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A NOVEL BIOMETRIC RECOGNITION USING SCLERA VEIN AND FINGER VEIN FUSION

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ABSTRACT

Biometric recognition techniques are mainly used for human identification and authentication. A comprehensive approach for multi biometric recognition is designed by fusion of finger vein and sclera vein. Sclera vein and finger vein is a new parallel vein recognition method using a two-stage parallel approach for registration and matching. The proposed method can achieve dramatic processing speed improvement without compromising the recognition accuracy. The proposed approach combines finger vein approach and sclera vein approach. The frequency based approach is used to achieve the combination of both approaches which is based on identical biometric vector. Two new score-level combinations, holistic and nonlinear fusion is to be developed and investigated, then comparatively evaluate with more popular score-level fusion approaches to ascertain their effectiveness in the proposed system. The process offers a state-of-the-art advancement of multi biometrics, offering an original view point on features fusion. Consecutively, a hamming-distance-based matching algorithm deals with the combined homogenous biometric vector. Thus, the multimodal system achieves interesting results with several commonly used databases.

KEYWORDS:- *Vein Segmentation, Vein Feature Extraction, Fusion Vein Matching.*

1. INTRODUCTION

Biometric system is a pattern recognition scheme based on the physiological and behavioral features of an individual. Physiological characteristics that are tied up to the frame of the body include fingerprint, palm veins, facial expression recognition, palm print, hand geometry, retina, and iris recognition.

Behavioral characteristics that are tied up to the blueprint of the behavior of a person include typing, gait, voice. Physiological characteristics are more stable than the behavioral characteristics. Biometric identification is unique to persons and they are more reliable than the previous identification techniques. The eyes are one of the most complicated human organs and to find lots of information by analyzing it. There are many research works done to differentiate human beings based on eye parts. Sclera is the opaque, white area and acts as a protective covering of the human eye. The sclera completely surrounds the eye.

The vein patterns seen in the sclera region are unique to each person in visible wavelengths. So it is made as a biometric tool for human identification.

Finger vein recognition is a method of biometric authentication that uses pattern-recognition techniques based on images of human finger vein patterns beneath the skin surface. Finger vein recognition is one of many forms of biometrics used to identify individuals and verify their identity. Sclera and finger vein recognition using multi-biometric recognition techniques would be very challenging to be implemented in a real time biometric system, especially when there is large number of templates in the database for matching.

They proposed multimodal biometric recognition based on the fusion of sclera vein and finger vein. The fusion is based on the following consideration: (i) Sclera vein and finger vein recognition are complementary. Sclera vein recognition has high recognition rate, but it is vulnerable to the quality of collected images because sclera vein are often damaged, and are easy to stolen. Different from sclera recognition, finger vein recognition makes use of features inside finger rather than finger surface. Thus finger vein images are difficult to forge. However, features extracted from finger vein are not as precise as those from finger vein. In view of the advantages and disadvantages, fusing sclera vein with finger vein can compensate for lacks of a single biometric effectively. (ii) Integrated device can be designed. Both sclera vein and finger vein recognition system get data from fingers and iris, thus an integrated device can be designed that avoids high costs, complex collection using multiple capture devices.

2. METHODOLOGY

2.1 USER INTERFACE DESIGN

The goal of user interface design is to make the user's interaction as simple and efficient as possible, in terms of accomplishing user goals—what is often called user-centered design. Good user interface design facilitates finishing the task at hand without drawing unnecessary attention to it. Graphic design may be utilized to support its usability. The design process must balance technical functionality and visual elements (e.g., mental model) to create a system that is not only operational but also usable and adaptable to changing user needs.

