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Support Vector Machine Based Iris Recognition System for Personal Identification

Priyanka V. Bhongade[1], Prof. Mr. P.R. Rothe[2]

M. tech. Student, Department of Electronics Engineering, Priyadarshini College of Engineering, Nagpur, India[1]

Department of Electronics Engineering, Priyadarshini College of Engineering, Nagpur, India[2]

Abstract: Iris recognition is emerging as important method of biometrics-based identification systems. Image preprocessing is performing at first, follow by extracting the iris portion of the eye image. The extracted iris part is then normalize and then Iris Code is construct using 1D gabor filter.The selection of the finest feature subset and the categorization has grow to be an important issue in the field of iris recognition. In this paper we propose several methods for iris feature subset selection and vector creation. The acceptable feature sequence is extracted from the iris image by using the contour let transform technique. Contour let transform capture the fundamental geometrical structures of iris image. It decompose the iris image into a set of directional sub-bands with texture particulars captured in different orientations at a variety of scales so for dropping the feature vector dimensions we use the method for extract only significant bit and information from normalized iris images. In this method we disregard fragile bits and finally we use SVM (Support Vector Machine) classifier for resembling the amount of people identification in our proposed system. Experimental result show that most projected method reduces processing time and enlarge the classification accuracy and also the iris feature vector length is much smaller versus the other method. Experimental image results illustrate that, exclusive codes can be generated for every eye image. Iris recognition analysis the features that exist in the colored tissue neighboring the pupil, comparison, rings , furrows and freckles.

Keywords: Biometric-Iris Recognition, Contourlet-Support Vector Machine (SVM), Grey Level co-occurrence matrix(GLCM), IRIS.

I. INTRODUCTION

In recent days, iris recognition systems sustain to perform with high accuracy. On the other hand, these iris images are capture in a controlled environment to make sure high quality. Daugman recomend an iris recognition system that represent an iris as a mathematical function. Several other researchers proposed different recognition algorithms with a complicated iris capture setup. Iris images are capture in an uncontrolled environment; create non ideal iris images with unreliable image quality. If the eyes are not properly open, definite regions of the iris cannot be capture because of block which supplementary affects system. This research effort focuses on dropping the false rejection by precise iris detection.

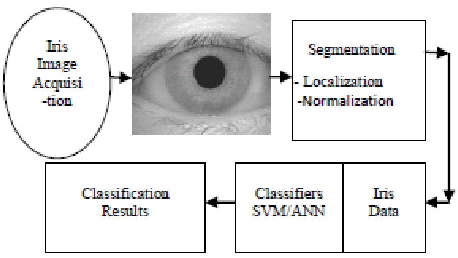
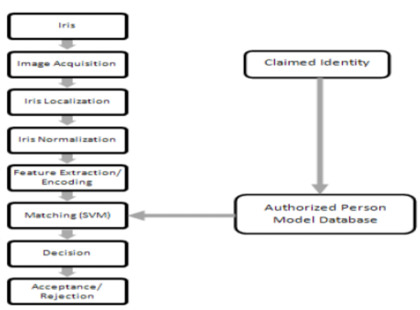


Fig.1. The Architecture of Iris Recognition System

This paper proposes a two-level hierarchical iris segmentation algorithm to precisely and powerfully detect iris boundaries from non ideal iris images. The SVM quality enhancement algorithm identifies good-quality regions from dissimilar enhance iris images and combines them to generate a single high-quality feature-rich iris image. In this paper, the feature extraction algorithm extracts global textural skin texture and local topological features. The 1-D log polar Gabor transform is useful to extract textural features which are invariant to translation and alternation. Euler number method is utilized to pull out the topological features which are invariant under translation, scaling, polar transformation and rotation. 2ν-SVM develops a fusion algorithm that combines the match scores obtain by harmonizing textural and topological features for improved performance. In order to improve the identification performance, we will propose an iris indexing algorithm. In this indexing algorithm, the Euler code is first use to filter possible matches. The subset is further process using the textural features and 2ν-SVM fusion for correct identification.



BASIC STRUCTURE OF IRIS-BASED VERIFICATION SYSTEM

II. IRIS IMAGE PROCESS

Iris Recognition systems can be explained as follows:
1. Image Acquisition
2. Iris Preprocessing which includes segmentation and localization
3. Iris Normalization
4. Feature Extraction
5. Matching

The block diagram shows the steps involve in iris image processing.

