Person Identification Using Iris Recognition System Using Fastest Searching Algorithm

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***Abstract*— The Security is an Important aspect in a daily life. Whichever the system the security plays between vital. Iris based authentication system is essentially a pattern recognition technique that makes use of iris pattern, which are statistically unique, for the purposed of personal identification. In this system hamming distance recognition of iris pattern. The zigzag collarette area of the iris is selected for iris feature extraction because it captures the most important area of iris complex pattern and higher recognition rate is achieved. The proposed method is computationally effective as well as reliable. This project has been created to develop a biometric identification system though a man's iris using a computer to perform the processing on the raw image.**

***Index Terms*— Biometric, Image, iris, Hamming distance, Zigzag Collarette area, Wavelet**

I. INTRODUCTION

Biometric is assumption that each an every individual is unique and has different physical traits or behavior, which is use to recognize or validate the person. The iris of every human is individual to per person and generate a complex system unchanged during life time, from the childhood its starts growing still the person die. Even our two iris are different from each other. Most of the peoples have black iris.
The biometric system provides identification of an individual based on some kind of unique feature or characteristics.

Biometric system is also developed based on fingerprint, facial feature, voice, and even the retina. Biometric system works by fetch the sample of the feature, then the sample is transformed using some mathematical function into biometric templets, then the biometric templet is pass through normalized, efficient and highly discriminating representation of feature. Most biometric allow two modes operation. An enrollment mode to add templates to database and an identification mode were templets are created for individual and a match is search for in the database of pre-enrolled templets.

In this we focus on iris biometrics because it is one of the most accurate and reliable among all the biometrics traits presented because of its unique feature. Ring shape color area around the pupil is called as iris, it has an extra ordinary feature and provide many interlacing minute. Characteristics such as cornea, zigzag collarette area, strips etc. The iris has a unique pattern from eye to eye and person to person. This pattern is form by six months after birth, stable after a year and remains the same. In iris authentication system the iris feature need to record.

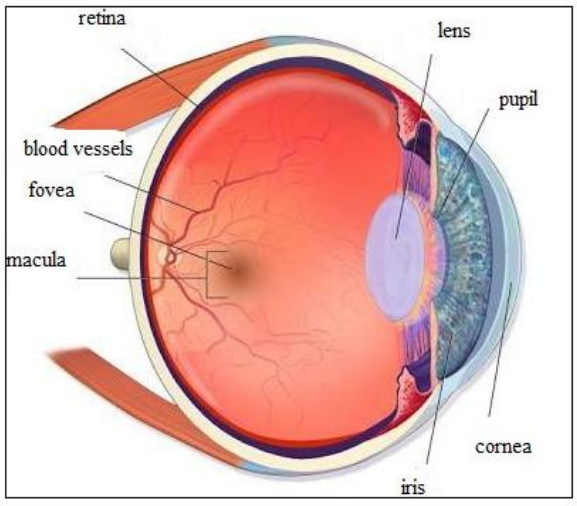

Fig.1: Structure of human eye

II. PROPOSED SYSTEM

2.1 Iris Recognition System

Image preprocessing and normalization is a significant part of iris recognition. Figure 2. Shows the stages involved in iris reorganization are:

