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Image Normalization Exploiting Intensity Parameters as well as Dimensional Characteristics

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Abstract: In present day world when identity circumferences many social, personal, professional outlooks, the identification of identity is highly critical. In pursuit of the same if we consider biological identity of person as a resource to identify his identity, we are approaching towards a new arena of a metric system call biometric system which enables us for automatic identification of an individual based on a unique feature or characteristic biologically possessed by the individual. This paper gives simulation results for complete iris recognition exploiting Intensity Parameters as well as Dimensional Characteristics of Pupil and Iris using MATLAB software version 2010b to improve feature extraction.

Keywords: Iris Recognition, coordinates, intensity, co-centric, biometric, test/real-time input.

I. INTRODUCTION

A biometric system provides automatic identification of an individual based on a unique feature or characteristic possessed by the individual. Iris recognition is regarded as the most reliable and accurate biometric identification system available. In present day world when identity circumferences many social, personal, professional outlooks, the identification of identity is highly critical. [1, 2]. Iris recognition is an automated method of biometric identification that uses mathematical pattern-recognition techniques on images of the iris of an individual's eyes, whose complex random patterns are unique and can be seen from some distance. [3, 4]

The first phase of iris biometric systems is capturing the sample of the iris. Then iris samples are pre-processed and segmented to locate the iris. Once the iris is located, it is then normalized from polar coordinate to Cartesian. Next, a template representing a set of features from the iris is generated. The iris template can then be objectively compared with other templates in order to determine an individual's identity. This paper presents the novelty involved in first step for the segmentation pupil by determining coordinates of image [5,6,7].

II. EXPERIMENTAL RESULTS

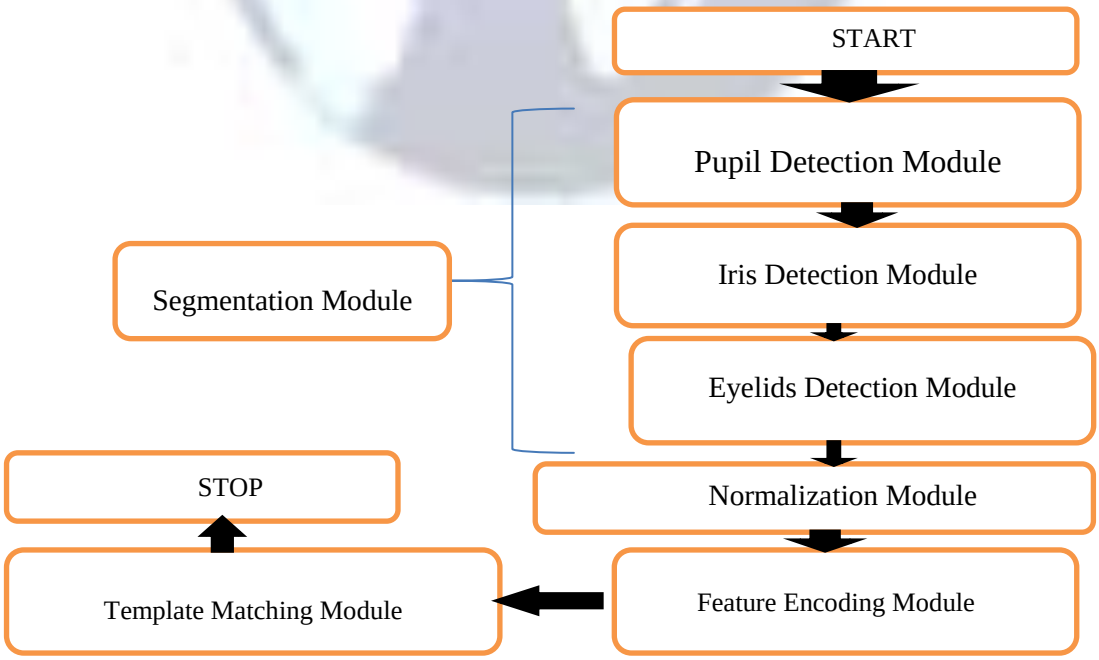


Fig. 1: Flowchart of implemented algorithm

The pupil detection module isolate the pupil from image, calculate the center and radius of pupil. The outputs achieved are then used in next module which is iris detection module. Further, the output from next hierarchal module which is eyelid detection module is thus provided as input to normalization module.

