Person identification for security system using Iris biometric technique

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Abstract— **The security plays is an important role in our daily life. The biometric authentication technique based on the pattern of the human iris is well suited to be applied to access control and provides strong e-security. Biometrics security systems having two basic purposes: to verify or identify users. This paper focuses on an accomplished methodology for iris detection for identification and verification, when the images have hurdles, visual noise and different levels of illuminations like flash and we use the CASIA iris database it will also work for CASIA Iris database which has images captured from distance while automotive a person. Efficiency is acquired from iris detection and recognition when it gives performance evaluation is accurate and secure.**

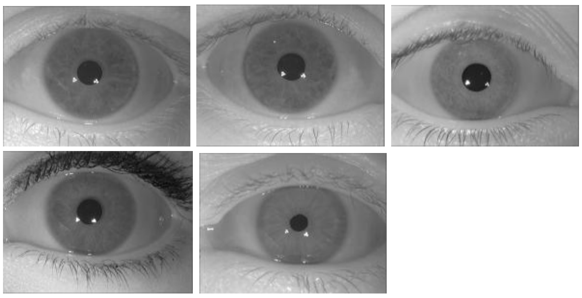
***Index Terms* — PC database, flash detection, security, iris localization, CASIA.**

I. Introduction

Today's e-security is very needful of finding close, firm and efficient alternatives to passwords and personal identification numbers (PIN) as financial losses increase over year from computer-based fraud such as computer hacking and identity theft [2]. Biometric is solutions address to these cardinal problems, because an individual's biometric data is specific and cannot be altered. Biometrics which refers to identifying an one-on-one by his or her physiological or behavioural characteristics has ability to distinguish between authorized user and an imposter. Biometrics is inherently more sure and able than traditional knowledge based and token based techniques. The usually used biometric features include speech, fingerprint, and face, Iris, voice, hand geometry, retinal identification. [4].

II. IMAGE ACQUSITION

An image of the eye to be analysed and captured must be acquired first in digital form suitable for analysis. In further implementation will be using CASIA database for iris images. [1]. Here main focus of CASIA database is to reduce the requirement of user cooperation. Several standard images of iris stored in database and import test image.



III. IRIS SEGMENTATION

Segment of irises are detected even when the images have hurdle, visual noise like flashes and different levels of light. Lighting reflections, eyelids and eyelashes obstructions are eliminated to make noise free image. First part of segmentation is to calculate change in pixel values as x and y coordinates by partial differentiation method. Apart from that when such type of pixels occurs mark it as point. Then connect those points by circular contour method on boundary of iris and pupil.

IV. IRIS NORMALIZATION AND FEATURE EXTRACTION

Here according to the segmentation part two circles are drawn one is pupil and second is iris. Now in normalization and feature extraction first is to calculate the center of the pupil then center of iris and take one point as center by right angle. From this center make radius up to the iris circle and measure all the points i.e. pixel values on radius from pupil circle to iris circle only and put it in matrix form. Here consider angle between two radiuses and calculate all pixel values between pupil circle and iris circle. By using Gabor filter convert all the measured values from 2D to 1D that means in matrix form. Now taking quantization of all values generate code of iris image which is taken form database as test image.

$$Is = I_E\,(Xc + r\cos\theta,\ Yc + r\sin\theta)$$

Being $2N\pi/Ls \leq \theta \leq 2(n+1)\pi/Ls$, $n \in IN \cup \{0\}$, r is fixed radius and (Xc, Yc) centroid of pupil. Here Ls- is the length of

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iris signature having predefined value 265. And 2 JI/Ls is the angular increment.

V. IRIS MATCHING

As the iris code generated of test image is compared with CASIA database images. Hamming distance shift bit method is used to check most probably match. In matching wavelet transform is used to make part of code and match it with database image then shift that bits and again check. To find out matched image is whose having less hamming distance.

$$HD(A, B) = 1/L \sum_{i=0}^{L} (pi \otimes yi)$$

Here hamming distance is calculated where L is length of vector; pi and yi are the i^{th} component of the template and sample vector, respectively, which are XORed in the equation.

VI. RESULTS

With the help of above algorithm results are shown in below in figures. In CASIA PC database captured images of iris are stored. Test image is taken from database shown in Fig.5.1 and apply denoising to remove flashes to make noise free images.

