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Personal Palm Print Identification Using KNN Classifier

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Abstract:—*The Palm print recognition system recognizes on the base of the palm print of a individual. The print patterns are always unique due to the fact It is trustworthy, even in the monozygotic twins. Three principle lines, wrinkles and ridges normally contain in the inner surface of the palm. Where the wrinkles are called secondary creases and the principal lines are also called flexion creases. personal authentication has become a vital and highly demanding technique which is the foundation of many applications, such as security access systems, time attendance systems, and forensics science. The experimental results showed that the designed system achieves an excellent and more accurate recognition rate and provide more security than unimodal biometric-based system.*

Keywords:— *Image Acquisition, Preprocessing, Featur Extraction and Matching*

1. INTRODUCTION

Biometric is automated method of recognizing a person based on a physiological or behavioural characteristic Among the features measured are; face fingerprints, hand geometry, handwriting, iris, retinal, vein, and voice Biometric technologies are becoming the foundation of a extensive array of highly secure identification and persona verification solutions [1]. As the level of security breaches and transaction fraud increases, the need for highly secure identification and personal verification technologies becoming apparent.

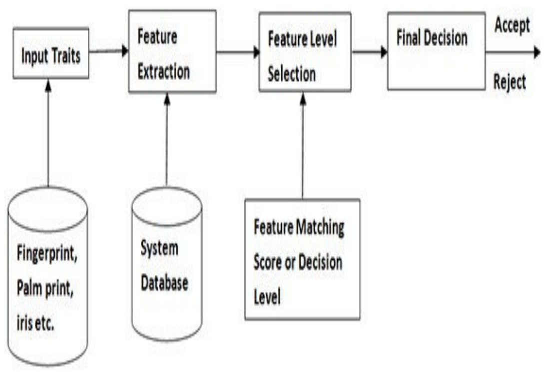


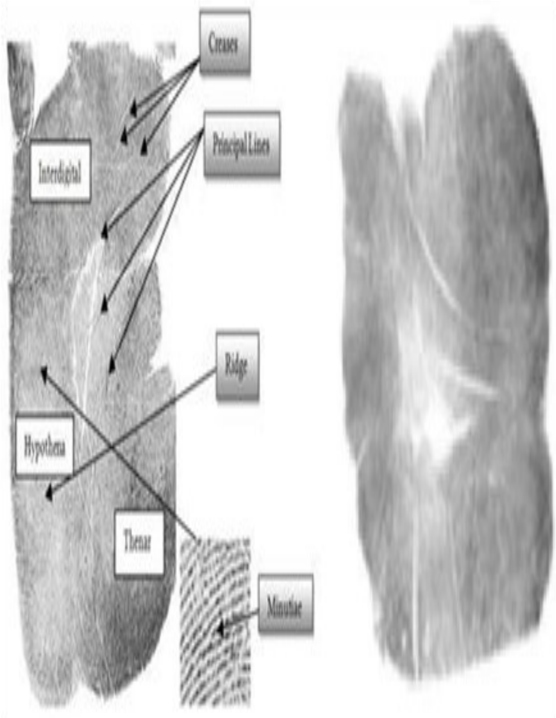
Figure 1: Biometric System

Biometric-based solutions are able to provide for confidential financial transactions and personal data privacy There are different types of modalities available fo identification purpose such as iris, fingerprints, palmprint face etc. [2], where iris and fingerprint modalities are widely used in biometrics system as these two modalities are most reliable and possess uniqueness. Palmprint is also one of the reliable modality since it possess more features than that o the other modality such as principal lines, orientation minutiae, singular points etc. Also palmprint modality i unique for each individual [2], moreover it is universal Palmprint recognition is used in civil applications, law enforcement and many such applications where access control is essential.

Rest of paper is organized as follows: Section I describes Palmprint Recognition System, Section II explains review of previous work and Section I summarizes the contributions of the paper.

2. PALMPRINT RECOGNITION SYSTEM

Palmprint identification can be divided into two categories on-line and offline. Figure 2 (a) and 2 (b) show an on-line palmprint image and an offline palmprint image respectively.



(a) *(b*

Figure 2: Examples of (a) on-line, with line definitions and (b) off-line palmprint image

Research on offline palmprint identification has been th main focus in the past few years. Due to the relative high-resolution offline palmprint images (up to 500 dpi), som techniques applied to fingerprint images could be useful for offline palmprint identification, where lines, datum points and singular points can be extracted. For on-line palmprint authentication, the samples are directly obtained by a the outlook of the scanner device [14].

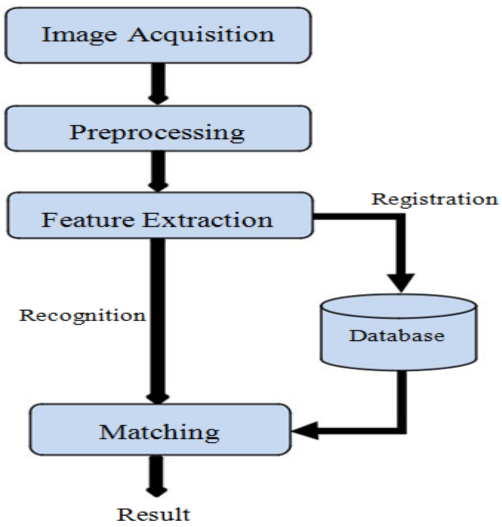


Figure 3: Generalized block diagram of Palmprint Recognition

It is believed that palm print is unique to individuals. They remain unchanged throughout at least a certain period during the adult life of an individual.