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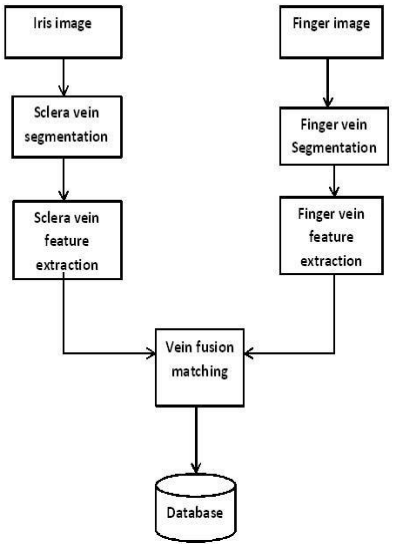

Figure 1.Methodology of proposed work

2.2 NEW ACCOUNT AND MULTI BIOMETRIC REGISTRATION

Create new using the raw biometric data is captured. Depending on the technology being implemented, the data captured could be a finger image, eye image stored into database with respect to account number. Required proof details are registered with personal details of the user.

Finger and Eye Image Enrollment: After successful completion of registration of personal details, user needs to register their finger print and eye image. By giving account number and proofs details user get the file browse option in that select the location of their finger print and eye image and save it.

2.3 SCLERAVEIN SEGMENTATION

Sclera image segmentation is the first step in sclera vein Recognition. They used a clustering algorithm to classify the color eye images into three clusters - sclera, iris, and background. A segmentation approach based on a normalized sclera index measure, which includes coarse sclera segmentation, pupil region segmentation, and fine sclera segmentation. A skin tone plus ―white color‖-based voting method for sclera segmentation in color images and Otsu's threshold based method for gray scale images.

2.4 SCLERA VEIN FEATURE EXTRACTION

After sclera segmentation, it is necessary to enhance and extract the sclera features since the sclera vein patterns often lack contrast, and are hard to detect. To use a bank of multi-directional Gabor filters for vascular pattern enhancement. It is used to contrast limited adaptive histogram equalization (CLAHE) to enhance the green color plane of the RGB image, and a multi-scale region growing approach to identify the sclera veins from the image background. When the numbers of branches is more than three, the vessels branches may come from different sclera

layers and its pattern will deform with movement of eye. Y shape branches are observed to be a stable feature and can be used as sclera feature descriptor. To detect the Y shape branches in the original template, we search for the nearest neighbors set of every line segment in a regular distance, classified the angles among these neighbors. If there were two types of angle values in the line segment set, this set may be inferred as a Y shape structure and the line segment angles would be recorded as a new feature of the sclera.

2.5 FINGERVEIN SEGMENTATION

The segmentation from the random localized algorithm is used to segment the original input finger vein image. This method will segment the finger vein image without line removal process. This algorithm the background is indicated by the blacked out region. The figure demonstrates clearly that the detected finger vein regions from the proposed segmentation algorithm are much smaller and more accurate than those of the previous method. From this figure, the ability of the proposed algorithm to reduce the searchable finger vein area while improving accuracy can be visualized.

2.6 FINGER VEIN FEATURE EXTRACTION

The repeated line tracking method gives a promising result in finger-vein identification. Vein identification in the finger vein image using the repeated line tracking algorithms. The idea is to trace the veins in the image by chosen directions according to predefined probability in the horizontal and vertical orientations, and the starting seed is randomly selected, the whole process is repeatedly done for a certain number of times. As its name suggests the maximum curvature method locate the position that possess the maximum curvature from the image profile, and the profile are acquired in different direction, while all points are extracted, they are connected and combined according to the rules.

2.7 VEIN FUSION MATCHING SCORES

Fusion is performed by combining the biometric template extracted from every pair of finger vein and eye representing a user. The matching score is calculated through the hamming distance calculation between two final fused templates. The template obtained in the encoding process will need a corresponding matching metric that provides a measure of the similarity degree between the two templates. The result of the measure is then compared with an experimental threshold to decide whether or not the two representations belong to the same user.

3. CONCLUSION

Traditional fusion based vein recognition methods have the shortcomings of the curse of dimensionality an increased running time in extracting multiple features. The proposed multimodal biometric recognition based on the score level fusion of sclera vein and finger vein. The purpose of

iris and finger recognition, a biometrical based technology for personal identification and verification, is to recognize a person from iris and finger vein images. It is attempt to have been made to present of different recognition methods. The study of different techniques provides a development of new technique in this area as future work.

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