variables used for enforcing security and maintaining a reliable identification of any individual. Fingerprints are used as variables of security during voting, examination, operation of bank accounts among others. They are also used for controlling access to highly secured places like offices, equipment rooms, control centers and so on. The result of the survey conducted by the International Biometric Group (IBG) in 2004 on comparative analysis of fingerprint with other biometrics is presented in Fig. 1. The result shows that a substantial margin exists between the uses of fingerprint for identification over other biometrics such as face, hand, iris, voice, signature and middleware [16]. Figure 1.

Comparative survey of fingerprint with other biometrics

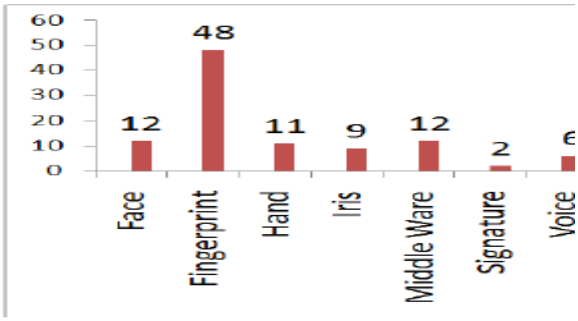

Figure 1. Comparative survey of fingerprint with other

Figure.2 Colored porton of eye

IRIS BIOMETRIC

Iris recognition is the process of recognizing a person by analyzing the random pattern of the iris (Figure 1). The automated method of iris recognition is relatively young ,existing in patent only since 1994.The iris is a muscle within the eye that regulates the size of the pupil, controlling the amount of light that enters the eye. It is the colored portion of the eye with coloring based on the amount of melatonin pigment within the muscle (Figure 2).Figure.1 Human Eye

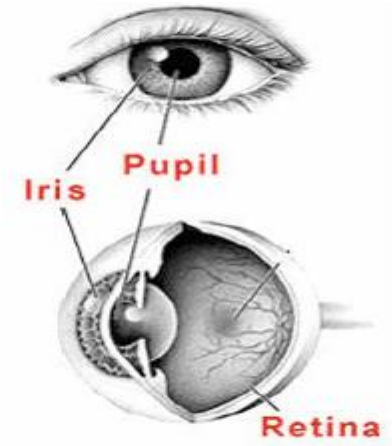

Figure.1 Human Eye

Figure.2 Colored portion of eye

II .THE IRIS AS A BIOMETRICS

The iris is an overt body that is available for remote assessment with the aid of a machine vision system to do automated iris recognition. A. Iris recognition technology combines, pattern recognition, statistical inference, and optics .B. The spatial patterns that are apparent in the human iris are highly distinctive to an individual.

- Clinical observation
- Developmental biology

Although the coloration and structure of the iris is genetically linked, the details of the pattern are not. The iris develops during prenatal growth through a process of tight forming and folding of the tissue membrane. Prior to birth, degeneration occurs, resulting in the pupil opening and the random, unique patterns of the iris. Although genetically identical, an individual's irises are unique and structurally distinct, which allows for it to be used for recognition purposes.

Major design steps involved in iris recognition system are given as follows:

Information/pattern Acquisition:

This involves the acquisition of eye images from a group of persons. In this work, a database is

created by collecting only left eye images and saved in .jpg _le format .viii ix

Image Segmentation:

This is a technique that excludes the artifacts and locates the circular iris region approximated by two circles; one for iris and another for Pupil boundary. The eyelashes and eyelids normally occlude the upper and lower parts of the iris region. The inner and the outer boundaries of the iris are determined algorithmically using Hough Transform after the edge detection.

Normalization:

The iris images of different or same person normally captured differ in sizes and illuminations, etc. The normalization process produce iris regions with same dimensions so have similar characteristic features at various spatial locations.

Binarization:

In current techniques, the binarization is usually performed either globally or locally. However some hybrid methods have also been proposed in the recent literature. The global binarization methods use one pre-calculated threshold value to distinguish image pixels into object and background classes. Whereas the local binarization schemes may have many different adapted threshold values selected according to thelocal area information. Hybrid methods use both global and local information to decide the pixel label. In binarization, each pixel is converted into one bit having 1 or 0 value depending upon the mean of all adjacent pixels.

Feature Extraction:

Significant features of an iris are required to be extracted so as to compare their templates images. Most of iris recognition systems make use of a band pass decomposition of an iris image to create Biometric template. It provides texture information in the form a feature vector, i.e. an ordered sequence of features extracted from the iris image.

Improved Canny Edge Detection:

Canny Edge Detection algorithm is well known algorithm for optimal edge detection. It works on three main principles; low error rate, well localization of edge point and one response to a single edge. To enhance the edge detection methods .Canny proposed two new techniques in his algorithm, viz. Non maximum suppression and Double threshold to select the edge points. However, these two threshold value are set experimentally .Authentication is required when there is a need to know about a person who they claim to b e. It is a procedure which involves a person making a claim about his identity and then providing evidence to prove it. In this thesis, iris biometric identification system has been implemented in MATLAB environment that uses modified Canny Edge Detection algorithm for segmentation, binarization and cropping. Feature extraction is done by normalization and feature encoding process followed by matching process based on manhattan distance .Experimental simulation results are analyzed on the basis of (False Acceptance Rate) FAR and (False Rejection Rate) FRR and found better. Modified Canny Edge Detection algorithm provides accuracy up to 99.08 on the basis of FAR and FRR.

Conclusion:

In this paper we have analyzed how the network behaves when an input is given and for that error rate specified was. The network has been trained and tested for a number of eye images. our project is a system that can take a image (as input of human eye) and can distinguish between papillary body and iris part of the human eye. For this we had used different mathematical functions and calculations to detect various eye boundaries and it encircles outer boundary of pupil which is inner boundary for the iris using modified Canny edge detector algorithm. After this the detection of outer boundary of the iris is

done. The development tool used is c# using windows application, matlab and emphasis is given on software for performing recognition, and not hardware for capturing an eye image.

REFRENCES:

1.Boles, W. W. and Boashash, B. (1998). A human identification technique using images of the iris and wavelet transform. IEEE transactions on signal processing, 46(4):1185{1188.

2.Chen, W., Er, M. J., and Wu, S. (2006). Illumination compensation and normalization forrobust face recognition using discrete cosine transform in logarithm domain. Systems, Man, and Cybernetics, Part B: Cybernetics, IEEE Transactions on, 36(2):458{466.

3.Abhyankar, A. and Schuckers, S. (2010). A novel biorthogonal wavelet network system for angle iris recognition. Pattern recognition, 43(3):987{1007.

4.Das, P., Bhattacharyya, D., Bandyopadhyay, S. K., and Kim, T.-h. (2009). Person identification through iris recognition. IJSIA-International Journal of Security and Its Applications,
A publication of Science and Engineering Research Support Center, 3(1):129{148.

5.Tian, Q.-C., Pan, Q., Cheng, Y.-M., and Gao, Q.-X. (2004). Fast algorithm and application of hough transform in iris segmentation. In Machine Learning and Cybernetics, 2004. Proceedings of 2004 International Conference on, volume 7, pages 3977{3980. IEEE.

6.W.W. Boles, B. Boashah: A Human Identification Technique Using Images of the Iris and Wavelet Transform.
IEEE Transaction on Signal Processing Vol. 46 (1998) 1185-1188