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Iris Recognition Based on 2D Wavelet Coefficients

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Abstract: ***Iris recognition is one of the robust technique for authentication and verification system and in this paper we proposed a robust and new technique for iris recognition system based on reverse biorthognal 2D discrete wavelet transform, and with the proposed technique we have achieved a recognition rate of 99.96% and the time of feature extraction and verification is 2.3 ms, and the system performance will be tested over blur and noisy image database UBIRIS version1.***

Keywords: Segmentation, normalization, feature extraction and matching

1. Introduction

In the ever – demanding and booming IT industry, data is considered as most important asset of a company. Data plays a pivotal role in generation of monetary benefit and development of an organization in every field. One can imagine the importance of data by just considering an example that one can develop a new idea and implement it if just total number of internet users is known. This will help in deployment of the idea and development of a new product that can change the lives of people around the globe.

If data can account for such benefits, it should be considered important and for this one of the techniques which are used to protect it from unauthorized access is IRIS recognition. The term "IRIS" can be defined as the part of eye which is responsible for controlling the size and diameter of the pupil. The size of pupil depends on the distance of the object to be viewed and intensity of the light coming from the source. Iris recognition is the technique which is most widely used for the authentication and authorization purposes. This is because of the fact that iris is one of the part of the human body which is least affected by the environmental factors. No doubt each and every individual in this world is having different fingerprints, facial features, speech pattern etc., but these can get affected to a larger extent than the iris, as they are more exposed to the physical environment around them. Nowadays no field has remained untouched by this technique. Whether it is a mobile phone, laptops or any building where secure access is required, iris recognition has been used intensively because of its intense reliability factor. The technique is highly affected by a number of factors such as noise, distance of the subject, reflection in the eye and also the time duration of capturing the data and many more. All the factors should be considered while designing a system based on this technique. Researchers around the world are incessantly working to figure out the various methods to make this reliable technique more and more accurate.

This paper comprises introduction of system type, in second section of the paper we formulate a table of related research work, at third section of the paper comprises proposed system type at forth section of the paper comprises the result and discussion and finally we concluded our proposed system.

2. Related Work

Given below in the table some of the existing research work and their drawbacks.

Table of Relative Comparison of Different Algorithm

Researcher Name	*Year*	*Algorithm Used*	*Drawbacks*
John G. Daugman	1994	Integro-Differential, Daugman Rubber Sheet Model, 2-D Gabor Filter, XOR operator Hamming Distance.	Integro-differential operator fails in case of noise and total execution time is also very high.
W. W. Boles and B. Boashash	1998	1-D wavelet transforms, Edge detection technique, Zero crossing representation.	Algorithms are tested on few number of Iris images, Correct recognition rate is 92%, Equal Error rate is 8.13%.
Zhonghua Lin and Bibo Lu	2010	Morlet wavelet transforms Polar co-ordinate transform.	Recognition rate is low of the system.
Bimi Jain, Dr. M.K. Gupta and Prof. JyotiBharti	2012	Fast Fourier transform, Euclidean distance for matching.	Algorithm tested only on 10 images, FAR and FRR are also not declared and Euclidean distance technique make computational slow.
Mohd . T. Khan	2013	1-D Log Gabor filter, K-dimensional tree technique for matching.	Search efficiency is decreased by large tree size and FAR, FRR, ERR are not mentioned in results.

3. Proposed System

In the proposed work we have used canny edge detection and Hough circular transform for the segmentation as this is the most important part of the system with this technique we were able to achieved 93% exact segmentation rate in case of UBIRIS database version 1, maintain a database with the images which gets properly segmented we perform the second phase i.e. normalization over the images, and image enhancement over the normalized image with the Gaussian filter and histogram equalization. Now at this state the most important part of algorithm is needed to be apply that is feature extraction technique and for feature extraction we

have used 2D discrete wavelet transform with 5 level of decomposition of reverse biorthogonal wavelet

6.8(RBIO6.8) this wavelet have an advantage over the other wavelet that only this wavelet have an advantage that it has separate input and output waveform as well as the compression ratio is more than 100000 times, over the feature we maintain two different database one of genuine and the next one of non genuine, with the help of Hamming distance classifier.