A. Image Acquisition
Image acquisition means to capture the human‟s eye region image. The captured image must be of high quality to work properly for iris recognition system. The acquired image of eye must have good resolution and clarity for supporting the better recognition.

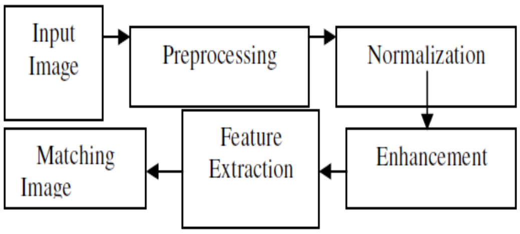


Fig. Iris Image Processing

The illumination in the image must be removed because illumination will results in poor quality images with lots of reflection. For capturing good quality images with high resolution and low illumination, infra-red camera should be used.

B. Iris / Pupil Localization
The iris is an annular part of the eye located between the pupil (inner boundary) and the (outer boundary) sclera. Since, both the inner boundary and the outer boundary of a typical iris can be taken as inexact circles.

B. Iris Normalization
The rubber sheet model for the normalization of the isolated collarette area is used. The center value of the pupil is considered as the point of allusion and the radial vectors are passes through the collarets region. The number of data points beside each radial line are decided that is define as the radial resolution and the number of radial lines obtainable around the collarette region is consider as the angular resolution.

C. Feature extraction and encoding
Only the important features of the iris must be encode so that comparison between template can be prepare. Wavelet and Gabor filter are the well-known techniques in texture analysis. The feature representation ought to have information enough to categorize various irises and be less responsive to noises. As well in the the majority appropriate feature extraction an attempt to extract only significant information will be made. More over reducing feature vector dimensions, the processing will be lessened and enough information will be supplied to introduce iris feature vectors classification.

D. Feature subset selection and vector creation in proposed method
It is necessary to choose the mainly representative feature sequence from features set with relative high dimension. propose several A method will be proposed to select the most favorable set of features, which provide the discriminating information to classify the iris patterns.

E. Gray Level Co-occurrence Matrix (GLCM)
GLCM means Grey Level Co-occurrence Matrix is exercise in iris recognition. The procedure uses the GLCM of an image and provides a simple approach to capture the spatial relationship between two point in a texture prototype. This is calculate from the normalize iris image by means of pixels as prime information. GLCM is a square matrix of size G * G. G is the number of gray levels in the image. The specific features probably considered in this work are will be as follows:

1) Energy
2) Contrast
3) Correlation
4) Homogeneity
5) Autocorrelation

F. Combination of Local and Global Properties in an Iris Image
An additional method, we use for creating iris feature vector is global and local properties of an iris image. The detail changes of in an iris images is called the local properties.

III. NON IDEAL IRIS SEGMENTATION ALGORITHM

Processing of non ideal iris images is a difficult task because the iris and the pupil be noncircular. Early step in iris segmentation is the finding of pupil and iris boundaries and unwrap the extracted iris into a rectangular form. So many researchers have proposed different algorithms for iris detection. Daugman applied an differential operator to perceive the limits of the iris and the pupil. The segmented iris is then revolutionize into a rectangular form by applying glacial transformation. Wildes used the first derivative of image intensity to find the place of edges analogous to the iris boundaries. This system clearly models the upper and lower eyelids with parabolic arcs, whereas Boles and Boashash localized and normalized the iris by using edge detection and other computer vision algorithms. Maet used the Hough transform to detect the iris and pupil boundaries. Here ,in propose two-stage iris segmentation algorithm, at first we estimate the inner and outer boundaries of the iris using an elliptical model. Then after in second stage, we apply the modified Mumford–Shah functional in a narrow band over the expected boundaries to calculate the exact inner and outer boundaries of the iris.

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To recognize the fairly accurate boundary of the pupil in non ultimate eye images, an elliptical region with major axisa=1, minor axisb=1, and center (x, y) is selected as the axis of the eye, and the power values are compute for a fixed number of points on the perimeter. The approximate outer boundary of the iris is also detect in a parallel manner. The parameters for the outer boundary a1,b1, y1, x1, and θ1 are vary by setting the initial parameters to the pupil boundary parameters. Computing the outer boundary with the help of intend algorithm, provide correct segmentation even when the pupil and the iris are not concentric.

