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A Survey Based on Palm Dorsal Vein Pattern Verification.

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ABSTRACT

The modern Technique used for biometric security is Palm vein authentication. It employs the dorsal pattern in the human palm to verify the person. It involves of high security and stability false authentication user identified by this method. Only one authentication user can use it. Sparse vein is different from each person, so that false identification was detected. To extract the region of interest, knuckle tips are used as key factor for the image normalization. Through the Hierarchical matching and the knuckle point matching score are generated. Authentication user can be is identified by this process. Palm vein authentication has the advantage of the high efficiency and the crucial identity information is unrevealed. Based on the wavelength of the incident illumination skin layers varies from person to person.

Keywords: Region of Interest, Palm vein, Hierarchical Matching

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INTRODUCTION

The palm vein extrinsic features are easily accessible which may lead to some privacy and security concerns, intrinsic biometrics (veins, DNA) requires more efforts are acquire without the knowledge of an individual. The high collectability of the biometric traits from the users must be taken using biometrics device. Biometrics refers to automated methods of recognizing individuals based on the measurement of their physical or behavioral characteristics. A Biometric system either makes identification or verifies an identity by inaugurate the probability that a specific physiological or behavioral characteristic is valid.

Palm vein biometric is a promising alternative for personal authentication. The basic aspects of vein recognition system are presented. First, a brief guidance to biometrics system is given and how the technology works consists of three stages they are enrolment stage, verification and identification stage and the principle of far and near infrared imaging techniques to know the capability of acquiring image of vein pattern .

The vascular patterns of an individual palm are taken as personal testimony, through which near-infrared light pass through deoxygenate hemoglobin in the blood flowing in the veins which absorbs near infrared rays, illuminating the hemoglobin causes it to be visible to scanner. An individual palm vein image are converted by algorithms into data points which is compress, encrypt and stores by the software registered in database set.

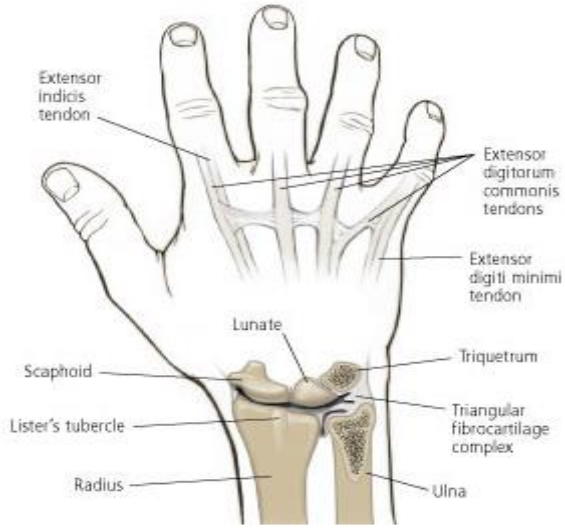

Fig (1): Palm Dorsal Vein Image.

DIFFERENT METHODOLOGY

There are multiple methods used in this vein pattern verification, there are taking the inputs as palm vein (front side of hand), palm dorsal (back side of hand) and finger veins for identification.

ROI and Segmentation Method:

Wenxiong Kang (2014) was proposed Local binary pattern (LBP) is popular for the texture representation owing to its discrimination ability and computational efficiency, it used to label the sparse texture in palm vein images, the discrimination ability is diluted, leads to lower performance, especially for contactless palm vein matching. The normalized gradient-based on the principal of maximal curvature algorithm and *k*-means method are utilized for texture extraction. The matched pixel ratio was adopted to determining the best matching region (BMR).

Fig. 2 gives an example of the construction of an LBP micro pattern for a small region from a grayscale image. Each resulting decimal number is considered as a type of micro pattern. All these micro patterns were

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arranged into different bins to form histograms that contain information of the disposal of edges, spots, and other local features in an image. As a simple yet very efficient texture descriptor, LBP has been successfully used for vein recognition because the main feature of a vein image is the texture feature.

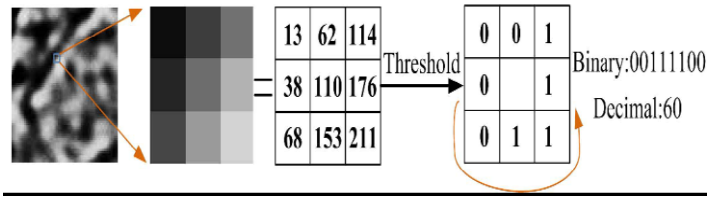

Fig. 2. Example of the construction of a LBP micro pattern for a small region from a grayscale image.

