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Efficient Iris Recognition on Eye Images Using Hough Transform

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ABSTRACT: Automatic identification of human being based on unique behavioural feature is called Biometric system biometric technologies such as fingerprint, facial recognition & iris recognition are used in application such as physical security, information security, military applications etc, the most accurate biometric system is iris recognition system and t is developed by Daugman and empirical mode decomposition(EMD).these algorithms are able to produce perfect recognition rates. The work presented in this paper develop segmentation of iris image using Hough transform and Daugman rubber sheet model for normalization in MATLAB and it calculates accuracy approximately equal to 100%.

I. INTRODUCTION

Biometric is the technical term for body measurement and calculation it is also called as realistic authentication used in computer science as form of physical security and information security. It is also used to identify the people who change their information for the purpose of influencing, managing, directing or protecting people. Biometric identification is characterised into two categories and they are Physiological characteristics and Behavioural characteristics. physiological characteristics are connected to shape of the body. Examples for physiological characteristics are fingerprints, DNA, palm print, hand geometry iris recognition etc. Behavioural characteristics are based on behaviour of the person like rhythm of typing, gait, voice etc. The most accurate form of biometric is iris recognition System. It is not identical for twins and also it won't change with person's age. In this paper we are working on accuracy approximately equals to 100%.

II. LITERATURE SURVEY

The Algorithms developed by the creator for detecting Human beings by the pattern of iris has been tried in many field and laboratories, after million differencial test there were accurate matches produced. The recognition principle is the failure of a test of statistical independence on iris phase structure encoded by multi-scale Quadrature wavelets[1].

[2]The paper combines the different modules to improve accuracy of the iris recognition system. They have used pre-processing of an image, segmenting an image, detecting the edges. The pre-processing of an image is done by extracting the iris portion of an image. The edges are detected by directional line detectors.[2]In this paper they have calculated the accuracy for artificial eye pictures by studying them deeply and they have maintained confidentiality.

[3] Nowadays we have seen many new patterns in application and these applications are utilized for confidentiality, physical and informational security. In this paper the whole algorithm is implemented on cyclone 2 FPGA. By this time of execution is very fast.

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III. PROPOSED SYSTEM

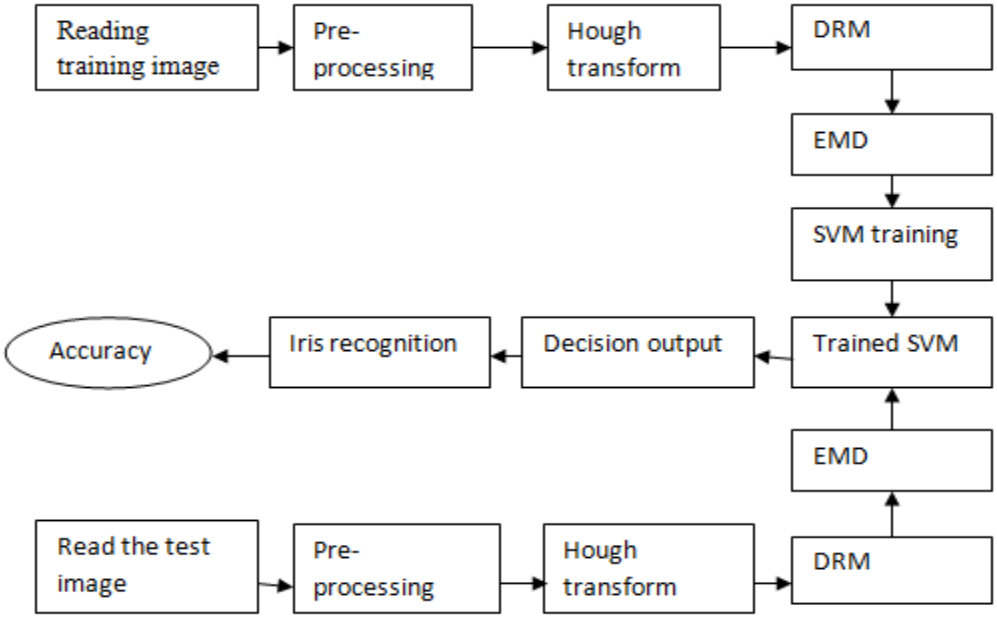

Fig 1.1: Block diagram of proposed architecture

IV. BLOCK DIAGRAM EXPLAINATION

In this block diagram the first block is reading the training image, actually we have two images one is training image and other one is test image. Training image is one of the concept in machine learning. It consist in learning a relation between data and attributes from a fraction of dataset. Test image is the actual input which is given to the system. In the block diagram both test image and training image are read at a time.

