Iris Recognition System

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Abstract- *There are several methods biometric identification but due to the distinguishing properties of iris, iris recognition have proved to be an ideal method of biometric identification. Now a days different methods are used for iris recognition so here we have used methods that can recognize iris centre and also localize it's centre. Iris recognition is done based on features extracted from iris image using wavelet descriptors. These wavelet features are the statistical features that are extracted from input image. SVM a discriminative classifier is used for matching purpose which is done based on the extracted features. Before feature extraction process was employed on iris images, smoothening process and edge detection process were employed. Normalization is then done on the pre-processed iris image. This process of iris normalization identifies iris and pupil region in the image and then the identified positions are reshaped. Efficiency is thus improved using normalization process. The person to whom the input iris belong is identified and with the help of identified person the matching process is employed. The performance of process is then measured which indicates that proposed algorithm is more improved and accurate as compared to existing approaches for iris recognition process.*

Keywords- DWT, Edge map,hamming distance metrics, SVM

I. INTRODUCTION

Authentication plays the most vital role in various security based applications. The most commonly used Biometric Authentication system is using Iris since this method is more reliable. The most complex architecture of Iris exhibits variations in every human thus having the advantage of higher security comparatively. Realizing the value of biometrics in todays world for various security systems, they are mainly used to identify or verify users.

Following stages are implemented :

- IMAGE ACQUSITION: eye images are obtained.
- PREPROCESSING AND SEGMENTATION: removal of eyelids and eyelashes using circular Hough transform.
- NORMALIZATION: used to obtain images of constant dimensions.
- FEATURE EXTRACTION: the most discriminating features of iris are stored in a template.
- MATCHING: extracted features are then matched using SVM.

II. IRIS PREPROCESSING

The input iris image is firstly pre-processed by resizing it to a particular size. The quality of frame is reduced based on the amount of noise present in it. In order to reduce the noise in the frame each frame is considered as an image and then using some filtering operations noise in the frame is eliminated completely.

III. SEGMENTATION

Segmentation technique locates the circular iris region and also is used to isolates and exclude the artifacts. Here, circular Hough transform is used for the purpose of segmentation. The parameters of simple geometric objects like circles and lines can be determined using Hough transform algorithm. This algorithm is then used to obtain the center and radius co-ordinates of iris and pupil regions. Primarily, the first derivatives of intensity values in an eye image are calculated to generate an edge map and then threshold the result. Using the edge map, the parameters of circles passing through each edge point are casted in Hough space. Using these parameters which corresponds to the radius r, center co-ordinatesxc and yc , any circle can be defined according to the equation. A maximum point in Hough space corresponds to the radius and center co-ordinates of circle that is best defined by edge points. Hough was found to be the better method for the segmentation process due to its higher accuracy and efficiency rate.

IV. NORMALIZATION

When iris images are captured for different persons the size of iris may vary depending upon camera resolution, illumination and several other factors. Also for same person the iris size may vary. By using this method of normalization it is possible to obtain iris images having constant dimensions . This ensures that when two iris images are compared which are captured under different conditions will predict same spatial characteristic features.

V. FEATURE EXTRACTION

Feature extraction takes initial set of measured data and builds features which are more informative leading to better human interpretation; it also reduces dimensionality. We have used standard discrete wavelet transform(DWT) which breaks down an image into four images. In the result one image will be high passed in both directions(HH), another will be low passed in the vertical and highpassed in the horizontal(LH), one that has been highpassed in the vertical and low passed in the horizontal(HL) and the last one is low passed in both directions(LL). While HH represents diagonal features, HL relates to horizontal structure, LH results vertical information and LL is used for further processing. After decomposing upto fifth level, the Haar wavelet then creates feature vector by combining [LH5HL5HH5] for feature extraction. Different combinations of HH5, HL5 and LH5 are tried to create feature vector. Best results can be found by comparing different combinations. Two level quantization is used for encoding binary feature vector and four level is used to improve the recognition rate.

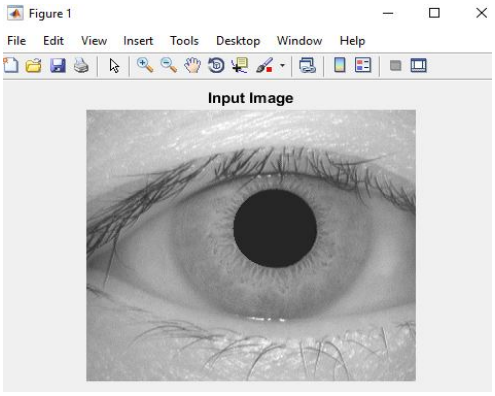
VI. MATCHING

Matching is used to authenticate via identification or verification to compare a template created by imaging the iris with stored value template in a database. By measuring the samples it decides whether they belong to the same person or not. The matching process is employed based on the Hamming distance metric and SVM.

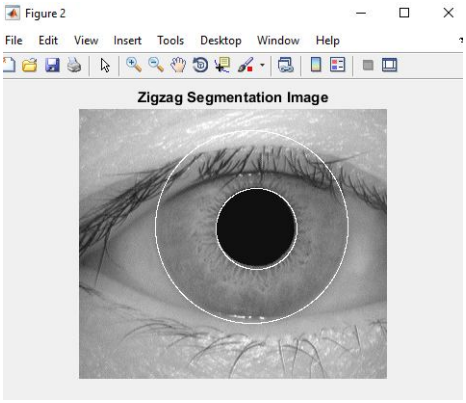
VII. CONCLUSION AND EXPERIMENTAL RESULTS

Iris images obtained at CASIA database were used to test the system. Hough transform method used for iris localization improves the performance of system due to removal of eyelids and eyelashes. Results were obtained on 60 images out of which 30 images were kept authorized and 30 unauthorized.

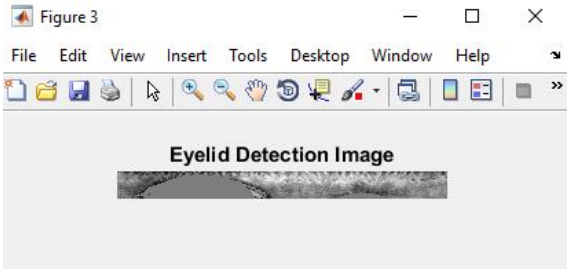
1) Input image



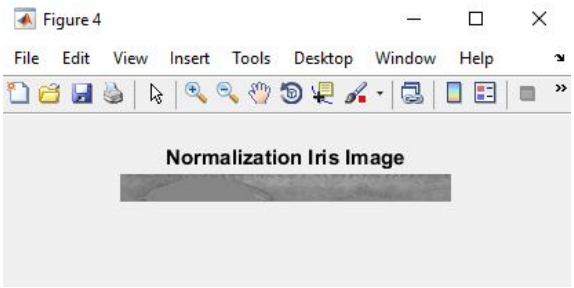
2) Segmentation image



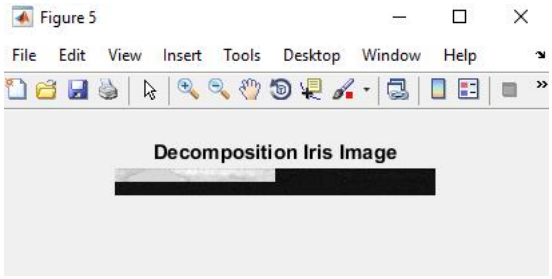
3)Eyelid detection



4)Normalized iris



5) Decomposition iris image



6)Final result

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