The sample images taken are:

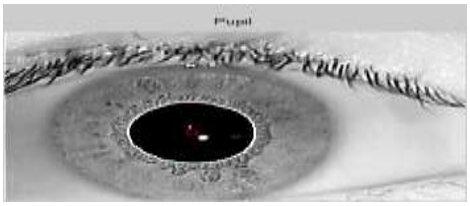


Figure 2: sample image 1

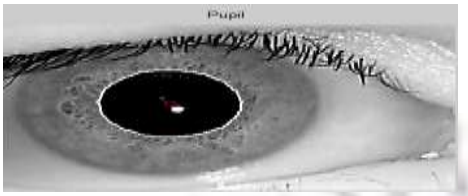


Figure 3: sample image 2

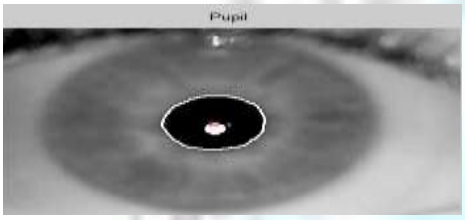


Figure 4: sample image 3

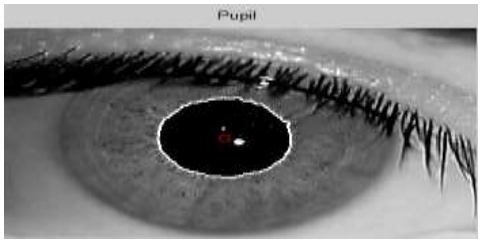


Figure 5: sample image 4

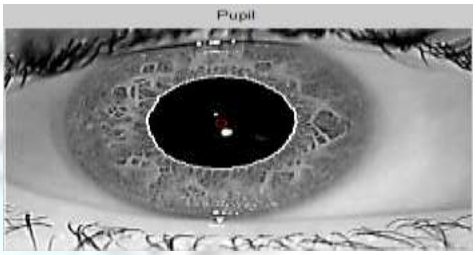
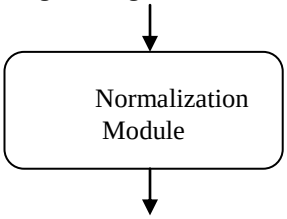


Figure 6: sample image 5

The image normalization is achieved as follows:

1. Now the segmentation reaches its culmination where we subtract the pupil circle from its exterior iris circle thus obtaining only iris portion.
2. At this stage we have a circular portion of a tube like structure of only iris portion from the original image which is devoid of noise.
3. From here iris starts its journey for the process of normalization.
4. The center of the pupil was considered as the reference point, and radial vectors pass through the iris region. A number of data points are selected along each radial line and this is defined as the radial resolution.

Input:
1. Iris portion which is to be normalized
2. Angular resolution
3. Radial resolution
4. (X,Y) coordinates of boundary coordinates of pupil and Iris
6. (X,Y) coordinates of boundary coordinates of sclera.
7. Matrix containing line segments.



Output:
1. Normalized Iris
2. Normalized Mask*
*Mask is used so that only informative and noise free portion is matched.

Fig. 7: Normalization module

5. The number of radial lines going around the iris region is defined as the angular resolution. Since the pupil can be non-concentric to the iris, a remapping formula is needed to rescale points depending on the angle around the circle.

A constant number of points are chosen along each radial line, so that a constant number of radial data points are taken, irrespective of how narrow or wide the radius is at a particular angle. The normalized pattern was created by backtracking to find the Cartesian coordinates of data points from the radial and angular position in the normalized pattern. From the iris region, normalization produces a 2D array with horizontal dimensions of angular resolution and vertical dimensions of radial resolution.