Pre-processing: In this step data bases are collected and morphological changes have been done. If there are any reflections found in the image are filled with the holes.

Hough transform: It is feature extraction technique which is utilized in digital image processing. Hough transform is the technique in which imperfections of the images are calculated easily by detecting the some shapes like circle, straight line, ellipse etc. there are two types of hough transform they are : circular hough transform and linear hough transform.

Dougman Rubber Sheet Model (DRM): The rubber sheet model remaps each point within the iris into pair of polar co-ordinates.

Empirical Mode Decomposition(EMD): This algorithm is utilized to extract the more information about the iris by calculating the extrema and minima of the sinusoidal signal like structures present in the iris. EMD algorithm is as shown below.

Let the signal be x(t)

1. Calculate all extrema of signal x(t)
2. Interpolate between minima (resp. maxima), ending up with some envelope emin(t) and emax(t))
3. Calculate the mean m(t)=(emin(t)+emax(t))/2
4. Extract the detail d(t) = x(t) − m(t)
5. Iterate on the residual m(t)

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V. RESULTS

1. INPUT IMAGE

Fig 1.2: Input image

Fig 4.1 is the real time input eye image which consist of sclera, pupil and iris region. Out of these three parts of eye iris pattern is the stable part which do not change with person's age. An iris of left and right eye of the same person is also different. Hence we use this as one of the biometric method. Input image is undergone through several techniques to identify the iris patterns.

2. RESULT OF HOUGH TRANSFORM

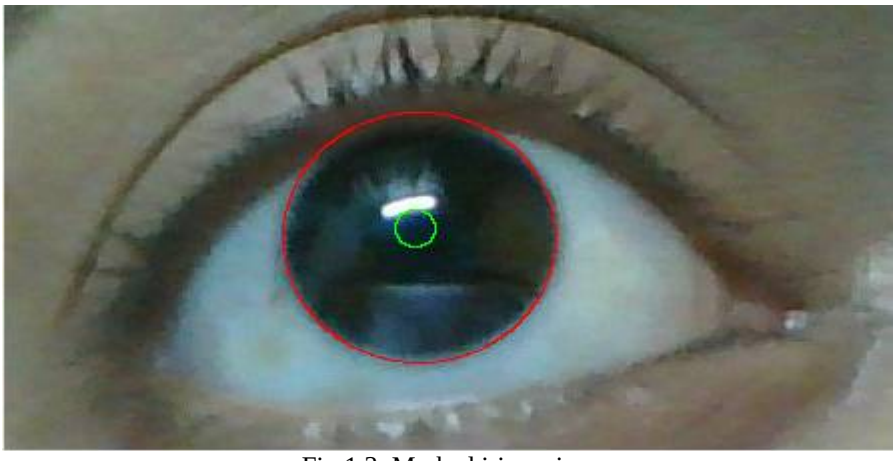

Fig 1.3: Marked iris region

In Fig 1.3 there two circles marked, red and green. The centre co-ordinates of the pupil and iris are calculated, outer circle represents the iris and inner one is pupil. Radii of both iris and pupil are calculated to mark the circles. This

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technique of identifying two circles is called as hough transform. After identifying circles image has to undergo Normalization.

3. RESULT OF IRIS DETECTED REGION

Fig 1.4: Detected region

In fig 1.4 here in this image only iris part is extracted all the part except iris is darkened. Image is half darkened because it will calculate till iris part, when we get full iris part the rest part of the image is remained as same, because there is no need to check for presence of noise after iris section.