In curve evolution method, the model begins with the energy function for iris segmentation. Parameter rizing energy function and deduce the connected Euler–Lagrange equation lead to active contour model. The active contour is initialize to the approximate pupil boundary, and the precise pupil boundary is compute by developing the contour in a narrow band of ±5pixels.The detect iris is unwrapp into a rectangular region by convert it into polar coordinates.

IV.GENARATION OF IRIS IMAGE USING SVM

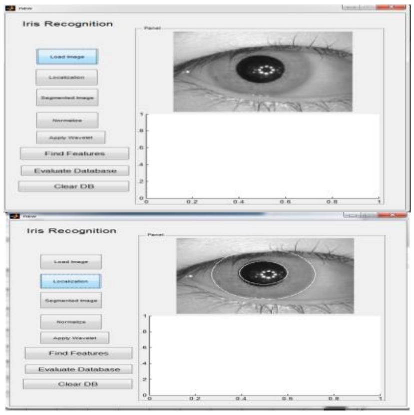
For iris image enhancement, researchers successively apply chosen enhancement algorithms, such as denoising, entropy correction, deblurring and background subtraction, and use the final enhanced image for later processing. Previous filtering techniques are not effective in explanatory the effects of haze, out of focus, and entropy-based irregularity. Another dare with existing enhancement techniques is that they enhance the low-quality regions that are here in the image, but are probable to deteriorate the good-quality regions and alter the features of the iris image. A non ideal iris image containing multiple irregularity may need the application of exact algorithms to local region which need enhancement. Though, identifying and separating these local regions in an iris image can be deadly, time consuming, and not practical. In this paper, we deal with the problem by applying a set of choosen enhancement algorithms globally to the original iris image. Thus, each resulting image include enhanced local region. All these enhanced local regions are identify from each of the transform image using an SVM-based learning algorithm and are then synergistically combined to generate a single high-quality iris image. For every iris image in the instruction database, a set of transform images is generate by applying normal enhancement algorithms for noise elimination, defocus, motion blur removal, , homomorphic filtering, histogram equalization, entropy equalization and background subtraction. The set of enhancement functions is express as follows:

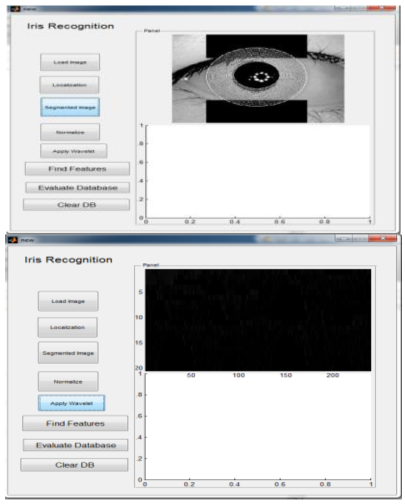
I1=fnoise(I)
I2=fhistogram(I)
I3=fblur(I)
I4=ffocus(I)
I5=fentropy(I)
I6=ffilter(I)
I7=fbackground(I) (6)

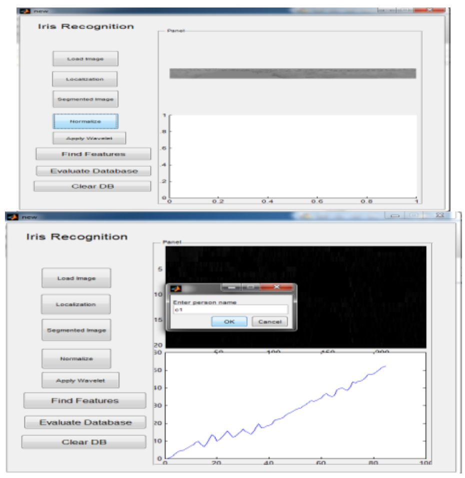
Where algorithm for removal of noise is fnoise, algorithm for removal of blur is fblur, ffocus is the algorithm to adjust the focus of the image whereas fhistogram is the histogram equalization function and fentropy is the entropy filter also ffilter is the homomorphic filter for contrast enhancement and fbackground is for background subtraction process.

V. SIMULATION RESULT

The following figure shows the results of Support vector machine based iris recognition system for personal identification.