ROI segmentation scheme is illustrated in Fig. 3. Hand shape segmentation is the basis of accurate extraction of palm vein ROI. The previous experiments show that direct segmentation of grayscale images results in poor segmentation performance. Therefore, Gaussian blur is first adopted for smoothing the images; the result is illustrated in Fig. 3(a). To extract a larger ROI form palm vein image by defining the midpoint $p1$ of the two valley points on both sides of the index finger and the midpoint $p2$ of the valley points on both sides of the little finger as two reference points for the ROI extraction. Let d denote the distance between $p1$ and $p2$, as shown in Fig. 3(b), let a be the scaling factor, and let ϑ represent the angle between line $p1$ $p2$ and the vertical line L.

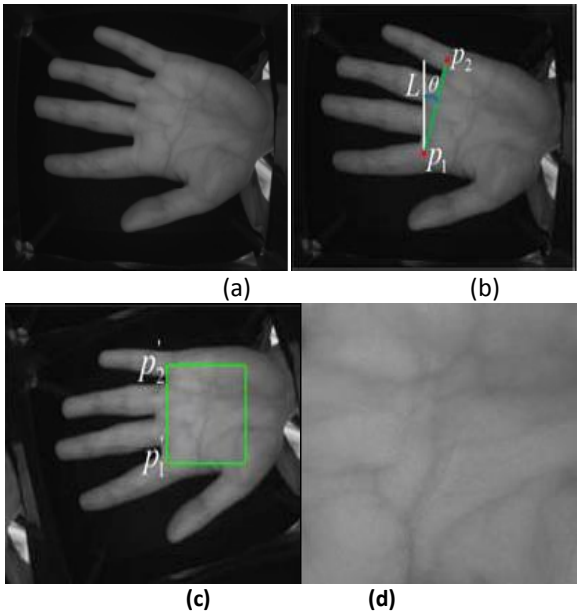

Fig: 3. Illustrations of palm vein ROI extraction (a): original hand image, (b): the angle ϑ between line $p1$ $p2$ and vertical line L, (c): normalized palm vein image, and (d): palm vein ROI.

To adopt a bilinear gray value differential method to perform scaling and rotation correction for palm vein image normalization; the result is shown in Fig. 3(c). After normalization, the deformed points $p1$ and $p2$ are the side lengths of the square used to define the palm vein ROI shown in Fig. 3(d) in conjunction with the truncated area.

This method is feasible and effective for contactless palm vein recognition. To enhance the matching accuracy of the to-be-matched regions from contactless palm vein images, Model Predictive Control of the normalized gradient and k-means segmentation, as well as 8-neighborhood gradient module calculation methods, were utilized for texture extraction of palm vein ROI.

Yingbo Zhou (2011) proposed that a new approach attempts to more effectively contain the potential deformations, revolving and paraphrase changes by encoding the orientation conserve features and utilizing a novel region based matching scheme. The palm vein identification approaches with one or two different

databases that are collect with the contactless and touch based imaging setup. This approach performs very well even with the minimum number of enlistment images. Ying Hao (2009) et al Method involves image acquisition dedicated appliance under contact free and multispectral environment from each individual hand images feature-level to align ROIs from different spectral images preprocessing to locate Region of Interest (ROI). Generally forged sample can only imitate only one aspect of skin is less likely to be accepted by the system registered with fused sample to combine images from multiple spectra.

Lin Zhang (2012) proposed that computerized Palm print recognition methods. In this they analyze the fragile bits event in the state of the art Palm print coding scheme, namely, binary orientation co-occurrence vector (BOCV). Then, the BOCV to extend BOCV by integrate fragile bits information in appropriate ways. Experiments conducted on the benchmark dataset display that extended BOCV HD concept can obtain the highest evidence accuracy among all the state-of-the-art Palm print verification methods were evaluated. In this BOCV HD will be used to represent the conventional Hamming distance. HD weights of all bits in a code map equally. However, actually not all of the bits in a code map are equally useful. Instead, fragile bits are tend to multiply an intra-class matching distance by fusing the modified Hamming distance and the FPD together; to enlarge the original BOCV to extended BOCV.

Enhancement Method:

Lefki Redhouane (2014) is presented the hand vein biometrics recognition and verification are just like any recognition system. These are having the four steps: acquisition, feature extraction, enhancement and classification. New adaptive feature extraction method for the dorsal hand vein biometrics is the discrete wavelet transform. The main objective of the wavelet transform is data compression.