4. DAUGMAN RUBBER SHEET MODEL

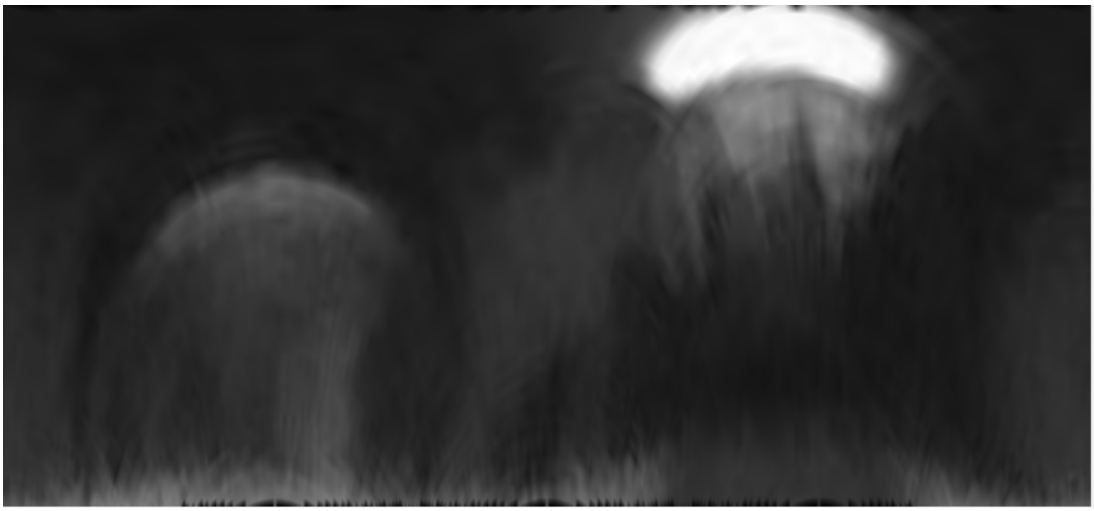

Fig 1.5: DRM(daugman rubber sheet model)

Fig 1.5 shows image in which the circular part of the iris is converted into two polar co-ordinates. This is result of Daugman rubber sheet model. Details of daugman rubber sheet model template is explained in chapter 3 (fig (3.9a)). Certain angle and radius of the circular hough transform is selected and converted into polar co-ordinates to get more features.

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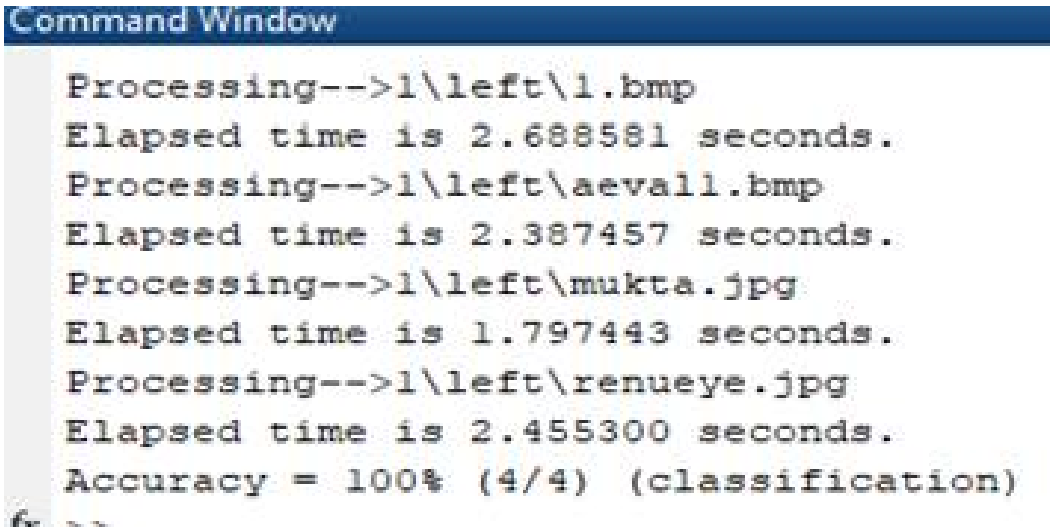

Fig 1.6: SVM result

The above shown figure is result of SVM training, in this classification of images and extraction of all features are done. After extracting all the features we calculate the accuracy and I am getting 100% accuracy. Time taken to process the image is also shown in the above fig5.5. Elapsed time is different for different image. It depends on the size, intensity and blurriness of the image. If the image is blurred it will take less time to execute because blurred image does not have more features to extract. If the size of the image is more then it will take more time to extract. Table 1.1 shows the person name and time taken to extract the feature.

Person name	Image type	Time in seconds
1 left	.bmp	2.688s
Aevall	.bmp	2.387s
Mukta	.jpg	1.797s
Renueye	.jpg	2.455s

Table 1.1 Timing analysis of results

VI. CONCLUSION

In previous works, iris recognition system has some disadvantages. The techniques used in the each method were quite complex, costly, time consuming and also accuracy in previous work was less. But here in this work we have used alternative methods compared to other works to overcome the drawbacks of previous works and to get better results. In other works they have used combination of hough transform and daugman rubber sheet model to extract the features of iris. But in this work we have used combination of three algorithms. The Hough transform, daugman rubber sheet model and empirical mode decomposition but EMD has one more advantage, it will extract all the sensitive features present in the signals of iris image which helps to identify the authenticated person. The proposed work is achieved with 100% accuracy.

In this work an automatic edge detection is done by utilizing canny edge detector to get better performance, Segmentation process is done to localize the iris and to remove the noise occurred due to eye lashes and eyelids.

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