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Effective Iris Recognition System

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Abstract

Biometric identification has provided a robust technique for proving identity and has become the standard in identity authentication and access control. Iris recognition is a prudent biometric identification system with promising results in the security systems area. In this work, our system introduces a more accurate method called RANSAC (Random Sample Consensus) for fitting ellipse around non circular iris boundaries. It can locate iris boundaries more accurately than the methods based on Hough transform. Also we used Daugman's rubber sheet model for iris normalisation and elliptic unwrapping, and correlation filter based matching for intra class and inter class distance evaluation.PSR(Peak Side Lobe Ratio) is the similarity measure used for matching templates. By these the recognition process is improved compared to Daugman's method. WVU database is used for conducting experiments and promising results are obtained.

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Keywords:RANSAC;PSR,Normalisation;WVU

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1.Introduction

Biometrics refers to metrics related to human characteristics. Biometric recognition can be used as a form of identification and access control. A biometric recognition system is used to identify individual in a group that are under surveillance. Biometric identifiers are often classified as physiological characteristics and behavioural characteristics. Physiological characteristics are those related to the shape of the body like fingerprint, DNA ,palm veins, iris recognition, face recognition and so on. The second category includes the pattern behaviour of an individual like voice, gait etc.

Iris recognition is nowadays considered as one of the most accurate biometric recognition techniques. Iris recognition is user friendly since the iris can be captured from a certain distance. Critical step in the recognition process is the segmentation of the iris pattern in the input eye image. This process has to deal with the fact that the iris region of the eye is a relatively small area, wet and constantly in motion due to involuntary eye movements. Moreover, eyelids, eyelashes and reflections are occlusions of the iris pattern that can cause errors in the segmentation process. As a result, an incorrect segmentation can produce errors in biometric recognitions and seriously reduce the final accuracy of the system. After J Daugman proposed the first automatic iris recognition system, a lot of commercial iris recognition systems were developed to deal with eye images[8,9] and in most cases, iris segmentation is a challenge in the case of noisy images.In the previous works, great improvement have been made in constrained environment. Recent researchers have provided great attention on recognition in less constrained imaging condition. General framework for iris feature representation based on ordinal measure has been presented in [10].The challenging phase in all these previous works lies in the segmentation phase where iris boundary has to be localised with great accuracy. This paper studies iris recognition in the less constrained imaging conditions. In order to improve the segmentation accuracy,we are using an algorithm called RANSAC in conjunction with direct ellipse fitting[2] .

Random Sample Consensus (RANSAC)[2]is used for localizing iris outer boundaries with ellipses which results in improvement over existing approaches. After locating iris region, we will normalise the segmented region and it is used as template for matching. In order to compare two templates correlation is performed and PSR(peak Side Lobe Ratio) is used as a similarity measure in recognition process.DET curve is used for comparing its performance with Daugman's method[1],where Hough transform is used for locating iris boundary. The different steps in implementing the proposed work is illustrated in Fig.1and each step is explained in detail in the following section.

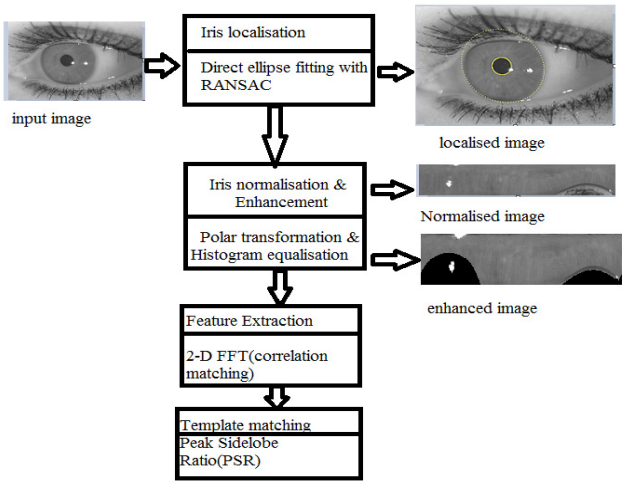

Fig 1.Flow diagram of the proposed algorithm