4. Result and Discussion

For the evolution of proposed technique we have used MATLABversion 2012a, with the operation system windows 8 and the processor of i5 having processor speed2.85 GHz and the ram of 8 GB. And the recognitionrate achieved with the proposed algorithm is 99.96% with a FAR 0.00% and FRR 0.08% and equal error rate 0.003% also the time off feature extraction is 2.3 ms.Figure shown below shows the convergence of two matrix types.

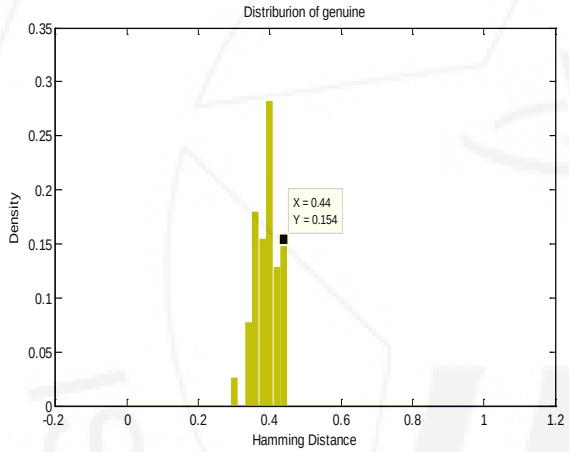

Figure 1: distribution of genuine matrix

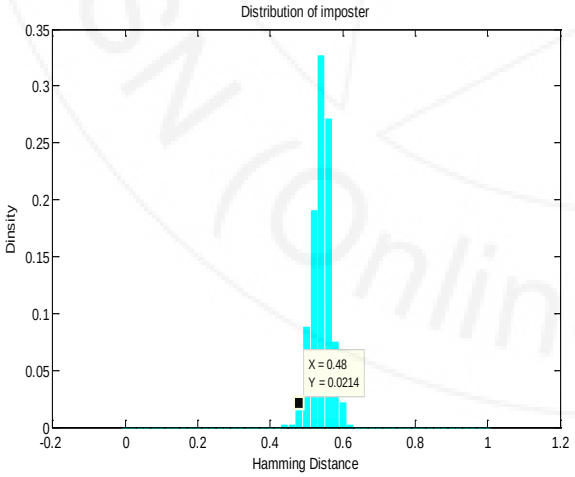

Figure 2: distribution of imposter

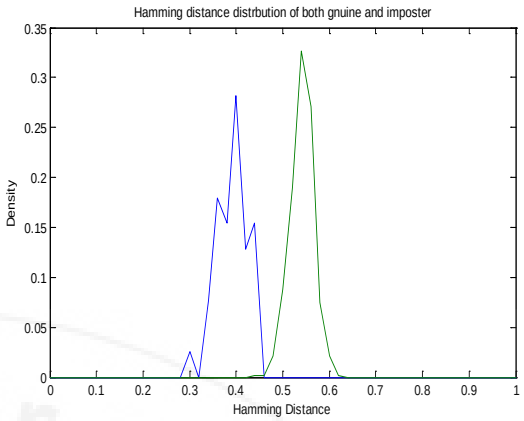

Figure 3: distribution of genuine and imposter

5. Conclusion and Future Work

In this paper we have presented a new robust technique for iris recognition system and with the proposed technique we would able to achieved avery high recognition rate over the noisy image database and this much high recognition rate would never been achieved before over the noisy images so we can conclude that if the system would be designed with the described feature extraction technique the existing systems which are using now a day's get better performance. In the future work we would design a fusion system which will be the combination of iris, face and fingerprint with the same feature extraction technique.

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