ALGORITHM FOR BIOMETRIC APPLICATION USING IRIS

Ms. Chandgude Pranita M[1], Mr. Patil Anil A[2]

[1]PG Scholar , [2]Associate Professor, Department of Electronics and Telecommunication,

SVPM College of Engineering,Malegaon (BK), Maharashtra (India)

ABSTRACT

In today's information technology world, security for systems is becoming more and more important. The number of systems that have been compromised is ever increasing and authentication plays a major role as a first line of defence against intruders. So , Biometrics applications are becoming more popular to verify or to authenticate the living person based on its behavioral & psychological characteristics in recent years. Iris recognition system is reliable for authentication purpose because of its unique iris patterns. Previous biometric identities involves fingerprint, palm , voice, signature etc. but as age of human being increases they will suffer from various problems with this previous biometric identities. Whereas iris will have less problems as it is internal organ of the eye & iris patterns will be stable throughout our life. So iris recognition will one of the new & innovative biometric application.

Keywords: biometric, iris recognition, feature extraction, security.

I. INTRODUCTION

Traditional biometric application involves the identification of person from his/her fingerprint recognition, signature & face recognition, palm recognition, voice recognition gait style etc. [2] but sometimes there may be problem like fingerprint distortion etc can occur so, to achieve more   accuracy we are introducing iris recognition algorithm. As the iris part is surrounded by the eyelids & eye – lashes so it is more secure internal organ of our body & there are less external hazardous for this iris so it try to provide more security in biometric applications. Each eye of every person will have unique & different   iris patterns & it is also similar to two twins hence it is one of the advantage of the iris patterns & so they are more popular for authentication in recent years or day to day activity. [5] These iris patterns remains unchanged until the death of person. So, this is more unique biometric application.

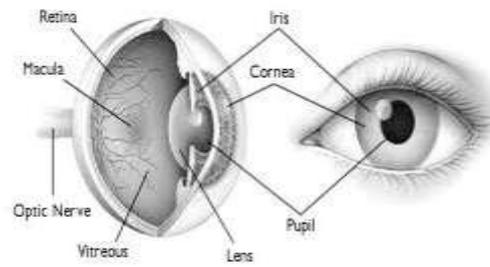Basic eye structure is as shown in below figure. 1.

Fig.1. Basic eye structure

Figure.1. shows the small black part which indicates the pupil part. Brown part in fig.1. indicates the iris part & white part indicates scalera. The basic function of iris here is to regulate the pupil size. For real time applications, this algorithm can be tested using standard database such as CASIA, UBIRIS etc. for experiment purpose we can also create our own database.

This paper is organized as follows:

Section 1 gives introduction whereas methods used are given in section 2 & Section 3 represents existing algorithm to iris recognition & second last section gives conclusion & future scope & last section gives results of the paper.

II. METHODOLOGY

Previous different researchers have worked on iris recognition & also different approaches exists for iris recognition.

Phase based method (Integro differential operator) : To perform edge detection operation, first we need to calculate boundaries of the pupil & boundaries of iris to capture only iris part so, this phase based method uses the integro differential operator to calculate the boundaries & radius of the pupil & iris.[5]

Texture analysis method : 1) decomposition of iris by application of laplacian of Gaussian filter. 2) Zero crossing representation method : By using this method, some researcher makes the use of 1D wavelet filter for encoding iris data.[7]

Intensity variation based method: Hough transform : It is mainly useful to find out geometric objects in an image (lines, circles etc). here circular hough transform can be applied to determine the radius & center co-ordinates of the pupil & iris regions. In this method, segmentation algorithm based on circular hough transform is also useful in which edge map is generated first by calculating derivative of intensity values. [7]

Multiscale quadrature (2-D) Gabor filter is used by daughman to demodulate the phase info. Of an iris image to create an iris code for authentication purpose.[2]

Ma et. al. uses spatial filters to extract the features. This method first converts the circular image of iris into rectangular pattern by unwrapping circular image.[9]

Lim et. al. [3] uses 2D Haar transform for feature extraction & classifier used are initialization method of weight vectors & new winner selection method.[10]

III. EXISTING IRIS RECOGNITION ALGORITHM

Before starting work on iris recognition most important thing is to create our own training database with the eye images as per our requirement. Each image which we have to stored in database, first we have to extract features from that all images & then we have to store that features in the database. Standard eye databases are also available such as CASIA, UBIRIS etc.

CASIA Database

The Chinese Academy of Sciences - Institute of Automation (CASIA) eye image database have 756 grayscale images having 108 unique eyes or classes and 7 different images of each unique eye some egs are as shown below.
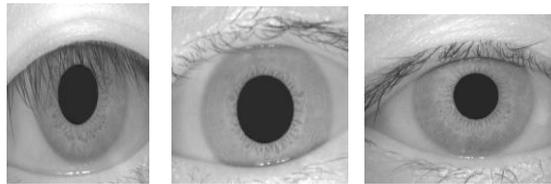
Images example of CASIA database

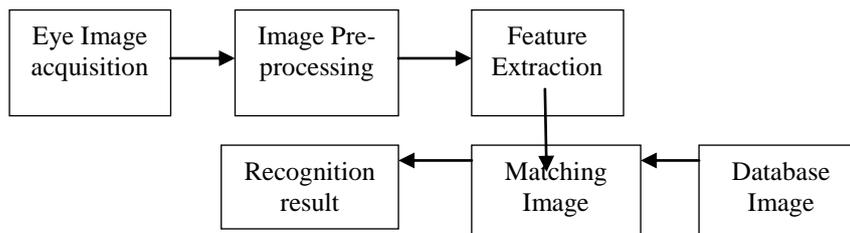Stages to be carried out are as shown in below figure.2.

