A Fast Localization and Feature Extraction Method Based on Wavelet Transform in Iris Recognition

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ABSTRACT

With an increasing emphasis on security, automated personal identification based on biometrics has been receiving extensive attention. Iris recognition, as an emerging biometric recognition approach, is becoming a very active topic in both research and practical applications. In general, a typical iris recognition system includes iris imaging, iris liveness detection, and recognition. This research focused on the last issue and describes a new scheme for iris recognition. This paper proposes a new method to find the inner boundary of the Iris for localizing its area in the eye images. The proposed method besides having higher speed and lower calculation cost and simplicity, has got an acceptable precision for internal boundary localizing the proposed algorithm for feature extraction, characterizing the important information via biorthogonal wavelet and experimental results show that the proposed method has an encouraging performance.

KEYWORDS

Biometrics, iris recognition, localizing, feature extraction

1. INTRODUCTION

Biometrics are systems for identification and verification of people. Any individual and distinctive, robust and measurable physiological or behavioral characteristic which can be used for automatic identification or verification is called biometrics [1], [2].

Among biometrics, iris scan systems are foolproof and have got very high confidence because of iris stability specifications and also the iris pattern individuality, which cannot be copied artificially [3]. Iris is the colored part of the eye and lies in dorsal part of the cornea. Iris structure starts forming in the 3rd month of fetal period. [4] This body organ is the single internal organ which normally can be seen from outside of the body. Each iris has got a complicated individual pattern that makes a complete difference between left iris and right iris in one person. It is claimed that iris scan systems are foolproof, because, it is impossible to copy iris artificially due to particulars and numbers of its measurable specifications.

Generally, an iris recognition system is divided into four parts. In the first part, a sequel of eye images is captured, then in the second part, the localization is performed and in the third part, extraction of specification is done and iris code is gained and finally in the fourth part the comparison is performed [5].

In this cae, different algorithms are presented. The proposed method by Daugman for iris localization is based on finding two internal and external boundaries. In this method Daugman has used an integral-differential operator. Then for feature extraction he projected the image on to a bank of 2D Gabor wavelets and took the sign of the real and imaginary results and encoded in a 20416-bit binary vector. Finally matching is performed using the Hamming Distance [6], [1], [7],[8]. Wildes uses Hough Transform to localize the iris. For the feature extraction he used Laplacian pyramids and 4-level resolutions. His algorithm relies on image registration and matching which requires many computations [5], [9].

Boles' prototype [10] operates in building a one-dimensional representation of the gray level profiles of the iris. He used zero-crossing of 1D wavelet transform of the resulting representation.

In Ma algorithm, estimation of pupil center and radius before edge detection and Hough Transform results in reduction of calculations because the searched area is being limited by Hough Transform. Furthermore, in this algorithm, local sharp variation points are utilized to present the characteristics of the iris by biorthogonal wavelet [4].

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