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AUTHENTICATING THE PERSON BY FINGER VEIN AND FINGER DORSAL USING ANFIS CLASSIFIER

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Abstract:-*Features that can be simultaneously extracted from the hand images .In this work our efforts are focused to develop an automated method to extract knuckle texture and geometrical features from finger-back surface and investigate its performance for a potential biometric system. The biometric authentication method is useful one for future security system. In this paper we design the finger dorsal and finger vein for biometric authentication system.*

1.1 FINGER VEIN AND FINGER DORSAL RECOGNITION SYSTEM

Biometrics, such as fingerprints, face, irises, palm prints, veins, finger knuckle-prints (FKPs), ears, voice, signature, etc. is the most secure and popular means used to determine personal identification and verify requirements for public security and privacy protection. Due to increased flexibility and higher user acceptance, hand-based biometrics has attracted more attention from researchers and engineers in comparison to other types of biometrics in the past decades.

The hand-based biometrics has received considerable attention in recent years which exploits several internal and external features that are quite distinct in an individual. The user-acceptance for hand-based biometrics system is very high. These systems are becoming more convenient and user-friendly with the introduction of peg-free and touch-less imaging. The usage of these hand-based systems for large scale personal authentication requires further efforts to explore additional features that can be simultaneously extracted from the hand images. In this work our efforts are focused to develop an automated method to extract knuckle texture and geometrical features from finger-back surface and investigate its performance for a potential biometric system. The biometric authentication method is useful one for future security system. In this paper we design the finger dorsal and finger vein for biometric authentication system.

Finger veins and finger-dorsal texture have higher flexibility than palm print and palm veins, and the mutual correlation of the former is higher than that of finger veins and fingerprint. Since there is much blood in the distal phalanx or fingertip (covered by the fingerprint region), this means that there are minimal veins that appear in fingertip images, thus it is difficult to obtain the positional relationship between finger veins and fingerprint. Comparatively, veins are relatively evident in the middle and proximal phalanges of the fingers, which is of one-to-
one correspondence with the region of the finger dorsal. The correspondence is inherent and unique. From this point of view, the use of finger veins in combination with finger-dorsal texture is more logical and promising.

Figure.1. Finger Vein and Finger Dorsal

2. RELATED WORK

Biometrics, like fingerprints, face, irises, palmprints, veins, finger-knuckle-prints (FKPs), ears, voice, signature, etc.it is the most secure and standard means that wont to confirm personal identification and verify needs for peace and privacy protection. because of augmented flexibility and better user acceptance, hand-based biometrics has attracted a lot of attention from researchers and engineers as compared to different varieties of bio science in the past decades.It is accepted that fingerprint recognition isn\'t solely the foremost early and classic suggests that of hand-based biometry, but also the foremost mature in real-world applications. though fingerprint identification contains a longer history and there square measure larger offered connected databases, the dearth of anti-counterfeiting capability, caused by easy fingerprint repetition and forgery, means fingerprint identification is\'t the foremost ideal in circumstances wherever high security is required.

Palmprint identification [1], as a potential alternative means of identification, has been another widely researched type of hand-based biometrics. It has achieved great success in the past decade. Moreover, many algorithms on palmprint identification with high accuracy were explored to meet both low-resolution and real-time requirements [1,4]. However, its anti-counterfeiting capability is also lacking because palmprint features that are similar, such as principle lines, wrinkles and ridges, may appear on the hands of different people [1]. Also, the forgery of palmprints is not very difficult although it is relatively more difficult to do so than in the case of fingerprints [4].