Palm print recognition employs either high or low resolution images. Most of the research on palm print recognition uses the low resolution images [3].

The palm print recognition system consists of four stages: Palm print image acquisition, Preprocessing, Feature extraction and matching as shown in Figure 4. The palmprint image is acquired using a palm print scanner.

Preprocessing has two parts, image alignment and region of interest selection. Image alignment is done by referring to the key points. Region of Interest selection is the cropping of palmprint image from the hand image. Feature extraction obtains discriminating features from the preprocessed Palmprints. The matching compares the captured image features with the stored templates.

Palmprint Image Acquisition

In this phase, image of palmprint is first capture with the help of different types of digital cameras. Acquired image may be blurred or it may have noise, which decreases the quality of an image and affects the performance rate of palmprint recognition system directly. The palmprint image acquired may vary by position, direction and stretching degree [2].

Preprocessing

After capturing the data or image of the palmprint, pre-processing is formed on image. To reduce the overhead, instead of directly using the palmprint images, preprocessing needs to be done.

Preprocessing is used to remove distortion, align the palmprints and to crop the region of interest. This cropped ROI is used for feature extraction. This is done in five steps:

- Binarizing the palm image.
- Boundary tracking.
- Key points detection.
- Establishing a coordination system.
- Extracting the central part.

The third step can be accomplished by two approaches, tangent based and finger based. The tangent based approach is preferred. This approach considers the edges of the 2 finger holes on the binary image to be traced. The common tangent of the two finger holes is considered to be the axis. The key points for the coordination system are calculated as the midpoint of the two tangent points.

Feature Extraction

Feature extraction is followed by pre-processing. The objective of this step is to extract variables that describe, unequivocally, the forms belonging to the same class while differentiating them from the other classes. In other words it is the process in which phase features of palm are extracted like principal lines, orientation field, minutiae, density map, texture, singular points etc. These features are helpful for identification or verification of individual. Extracted features are stored in *database* for further process of matching.

Research on feature extraction and matching algorithms are classified as follows: Line based, subspace based, Statistical based and coding based approaches.

Line based approach: This approach develops edge detectors and makes use of the magnitude of the palm lines. The magnitudes of the palm lines are projected in x and y coordinates forming histograms.

After this, the first and second order derivatives of the palm images are calculated. The first order derivative is used to identify the edge points and corresponding directions. The second order derivative is used to identify the magnitude of lines. Then the Euclidian distance is used for matching.

Subspace based approach: This approach makes use of Principal Component Analysis (PCA), Linear Discriminant Analysis (LDA) and Independent Component Analysis (IDA). The spatial coefficients are considered as the features used for matching. This approach does not need any prior knowledge of the palmprints.

Statistical approach: These are of two types, local and global. The local approach transforms the image in another domain. This transformed image is then divided into several regions such as mean and variance of each region.

The global features include moments, center of gravity and density. The global approach is applied on the whole palmprint image. This is the only difference between the local and global approach. The local approach is applied on the segments of the palmprint image whereas the global approach is applied on the whole image.

Coding approaches: This approach uses a single Gabor filter to extract the local phase information of palmprint. This extracted phase information is used by the palmprint recognition systems to reduce the registered data size and to deal with non-linear distortion between palmprint images. This approach has very low memory requirement and fast matching speed.

Matching

Matching is next to the feature extraction phase. Feature matching determines the degree of similarity of recognition template with master template. Different approaches are used for matching. Input provided by an individual is matched with templates present in the database. Matching is dependent on whether the system performs identification or verification. If it performs identification, then one-to-many matching, which matches input as palmprint of individuals with all templates of database, otherwise one-to-one match is done for verification, where input of an individual is matched with only the template he/she claims to be.

3. REVIEW OF PREVIOUS WORK

Some recent papers are reviewed for Palmprint recognition:

Sang et al. proposed a robust, touchless, palmprint recognition system which is based on colour palm-print images. This system uses skin-color thresholding and hand valley detection algorithm for extracting palmprint. Then, the local binary pattern (LBP) is applied to the palmprint in order to extract the palmprint features. Finally, chi square statistic is used for classification [4].

Khalifa et al. focused on three feature extraction techniques based on the discrete wavelet transform, the Gabor filters and the co-occurrence matrix. The support vector machine is used for the classification step [5].

Puranik et al. proposed an innovative touch-less, web camera based palm print recognition system. It describes to use a low-resolution web camera to capture the user's hand at a distance for recognition. The user does not need to touch any device for their palm print to be acquired [6].