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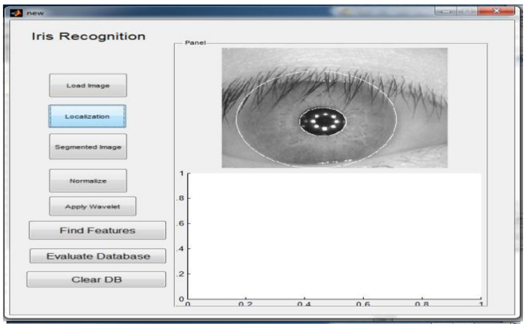

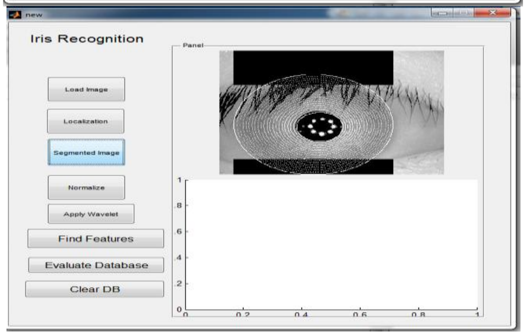

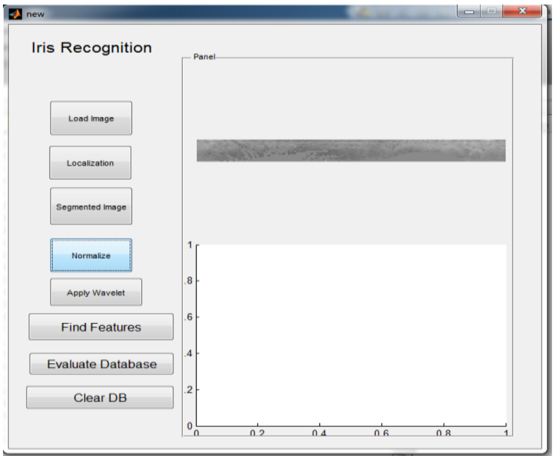

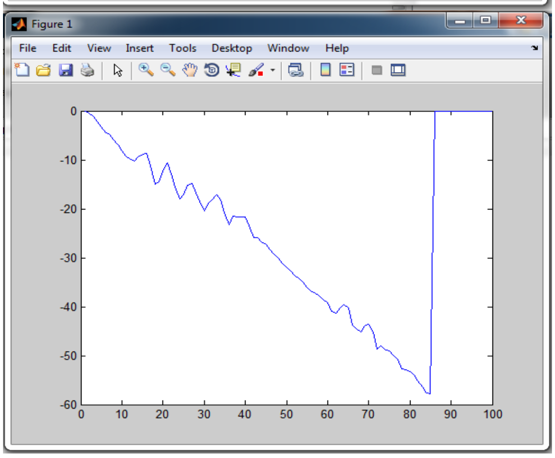

VI. CONCLUSION

This chapter has presented an iris recognition system, which was verify the authorized user of iris recognition technology. In this paper, we concentrate on the challenge of improving the performance of iris substantiation and recognition. This paper presents accurate non ideal iris segmentation. Depending on the type of abnormalities during image capture, set of global image enhancement algorithms is alongside applied to the iris image. This paper describes a novel knowledge algorithm that selects enhanced regions from each globally enhanced image and interactively combines to outline a single composite high-quality iris image. We extract global textural and general topological features from the iris image. The corresponding match scores are fuse using the propose2ν-SVM match score fusion algorithm to further improve the presentation. This proposes algorithm is also compare with existing algorithms. It is shown that the increasing effect of high-quality iris enhancement, accurate segmentation, intelligent fusion of match scores attain. Propose indexing algorithm; significantly reduce the computational time without affecting the identification accuracy.

VII. PROPOSED PLAN

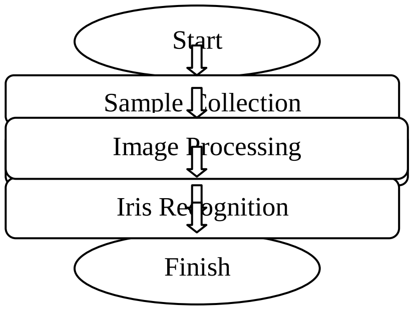

Fig.2. Propose Plan of Work

The basic purpose of Iris recognition is for personal identification. It will be very useful to prevent identity of a individual person.

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