Fig 2: Block Diagram

3.1) **Eye image acquisition**

First we have to apply the eye image as input test image this is the part of image acquasition. To work on the iris for real time applications, first we need to capture higher quality eye image using HD camera. Distance of camera should be upto 3 meters.

3.2) **Image preprocessing**

This second stage, image preprocessing involves four stages as given below.

3.2.1) Iris localization

In this stage, as our area of interest is only iris part so, we will find or to detect the pupil to iris boundaries & scalera to iris boundaries in order to recognize the iris part as shown in below fig.3.
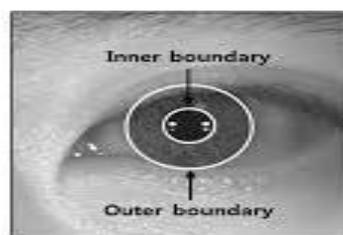
Fig.3. Iris localization

3.2.2) Iris normalization

After extracting iris region, as upper iris part is highly occluded by eyelids & eyelashes so due to this we get degradation in performance of our system so, we will consider only lower half part from whole iris for further processing which is in circular motion.

After that this circular half iris is converted into rectangular part this conversion is carried out in this normalization stage.

3.2.3) Eyelid masking

This process masks the irrelevant eyelid region in the normalized iris image. Here same method used for detecting the inner boundary can be applied for eyelid masking.

3.2.4) Contrast enhancement

For contrast enhancement , we are using local histogram equalization technique . It transform the pixel value so that the resulting image will have approximately flat histogram. To do this, we will use cumulative histogram of image as the pixel value mapping function.

3.3) Matching

The key idea in our paper is to use phase based Approach for image matching. In matching phase, we will use POC Function. if two images are similar then POC function gives sharp peak function. & if not then POC function drops significantly. The flow chart of our proposed algorithm is as shown in below figure.4.
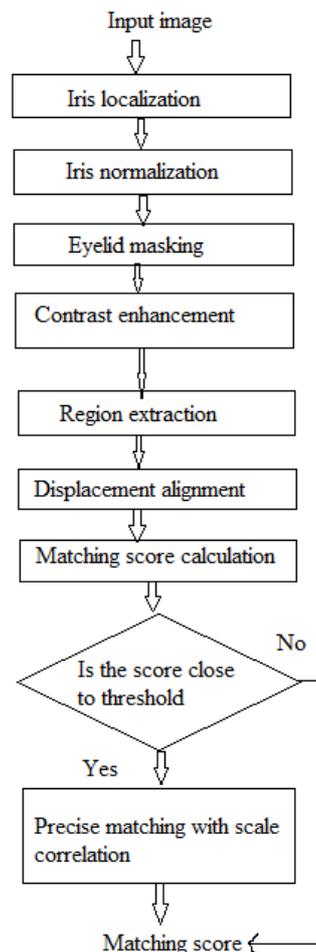
Fig.4. – Flowchart of proposed algorithm

IV. CONCLUSION & FUTURE SCOPE

Iris recognition is very unique biometric application to improve security due to it's unique iris patterns & it can be used as biometric identity cards at several places in country.

We can use standard database to implement iris recognition algorithm for real time applications or can create our own database for experiment purpose.

As iris of every person have different iris patterns & two identical twins also have different iris patterns so this is more reliable biometric identity than other biometric applications.

For future purpose these same algorithm can be implemented for other biometrics.

Results

For experiment, we used matlab 2013 software. in this we have created our own training database of 6 images & out of them we are giving two images as input test images. While creating training database each image of eye will go through following processes & then it is saved to database.
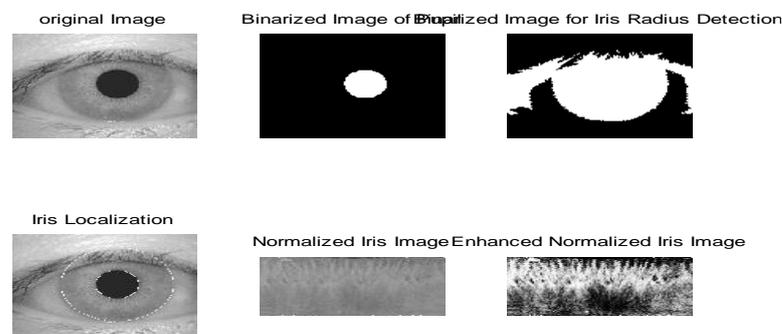
For matching, we are calculating magnitude spectrum for both testing images & then POC function is calculated. & by comparing peak amplitude with threshold value we get results(accept/access deniet) in our project.

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