Seshikala et al. used multi scale wavelet edge detection to carry out the feature extraction of palm print. The performance is compared with conventional edge detection techniques like Sobel and Canny methods [7].

Shashikala et al. proposed a palmprint identification system based on DWT, DCT and QPCA (PIDDQ). Histogram equalization is used on palmprint to enhance contrast of an image. The DWT is applied on Histogram equalized image to generate LL, LH, HL and HH bands. The LL band is converted into DCT coefficients using DCT. QPCA is applied on DCT coefficients to generate features. The test and database palmprint features are compared using Euclidean Distance (ED) [8].

4. PROPOSED METHOD

In this process, we propose a novel framework of combining the left with right palmprint at the matching score level. The palm prints are matched by using multi biometrics for this the recognition rate will be better than the existing system and computation cost for that system will be reduced. In the framework, three types of matching scores, which are respectively obtained by the left palmprint matching, right palmprint matching and crossing matching between the left query and right training palmprint, are fused to make the final decision. The framework not only combines the left and right palmprint images for identification, but also properly exploits the similarity between the left and right palmprint of the same subject. Extensive experiments show that the proposed framework can integrate most conventional palmprint identification methods for performing identification and can achieve higher accuracy than conventional methods. This work has the following notable contributions. First, it for the first time shows that the left and right palmprint of the same subject are somewhat correlated, and it demonstrates the feasibility of exploiting the crossing matching score of the left and right palmprint for improving the accuracy of identity identification. Second, it proposes an elaborated framework to integrate the left palmprint, right palmprint, and crossing matching of the left and right palmprint for identity identification. Third, it conducts extensive experiments on both touch -based and contactless palmprint databases to verify the proposed framework.Preprocessing is to setup a coordinate system to align palmprint images and to segment a part of palmprint image for feature extraction. Feature extraction is to obtain effective features from the pre-processed palm prints. Finally, a matcher compares two palmprint features that the left palmprint images and uses a palmprint identification method to calculate the scores of the test sample with respect to each class. Then it applies the palmprint identification method to the right palmprint images to calculate the score of the test sample with respect to each class. After the crossing matching score of the left palmprint image for testing with respect to the reverse right palmprint images of each class is obtained and performs matching score level fusion to integrate these three scores to obtain the identification result.

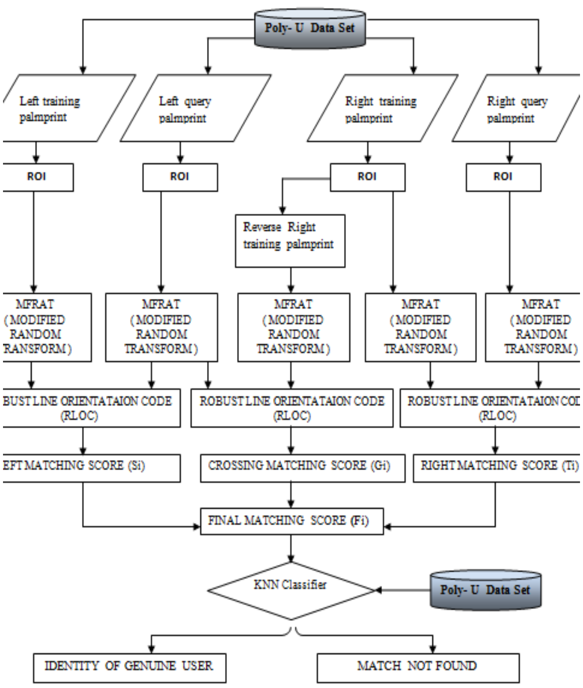


Figure 4: Flow Diagram of proposed Palmprint identification

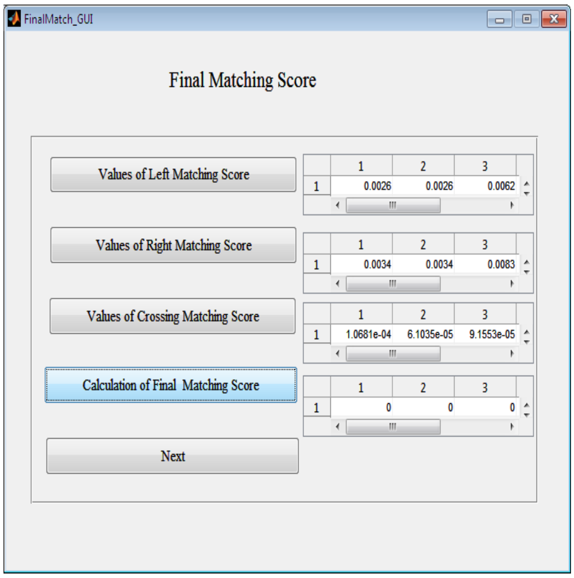


Figure 5: Final Matching Palmprint

5. CONCLUSION

In this paper we have developed the simple and effective algorithm to improve the precision of the orientation feature of the palmprint. Experimental results show that the proposed method can achieve higher accuracy in palmprint recognition than the state-of-the-art orientation-based methods. Moreover, the proposed method gives the most competitive performance in multispectral palmprint verification.

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