International Journal of Computer Science
and Engineering (IJCSE)
ISSN(P): 2278-9960; ISSN(E): 2278-9979
Vol. 3, Issue 4, July 2014, 43-48

International Academy of Science,
Engineering and Technology
Connecting Researchers; Nurturing Innovations

MULTIMODAL BIOMETRIC SYSTEM USING IRIS FUSION

P. DIVYA, K. VASANTHI, N. VALARMATHY & ANUSHYA

Assistant Professor, Pioneer College of Arts and Science, Coimbatore, Tamil Nadu, India

ABSTRACT

Biometric system is automated recognition of persons based on their biological or/and behavioral Characteristics. Automated dimension of these characteristics of person are depending upon the application context. A biometric system may be noted either as a verification system or an identification system. The main contribution of this study is the comprehensive survey of existing and development of new improvements which can be applied to filters parameter selection, filters construction, and feature computation. They are combined to provide a complete framework for optimally efficient computation of Gabor features. To make the proposed framework the most valuable and useful the implementation is distributed as public software. Hence, in real-time applications single biometric may not able to achieve the desired performance requirement. Such problems are overcome using multimodal biometric systems. It combines the information from multiple sources to arrive at a decision. Such, multimodal biometric systems can achieve better performance when compared with unimodal systems.

KEYWORDS: Gabor Filter, Iris Recognition, Multimodal Biometric

INTRODUCTION

Data mining has been used in many applications and as well as in organizations too. In several applications, data mining is becomes increasingly very popular. Data mining applications are widely used by all parties involved in varies areas of research.

Using biometrics system, it is possible to identify an individual in automatic manner. It is based on a exclusive feature or characteristic possessed by that individual. The measurement of biological and behavioral characteristics of a person is for medical [2], security or psychological purposes. A biometric system may be represented as verification or an identification system. A verification system may be briefed as validating a person by comparing the characteristics with biometric template, which will be stored previously in the system [3]. It performs one-to-one comparison to determine segmentation is true. A verification system can reject or accept the identity of an iris.

RELATED WORKS

Iris recognition is a most consistent and exact biometric identification system available. Iris recognition is a process which captures an image of an individual's eye. Then, the iris in the image is then meant for the further segmentation and normalization for extracting its feature [1]. The segmentation process decides the performance of iris recognition.

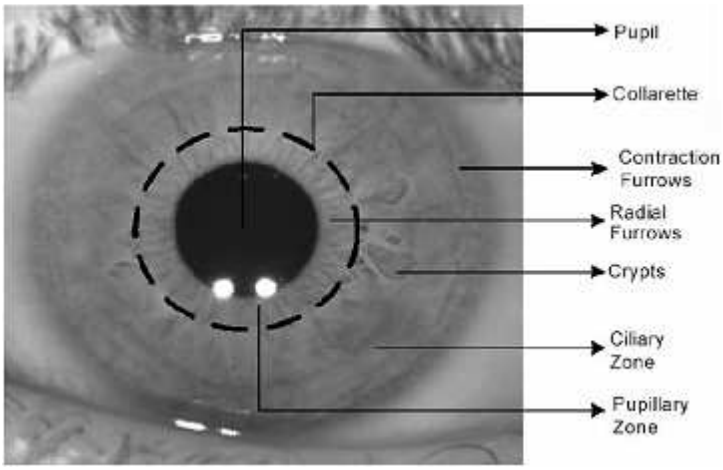


Figure 1: Front View of the Eye

The process of segmentation is mainly used for the localisation of the exact iris region in the exact portion of an eye. It should be done accurately and correctly to remove the eyelids, eyelashes, reflection and pupil noises present in iris region [5]. The iris recognition system comprises of an automatic segmentation system that is based on the Hough transform. It is able to localise the circular iris and pupil region, occluding eyelids and eyelashes, and reflections. The extracted iris region was then normalised into a rectangular block with constant dimensions to account for imaging inconsistencies [10].

Finally, the phase data from 1D Log-Gabor filters was extracted and quantised to four levels to encode the unique pattern of the iris into a bit-wise biometric template. It is the colored portion (brown or blue) of the eye that regulates the size of the pupil. The coloration and structure of two irides is genetically linked but the details of patterns are not. It has stable and distinctive features for personal identification.

Extremely data rich physical structure having large number of features. Its inherent isolation and protection from the external environment. The impossibility of surgically modifying it without unacceptable risk to vision.

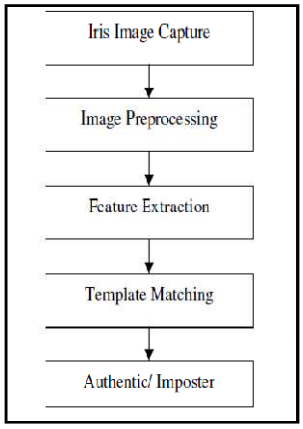


Figure 2: Block Diagram of Stages in Iris Recognition

PROBLEM DEFINITION

Although multimodal biometric systems have been traditionally regarded as more secure than unmoral systems, their vulnerabilities to spoofing attacks have been recently shown.

