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Survey of Different Approaches in Biometric Iris Recognition System

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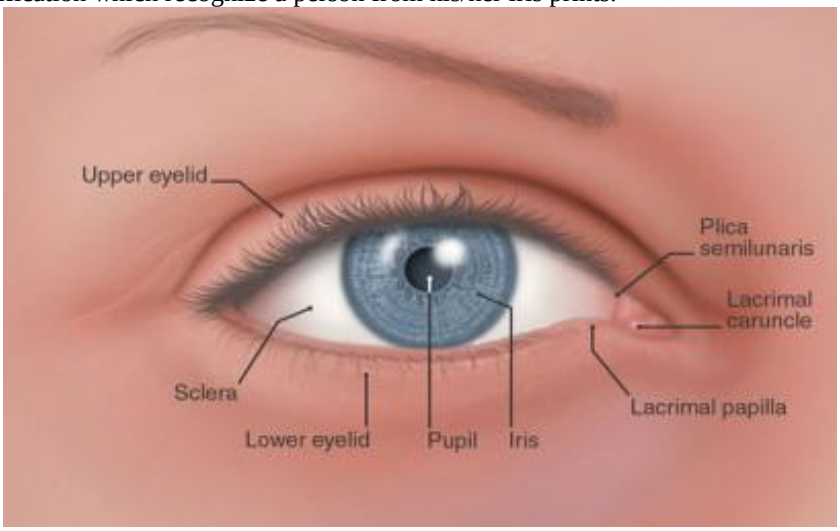
Abstract: Iris recognition is an automated method of biometric identification that uses mathematical pattern-recognition techniques. It is one of the most reliable technique used for personal identification. In this paper, we give a brief overview of different approaches used in iris recognition system.

Keywords: Biometrics, FAR, FRR, K-NN Classifier Circular Hough man Transform, Basic Rubber Sheet Model.

I. INTRODUCTION

Biometrics is an automated system that measure physical and behavioral uniqueness to identify an individual. Instead of requiring personal identification cards, keys or passwords, biometrics can identify fingerprints, face, iris, signature, or retinas of an individual for easy and convenient verification. Iris Recognition is a biometrical technology for personal identification and verification which recognize a person from his/her iris prints.



II. STAGES IN IRIS RECOGNITION SYSTEM

A. Image Acquisition-

It is to capture a sequence of iris images from the subject using a designed sensor. Image acquisition step is one of the most sensitive and important for the quality of image to be processed, data extracted from raw input determines the performance of the entire system to a large extent.

B. Localization/Segmentation-

The iris is acquired as a part of a larger image that contains data derived from the surrounding eye region. The inner and the outer boundaries of the iris are calculated.So it is important to localize that portion of the image that corresponds to iris.

C. Normalization-

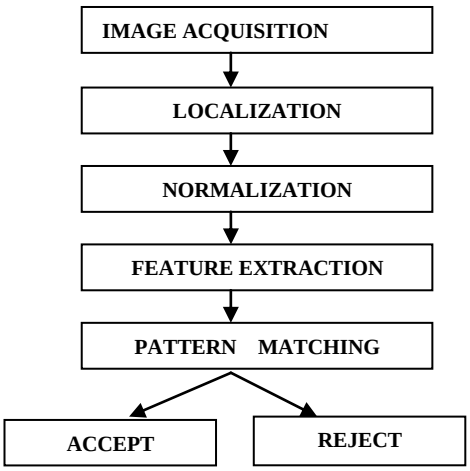
Normalization is a process that changes the range of pixel intensity values. It produce iris region which have the same constant dimensions, so that two images of the same iris under different conditions will have same features.

D. Feature Extraction-

The most important step in automatic iris recognition is the ability of extracting some unique attributes from iris, which help to generate a specific code for each individual. Feature extraction is a special form of dimensionality reduction.

E. Pattern Matching-

Matching phases comes in the last phase after all the initial phases. The feature generated in the feature extraction method is taken as the input value for matching the iris image with the iris codes. To authenticate via identification or verification, a template created by imaging the iris is compared to a stored value template in a database.



III. METHODS USED IN EXISTING IRIS RECOGNITION

A. Localization or Segmentation

1)Canny Edge Detection: It is an edge detection operator that uses a multistage algorithm to detect a wide range of edges in images. It is a method of segmentation. The boundary coordinates are separated from the rest of the image based on the intensity value of the pixel and strength of them.

2)Hough Transform: It is used for identify lines in the image. It is used to estimate the parameters of a shape from its boundary points in a image.

3)Circular Hough Transform: It is used to deduce the radius and centre coordinates of the pupil and iris regions by biasing the derivatives in horizontal direction during edge mapping detects the eyelids and biasing the derivatives in the vertical direction helps in detecting the circular boundary of the iris[7].

4)Daughman's Intergo-Differertial Operator: It is used for locating the circular iris and pupil region. This operator searches for the circular path. It takes the close up image as input from that where there is maximum change in pixel values by varying the radius and centre(x & y) positions.

B. Normalization

1)Daughman's Rubber Sheet Model: It converts the Cartesian coordinates (e.g. [1, 2]) into polar coordinates (e.g. [radius, angle]).It takes into account pupil dilation and size consistencies to produce normalized representation with constant dimensions[1].

2)Rubber sheet model of lower half of iris: The iris is partially covered with eyelids. This can lead to false recognition result. To avoid the prominent occlusion due to upper eyelid this technique was
Implemented[1].