The MATLAB simulation results for sample images are as follows:

Corresponding Normalized iris and its normalized mask are shown below:

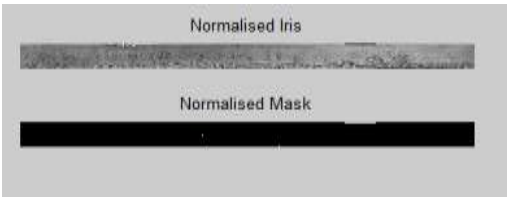


Figure 8: Normalized iris and normalized mask (sample image 1)

Figure 9: Normalized iris and normalized mask (sample image 2)

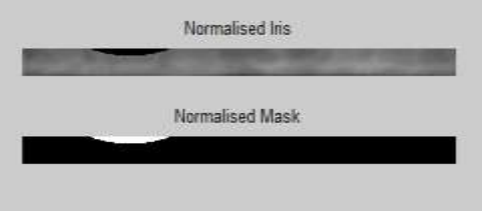


Figure 10: Normalized iris and normalized mask (sample image 3)

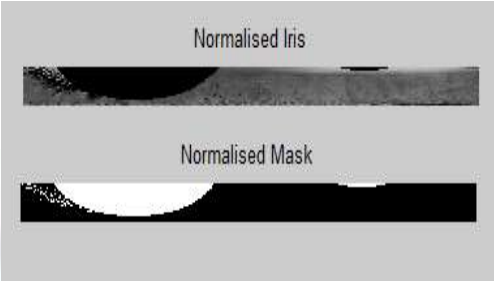


Figure 11: Normalized iris and normalized mask (sample image 4)

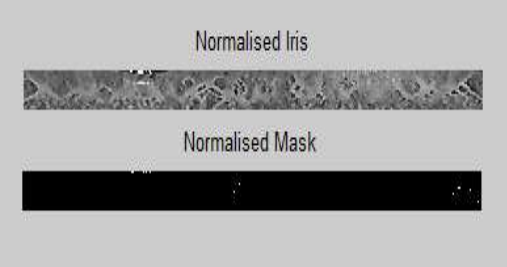


Figure 12: Normalized iris and normalized mask (sample image 5)

III. CONCLUSION AND FUTURE WORK

The image normalization is effectively implemented by this new method and depending upon various dimensional features viz. distance of camera from iris, image quality of iris etc., the performance of our work varies in fairly good manner. The future work involves reducing computational complexity of the above new algorithm.

REFERENCES

[1]. Jain, A. K., Hong, L., & Pankanti, S. “Biometric Identification" Communications” of the ACM, 43(2), 2000.
[2]. Jain, Anil K.; Ross, Arun "Introduction to Biometrics". In Jain, AK; Flynn, P; Ross, A. Handbook of Biometrics. Springer. pp. 1–22. ISBN 978-0-387-71040-2, 2008.
[3]. Jain, A.K., Bolle, R.; Pankanti, S., eds. “Biometrics: Personal Identification in Networked Society”. Kluwer Academic Publications, 1999.
[4]. Sahoo, Soyuj Kumar; Mahadeva Prasanna, SR, Choubisa, Tarun"Multimodal Biometric Person Authentication : A Review". IETE Technical Review29 (1): 54. retrieved 23 February 2012.
[5]. A. Rattani, "Adaptive Biometric System based on Template Update Procedures," PhD thesis, University of Cagliari, Italy, 2010.
[6]. A. Rattani, B. Freni, G. L. Marcialis and F. Roli,"Template update methods in adaptive biometric systems: a critical review," 3rd International Conference on Biometrics, Alghero, Italy, pp. 847-856, 2009.
[7]. N. K. Ratha, J. H. Connell, and R. M. Bolle, "Enhancing security and privacy in biometrics-based authentication systems," IBM systems Journal, vol. 40, pp. 614-634, 2001.