New fusion techniques have been proposed and their performance thoroughly analyzed in an attempt to increase the robustness of multimodal systems to these spoofing attacks [4].

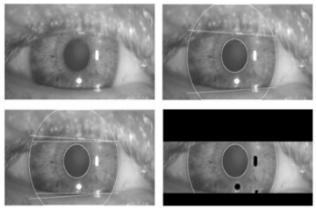
In this work, the software attacks against multimodal biometric systems are tested efficiently. Its performance is tested against a multimodal system based on face and iris, showing the vulnerabilities of the system to this new type of threat.

Score quantization is managing to cancel the effects of the proposed attacking methodology under certain scenarios Gabor filter [9] responses are widely and successfully used as general purpose features in many computer vision tasks, such as in texture segmentation, face detection and recognition, and iris recognition [8]. In a typical feature construction the Gabor filters are utilized via multi-resolution structure, consisting of filters tuned to several different frequencies and orientations.

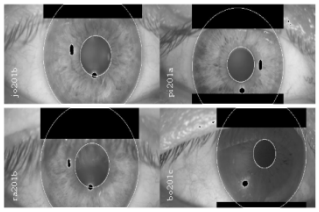
MAJOR CONTRIBUTION

Methodology

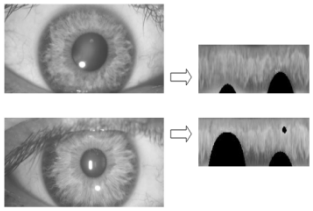
- Denoising
- Edge Detection
- Fast Fourier Transform
- Gabor Filter - Matching, Classifier (KNN)



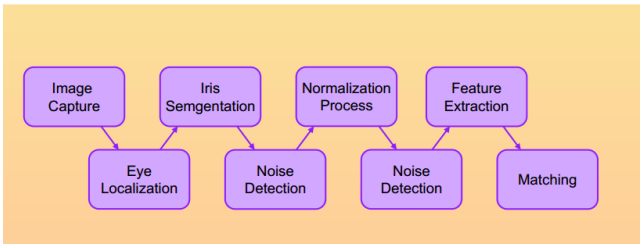
Iris Verification



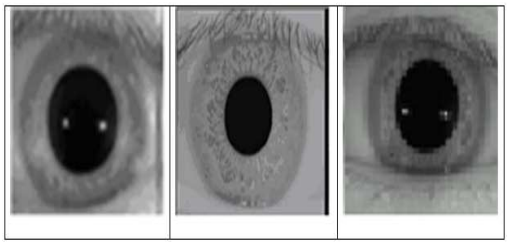
Iris Segmentation



Testing



Iris Recognition



Result of Enhancement Using Gabor Filter

EXPERIMENTAL RESULTS

The iris recognition system comprises of an automatic segmentation. Based on the Hough transform, the circular iris and pupil region can be localized. With constant dimensions, the resultant iris region is normalized into a rectangular blocks [6]. By means of Gabor filters the phase data was extracted and quantized. The unique pattern of the iris is encoded into a bit-wise biometric template.

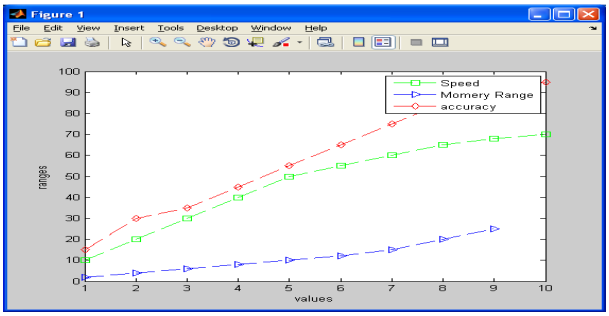


Figure 4: Speed & Accuracy, Memory Ranges in Biometric Recognition

The system performs recognition on a set of certain eye images. However, another set of test images are resulted in false accept and false reject rate. Former being 0.006%, later will be 0.246%. Hence, iris recognition is a reliable and accurate biometric technology [7]. The proposed face and iris recognition techniques as well as the other techniques was applied to the test set using all of the random realizations of each training set. The speed, memory range and accuracy criteria are also examined efficiently using graph. In the fig.4, the speed range from 15 and proceeds to the range above 80 (i.e) the speed of recognizing the face and iris is high. Then the memory are also predicted, it ranges from 10. It will gradually increases depend upon the biometric input.

CONCLUSIONS

A high recognition rate has been achieved by above technique, as it results from the performed experiments. The obtained results prove the effectiveness of our method. This technique provides a higher recognition rate than many other recognition approaches. The speed of the system can be improved. The most computation stages are performed by Hough transform, then manipulating Hamming distance between templates to search for a match. Since, the system is implemented in MATLAB. A frame grabber can be used to capture a number of images rather than having a fixed set of iris images from a database. So, obviously the recognition rate can be enhanced. An optimal feasibility could be determined by making use of an acquisition camera.

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