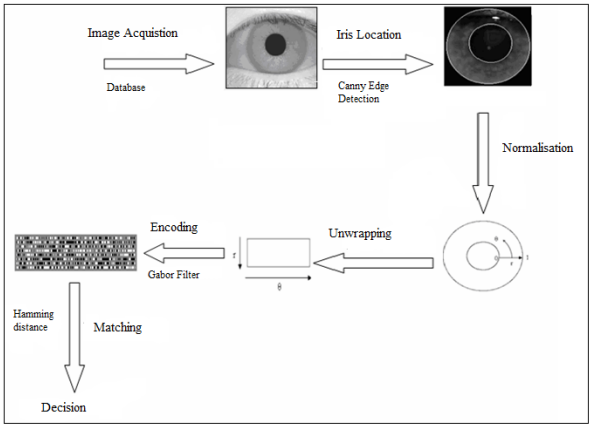

Fig.2: Frame work of Iris recognition

- The acquisition module takes the input eye image.
- The segmentation module detects iris texture and eliminates other structure such as pupil, eyelids, eyelashes.
- The normalization module is next step of segmentation it invokes normalization scheme to transform image from Cartesian to polar coordinates.
- The encoding module uses feature-extraction to generate a binary code.
- The matching module checks for the generated code matches the encoded code stored in database.

2.2 Segmentation

In this phase the actual iris is detected from the raw image when the image has something that obstructs, visual noise i.e. disturbing features such as eyelids, eyelashes, lighting reflection are eliminated to get the actual iris structure and then normalization process is done further.

2.2.1 Edge Detection and Localization

Edge detection is a technique to extract the useful structural information from different vision objects and reduce the amount of data to be processed.
Canny edge detection is a operator that uses a multistage algorithm to detect a wide range of edge in image. In various computer system it has been widely applied. It has been found that application requirement of edge detection on diverse vision system are relatively similar. Thus, edge detection solution to these requirements can be implemented in wide range of situation.

There are various criteria for edge detection they include:

1. The detection should accurately catch as many edges shown in the image as possible i.e. detection of edge with low error late.
2. The operator detects the edge point should accurately localize on the center.
3. The image should only be marked once and wherever possible it should not create false edges.

The process of Canny edge detection:

1. Apply filter to smooth image in order to remove noise.
2. Next, is to find the intensity gradients of the image.
3. To get rid of spurious response to edge detection apply non-maximum suppression.
4. To determine potential edge, apply double threshold.
5. Finally, the detection of edge by suppressing all the other edge that are week and not connected to strong edges.

2.3 Normalization

After implementing segmentation module, the normalization module is carried out. In normalization iris texture is transformed from Cartesian to polar coordinate. For this process it is often called as iris unwrapping.
Advantages of normalization: -

1. The variation that take place in pupil size due to change in external illumination that might influence iris size.

2. The iris of different individual are mapped onto common image domain in spite of the variation in pupil across subjects.
3. During the matching stage though a simple translation operation that can account for in plan eye and head rotation this enables iris registration.

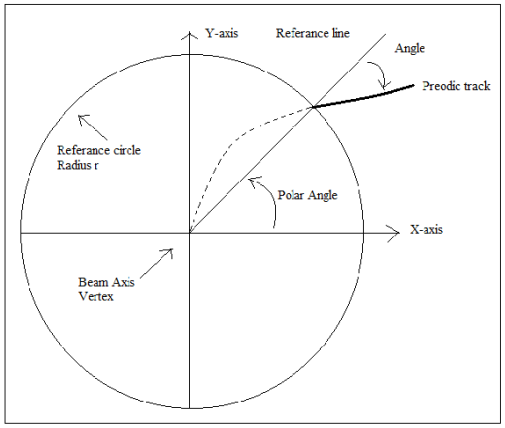

Fig.4: Normalization process

2.4 Feature Extraction

Feature extraction plays an important role in iris recognition system which gives the accurate attributes from the iris image and then generates a code for individual person. For human iris pattern and extracting feature Gabor and HAAR Wavelet transforms are used.

2.4.1 HAAR Wavelet

The HAAR wavelet and Gabor transform are considered as the mother wavelet. A feature Vector with 87 dimension is computed from multi-dimensionally filtering. Since each and very dimension has a value ranging from -1.0 to +1.0, thus the feature vector is sign quantized so that any positive value is represented by 1 and negative value as 0, thus it consists of only 87 bits, this result in a compact biometric template. The recognition rate of HAAR wavelet transform is slightly better than Gabor transform

Fig.5: HAAR Three Level Wavelet Decomposition

2.4.2 Gabor

Gabor is a filter, which are able to provide conjoint representation of a signal in space and spatial frequency. Gabor filter is created by modulating a sine/cosine wave with a Gaussian. This provide the optimum conjoint localization in both space and frequency in the signal. Therefore, sine wave is perfectly specified in the frequency but not in the space. Modulation of sine wave with Gaussian provide localization in space with lots of localization in frequency.