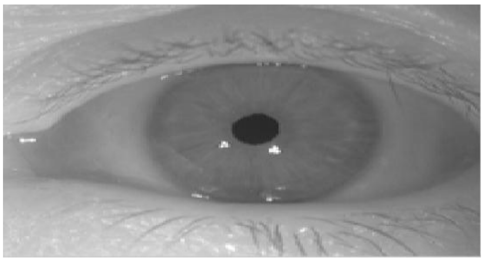

Fig. 5.1 Test image of original eye

In Fig.5.2 taking complement of test image to get binary image. Here zero becomes one and one becomes zero. Noise is detected.

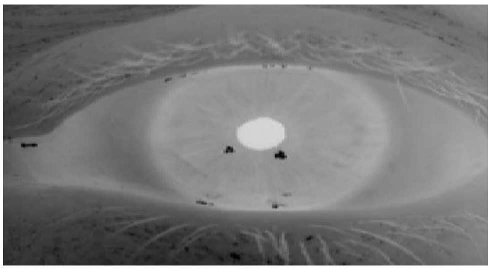

Fig.5.2 Complement of test image

In Fig.5.3 noise in terms of flashes are removed by contour trace boundary method.

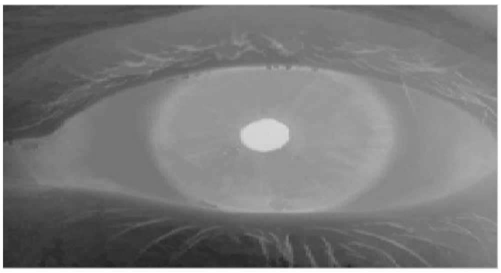

Fig.5.3 Flash is removed from binary image

Again taking complement of binary image to further operations shown in Fig.5.4

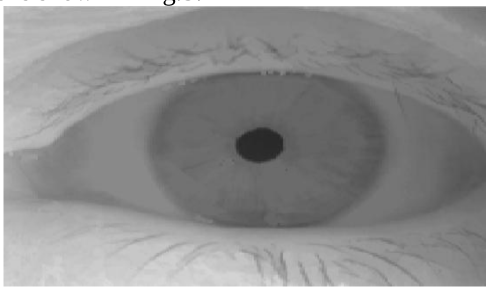

Fig.5.4 Complement of binary image

In Fig.5.5 using partial differentiation method boundary of iris and pupil calculated where change in pixel occurred. By using circular contour points on boundaries are connected.

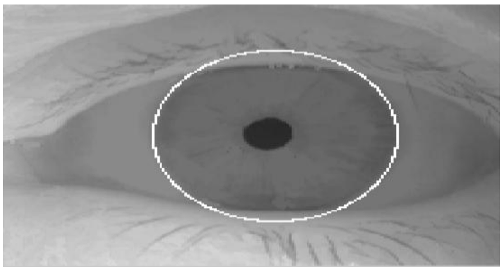

Fig.5.5 Segmentation of iris

Same as per iris segmentation pupil segmentation done by calculating change in pixel values in Fig.5.6

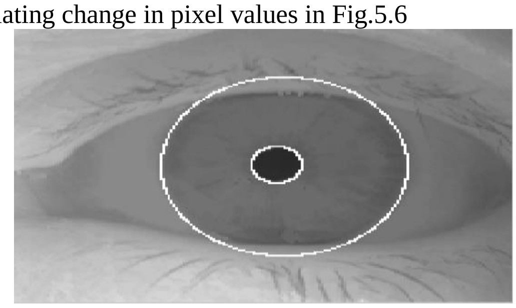

Fig.5.6 Segmentation (localization) of iris with pupil

Here part of area from pupil circle to iris circle pixel values calculated by angular method to convert Cartesians to polar form Fig.5.7. In Fig.5.8 error found in comparison of iris test image code and database code.

Fig.5.7 Cartesians to polar form of pixel values

Fig.5.8 Error between test image code and database code

Matching: In matching, iris of test images compared PC database and distance is calculated by shift bit hamming distance method. This is the hamming distance values between the test image and database. The shortest distance is the correct matched image.

hd1 = 0.5054

hd2= 0.3451

hd3 = 0.4789

hd4 = 0.3884

hd5 = 0.0253

VII. CONCLUSION

Iris recognition has proven to be a very useful and versatile security measure in biometric identification. In proposed project aim is to reduce hamming distance to get more reliable and secure identification. After image fetched from CASIA database iris segmentation is proposed an integro-differencial operator, which works by examining the difference in pixel levels between circles drawn in the image. In Feature Extraction changes to the polar coordinate system and then comparison between encoded image data and database. Iris recognition and identification algorithm for this project work has been done successfully.

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