They are definite works about feature extraction of hand veins pattern, through them there is the Gabor filter, Hough transform, triangulation and discrete Curve let transform of minutiae, etc. most of this methods are preceded by a preprocessing steps are in the Gabor filter and the Hough transform they uses the Median filter, Wiener in Gabor and SIFT method, the Mexican hat in triangulation minutiae.

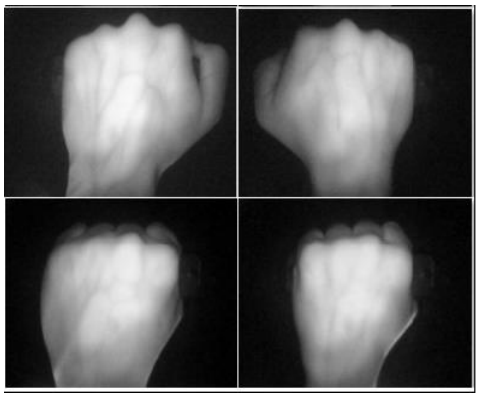

Fig (4): Samples of SAB Database

To enhance the contrast of the image can be applied a double adaptive equalization contrast to assert the vein divergence .The result is in the following figure.

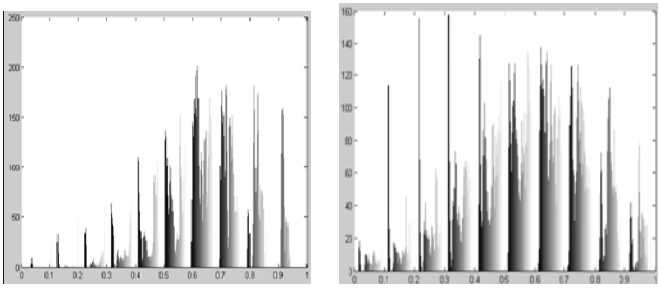

Fig (5): Double Adaptive Equalization.

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To extract dorsal hand vein pattern it used as a single two dimensional wavelet transform, the discrete wavelet transform in two dimensions can be achieved by running into two separate into the one dimensional transforms. First, the image (2D signal) is filtered horizontally (along the x-axis) and divided by two parts. There after that filtered sub-image is vertically (along they axis) and divided by two. To give an image composed of four bands after decomposition at a single level.

It exist many categories of wavelet. The most suitable data base was performed with all the test types of wavelet which was found in the bi-orthogonal reverse wavelet family with wavelet **bio** 3.1 this type of wavelet is predefined in Mat lab for more information just returns to Mat lab Help. It gives a good results is shown in Figure6.

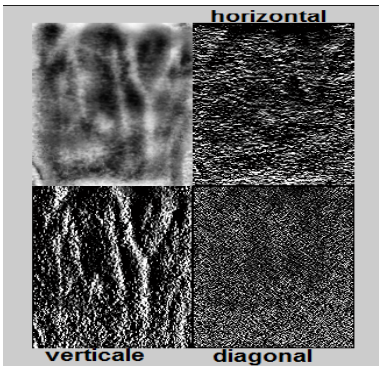

Fig (6): Discrete Bi-orthogonal wavelets transform

This applies an adaptive equalization on the vertical and horizontal specific image for upgraded contours veins as in this figure 6(a).

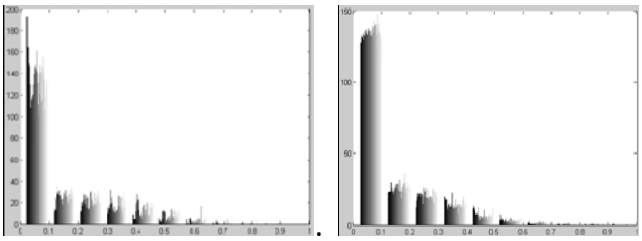

Fig6 (a): Adaptive equalization

Asmaa (2014) Proposed palm vein recognition and authentication system consists of two steps. The first one in the system is image enhancement and localization of veins grid which is a major threat due to poor quality of veins images and the second challenging task is the palm vein feature extraction. The scheme is applied for recognizable parts of the human body where the veins are accessible (comparable wrist and Finger etc.). The integrity image data is crucial for the application hence more work is needed in the data preprocessing stage. The current image enrichment methods can be improved to provide better enhancement results with lower complexity and time.

Zhang (2014) was Presented an online personal verification system by fusing palm print and palm vein information. Consider that, the palm vein image aspect can vary the image quality. To increase the anti-spoof capability of the system the liveness detection method was based on the image property. The designed and developed palm print clue system by fusing palm vein evidence algorithm based on the reasoning of brightness and texture of image.