Decomposition of signal can be acquired by quad ration pair of Gabor filter with a real part specified by cosine modulation by a Gaussian and an imaginary part specified by a sine modulation by Gaussian.

Daughman uses a 2D version of Gabor filter instead of encoding iris pattern data. A 2D Gabor filter over the image domain (X, Y) is represented as,

$$G(x,y) = e^{-\pi[(x-x_0)^2/\alpha^2+(y-y_0)^2/\beta^2]} e^{-2\pi i[u_0(x-x_0)+v_0(y-y_0)]}$$

2.5 Pattern Matching

The pattern matching modules compares the two iris i.e. first iris is newly generated code and second iris is encoded code store in database and check the feature set of iris. Technique use to compared two iris is Hamming distance, which differentiates between two iris code by corresponding bits.

Hamming distance

The hamming distances shows the similarity between two iris patterns. Supposed X and Y are two bit patterns which are compared then hamming distance is defined as sum of disagreeing bit over N, N means total number of bits. The derived equation is,

$$HD = \frac{1}{N} \sum_{j=1}^{N} X_j (XOR) Y_j$$

Since an individual iris area contains high degree features each iris area will generate a bit pattern which will be different then other iris area. Two iris code generate by the same iris will have high correlated.

Supposed two patterns are derived from same iris then Hamming distance will be close to 0,0 means they are highly correlated.

III. LITERATURE SURVEY

Sr. no	Title	Author	Year of publication	Described solution
1.	Iris Recognition using combined support vector machine and Hamming distance approach.	Himanshu Rai, Anamika Yadav	2013	Iris recognition, Noise removal, Support system machine, Hamming distance, zigzag collarette area.
2.	Iris Recognition System Gabor filter and Edge Detection.	Yachana Kumari, Rohini Sharma	2014	Segmentation, Normalization, Feature extraction ,1-D Gabor filter, Edge Detection.
3.	Iris Feature extraction for Personal Identification using Lifting Wavelet Transform	C.M.Patil, Sudharshan, Patilkulkarani	2010	Iris Recogntion, biometrics identification, lifting wavelet, and security.
4.	Iris Biometric Recognition for person identification in Security system.	Vanaja Roselin.E.Chirchi, Dr. L.M. Waghmare, E.R.Chrichi.	2011	Biometrics, Iris Recognition, occluded images, database.
5.	A New Iris Normalization Process for recognition system with cryptographic techniques	Nithyanandam.S, Gayathri.K.S, Priydarshini P.L.K	2011	Phase correlation, cryptography, Reed Solomon, Biometrics, Iris recognition

IV. FUTURE SCOPE

In future image segmentation either visual noise removal method can be improved, thus the input templet which is used in feature extraction stage could be made better which can give the final output.

V. CONCLUSION

The recent advantage of information technology and due to drastic increase in the security request have been entailed a development of biometric techniques which is based on identification with smart system. Biometric describe the characteristics or behavior of each individual to identify. The main advantage is

this is used in business security and bastion of exit and propagation along various country around the world.

Registration is a method, that determine the geometrical transformation that aligns. The points in one view of object which corresponding point in another view of an object. In this, the feature extraction method extract the most important area of iris complex pattern and higher recognition rate can be achieved. HAAR wavelet and Gabor used for the feature extraction.

Hence we have developed a new iris recognition system using comparison of two digital templets. Nowadays several organization uses iris not only for criminal investigation but as well in the control to restrict some area, employ identification, financial security and other fields.

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