3)Sector Based Normalization: There exists traditional method for iris normalization that transforms the detected annular ring into a rectangular block. The sector based normalization helps to minimize by eyelashes and eyelids.For certain range of angular values the radial dimension along left and right sector are taken completely because no occlusion occurs here. However for the upper and lower region only partial values are taken in the sector.

4)Analysis Band Based Normalization: In this technique the portion of the iris to be analyzed is
mapped and subdivided into eight analysis bands[1].

5)Dimension Reduction Approach: This approach is used to reduce the dimensionality of the problem. It takes the two portions having the size equal to the pupil size from the left and right side of the iris. After performing normalization operation, these two portions are merged[1].

C. Feature Extraction

1) Cumsum Based CPA:This is a algorithm used for extract features by generating iris codes by analyzing changes of grey values of iris pattern by using change point analysis which determine whether a change has take place from darkness to brightness or vice versa.

2) Daubechies Wavelets: It is used to transform huge data in smaller representations by using longer filters that produce smoother scaling functions.

3).Ridgelet: It is combination of random transform and wavelet transform.It relates the scales of the line position with wavelet transform which relates the scale of the point positions.

4)Wavelet Packet: Wavelet transform provides flexible time frequency resolution properties

D. Pattern Matching

1) Hamming Distance: It is a method that calculates the bit difference by using the XOR operation on the iris patterns. Hamming distance between two strings of equal length is the number of positions at which corresponding symbols are different.

2)Euclidean Distance: Euclidean distance is used as the matching metrics to match the iris with the iris images already present in the data base.

3)K-NN Classifier:It is one of the most important non-parameter algorithm and it is a supervised learning algorithm. The classification rules are generated by the training samples themselves without any additional data. The KNN classification algorithm predicts the test sample's category according to the K training samples which are the nearest neighbors to the test sample, and judge it to that category which has the largest category probability[5].

4)Histogram Matching: It is a graphical representation of the tonal distribution in a digital image. It plots the number of pixels for each tonal value.Pattern matching is performed by this technique.

E.Accept/Reject

Final phase is accept the code or reject the code.It depends on identification and verification which are important for every security system. In the verification, the system checks if the user data that was entered is correct or not (e.g., username and password) but in the identification stage, the system tries to find who is without any input information. \

IV. PERFORMANCE EVALUATION

Following metrics are used to evaluate the performance of the system.

A. False Acceptance Rate (FAR)

FAR is the measure of the likelihood that the biometric security system will incorrectly accept an access attempt by an unauthorized user. FAR is defined as the ratio of the number of false acceptances divided by the total number of identification attempts.

B. False Rejection Rate (FRR)

FRR is the measure of the likelihood that the biometric security system will incorrectly reject an access attempt by an authorized user. FRR is defined as the ratio of the number of false rejections divided by the total number of identification attempts.

V. CONCLUSION

We have study all methods which are used in iris recognition system and compare them according to their performance. Techniques and methods can be improved which are used under system for increasing the accuracy of iris recognition system. This can be done by decreasing FAR and FRR, so that final outcome can be improved.

REFERENCES

[1] Namrata P. Joshi, Roopal K. Lamba, Devang U. Shah, Bhargav V. Ghadia, *Implementation of Various Approaches for Iris Image Normalization*, Institute Of Technology, Nirma University, Ahmedabad –382 481,*IEEE*,08-10 dec, 2011

[2] J. Daugman, *How iris recognition works*", Proceedings of 2002 International Conference on Image Processing,Vol. 1, 2002.

[3] Emmanvel Raj.M.Chirchi, Dr.R.D.Kharadkar, *Improvement of Iris Pattern Authentication System using Cumulative Sum Algorithm*, International Journal of Engineering and Innovative Technology,ISSN: 2277-3754, Vol 2, Issue 5, Nov 2012.

[4] Anu Sharma Dr. Vijay Kumar Banga, *Improving Performance Of An Iris Recognition System Using Correlation Based Matching*, International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 Vol. 2 Issue 4, April -2013.

[5] Dolly Choudhary, Ajay Kumar Singh, Shamik Tiwari,A *Statistical Approach for Iris Recognition Using K-NN Classifier*, I.J. Image, Graphics and Signal Processing, 2013, 4, 46-52 Published Online April 2013 in MECS.

[6] Alinka P. Takale, Vanaja Roselin. E.Chirchi, *Iris Recognition: Cumsum Based CPA Approach*, -International Journal of Advanced Computational Engineering and Networking, ISSN: 2320-2106, Volume- 1, Issue- 5, July-2013.

[7] Matsoso Samuel Monaheng, Padmaja Kuruba, *Iris Recognition Using Circular Hough Transform,International* Journal of Innovative Research in Science,Engineering and Technology, ISSN: 2319-8753, Vol. 2, Issue 8, Aug 2013.

[8] Bansal,A; G.L.A.Univ.,Mathura,India;Agarwal,R.;Sharma, R.K, *FAR and FRR based analysis of iris recognition system*, IEEE, 15-17 March 2012.

[9] Bansal, A. ; G.L.A. Univ., Mathura, India; Agarwal, R. ; Sharma, R.K, *FAR and FRR based analysis of iris recognition system*, IEEE, 15-17 March 2012.

[10] Priyam Ghosh, M Rajashekharababu, *Authentication using Iris Recognition with Parallel Approach* ,International Journal of Computer Science and Network Security, VOL.13 No.5, May 2013.

[11] http://www.icdri.org/biometrics/iris_biometrics.htm

[12] Center for biometrics and security research. http://www.cbsr.ia.ac.cn/