Extraction and Filtering Methods:

Antonio Iula (2014) proposed that enhanced ultrasound technique for extracting 3D Palm print for biometric recognition. The Ultrasound Advanced Open Platform (ULA-OP) is occupied an ultrasound imaging

system. A commercial high frequency (12 MHz) linear array is given in the ascent direction by an automated scanning system based on this numeric controlled pantograph, it provides reliable and repition measurements. The feature methods provide a full 3D Palm print, as it is detects both palm curvature and deepness of the palm traits. If compared with past experiments, the enhanced empirical setup allows genuine rapid acquisition time and improved image quality and repeatability. This scanning technique can be exploited for manage ultrasound vein pattern and hand geometry, and can be easily combine all these three biometric characteristics are attaining a matter of fact in multimodal biometric characteristics.

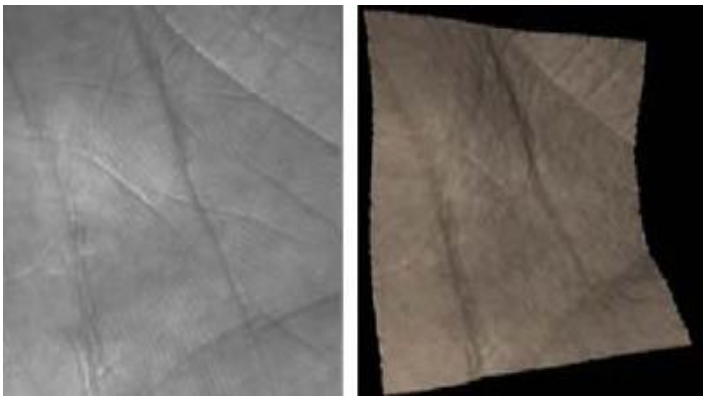

Fig (7): a) 2D Palm Print. b) 3D Palm Print

Eryun Liu (2013) proposed a coarse to fine matching strategy based on incidental clustering and incidental match propagation is invent especially for Palm print matching. To deal with the huge number of incidental, a local feature based incidental clustering algorithm was arrange to cluster incidental into certain groups such that minutiae belonging to the same group have similar local characteristics. Minutiae reproduction matching algorithm is inspection of formatted minutiae in the full Palm print. The Palm print matching algorithm was evaluated on a latent-to-full Palm print database consisting of 446 veiled and 12,489 acquisition full prints. Efficient and robust latent to full Palm print identical algorithm and it can also be applied to full to full Palm print identification. It deals with the huge number of minutiae in Palm print images, an incidental clustering algorithm is propose to group minutiae into multiple clusters based on the local features in minutiae neighborhood. The proposed algorithm is utterly fast and rigorous. It is economical and robustness.

Daniel Hartung (2011) proposed a new system was named as biometric vascular pattern recognition. In these vein pattern features were extracted based on minutiae points from fingerprint recognition. Minutiae points means that separate from the skeleton by the fast checking Skeletonization algorithm. The proposed system was enhance the performance compared to previous systems.

Deepamalar (2010) Proposed system is based on parallel mode multiple feature analysis and multilevel fusion. The directional information of the palm vein has been considered for better analysis. The multimodal palm vein recognition system has very low value of matching error rate and false acceptance or rejection rate. The palm vein recognition system using multilevel fusion of multimodal features and neural network classifier has been developed. The shape and texture features have been extracted and multimodal extraction level.

David Zhang (2010) et al Presented online multispectral palm print system the requirement of real time application. A palm print images under Blue, Green, Red, and near infrared (NIR) data acquisition device is design to capture the illuminations in less than 1s. The establishment of multispectral palm print database is recognition performance of each spectral band. It was also found that due to the much redundant information across some bands.

Adams Kong (2009) et al Described an overview of current palm print in particular acquire devices, preprocessing, verification algorithm palm print related fusion, algorithms especially designed for real time palm print identification in large databases and measures for protecting palm print systems and users privacy.

The different templates may require different measures for template protection. For high speed large scale personal identification iris recognition algorithm and Competitive Code or other coding methods are required.

CONCLUSION

The Survey paper proposed that different methodologies to identify the palm vein recognition by taking the different inputs like, palm vein (front side of hand) and palm dorsal vein (back side of hand) and palm finger veins for security purpose. It is improved version of the security. In these they are using Segmentation, Enhancement and Extraction Techniques. By using normalization it can get the accurate detection. Palm vein recognition used in the application of atm's, laptops and opening mobiles etc. It is secured version compare to finger print verification.

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