Ravikanth and Kumar [3] proposed a new biometric identifier for personal authentication, called finger-back surface [3] or finger knuckle surface [5]. The finger-back texture, which refers to the patterns of the upper surface around the phalangea joint, is unique and has been utilized for personal identification. Based on this such, Kumar and Ravikanth [7] and Kumar and Zhou [8] designed a series of new feature extraction algorithm and recognition methods. Another state-of the- art technique applies a scale-invariant feature transform (SIFT) algorithm to

finger-knuckle-print (FKP) images filter by a 2D Gabor filter [6]. In [9], Zhang et al. utilized Gabor filters and phase-only-correlation (POC) to extract local and global information of FKP images and designed an integral biometric system. In comparison with palmprints, this FKPsystem uses a smaller device with greater flexibility in image acquisition. Actually, FKPs are also based on the skin surface and their lack of anti-counterfeiting capability still remains a challenge. Obviously, some other highly discriminative biometric, not within the scope of skin biometrics, need to be explored which would have to include high anti-counterfeiting capabilities.

In recent years, vein identification has been emerging as a promising research topic in biometrics. The network pattern and structures of blood vessels underneath the skin are unique and consistent. This is especially the case for veins, which are internal and relatively more difficult to forge than external traits. Thus, hand [10,11,12], finger [21] and palm veins are attracting increasing more attention. Wang et al. [13] and Kumar and Prathyusha [14] utilized hand veins as a characteristic to perform personal authentication. Unimodal palm vein identification based on multi scale filtering has been proposed in [15]. Zhou and Kumar [16] presented two new approaches to improving the performance of palm vein based identification systems. Undoubtedly, these methods based on hand and palm veins have achieved great success in moving vein recognition technology forward. However, in terms of alternatives and flexibility, finger veins should be preferable. Miura et al. [17] proposed a repeated line tracking method to extract finger vein features for identification. In 2007, a method of calculating local maximum curvatures in cross-sectional profiles of a vein image was developed which significantly improved the accuracy and robustness of finger vein identification [26]. Yang and Yang [19, 20] and Yang and Shi [21] proposed a series of enhanced finger vein image localization methods for personal authentication. Thus, finger veins have become a popular area in research.

In [22], Yang and Zhang proposed a new multimodal biometric method based on the feature-level fusion of fingerprint and finger-veins. A unified Gabor filter framework was used to extract unimodal features of fingerprints and finger-veins, and then a canonical correlation analysis (CCA) was applied to find the most correlated features. However, they were notable to capture two modalities simultaneously. In [8], although an imaging system that simultaneously acquired finger texture and finger vein images was designed, there was no inherent relationship between the two modal images. To address these deficiencies, we attempted to fuse finger vein and finger dorsal images into a very small database without image registration in our previous work.

3. COMPARATIVE COMPETITIVE CODING

First, a multimodal biometric system is designed. Two widely focused types of biometrics, finger veins and finger dorsal texture, are selected as sources of information for a multimodal personal identification technique. They are captured from the lower and upper sides of the same finger simultaneously so that their inherent positional relationship could be preserved for better performance in identification. Secondly, by using the proposed multimodal biometric device, we establish a finger vein and finger dorsal image database with 220 subjects. Thirdly, this paper investigates a new pre-processing approach that combines region-of-interest (ROI) capture and image registration. Through this, the inherent and unique positional relationship of two modalities can be well preserved. We use the ROI information of one modality to achieve the ROI of the other modality, which can also minimize the complexity of the image segmentation algorithm under different lighting environments. Finally, we explore a new feature level fusion scheme, which preserves the more distinctive orientation information from the feature map of the two modalities, and implants new values for junction points. Our experimental results show the superiority of the proposed fusion approach.

3.1. RECOGNITION FRAMEWORK

After a pair of finger vein and finger dorsal images was simultaneously captured by separate cameras under white and NIR illuminations respectively, the pre-processing module then fulfilled the tasks of image pair registration as well as ROI extraction. Then ROIs of the finger vein and finger dorsal images were extracted and normalized in both size and intensity respectively. Subsequently, a feature extraction algorithm called the magnitude-preserved CompCode was used on the normalized sub-images. Comp Code is a state-of-the-art biometric algorithm known as a competitive code. It is worth noting that our Comp Code preserves the magnitude information for further processing. Furthermore, a comparative feature fusion strategy, which focuses not only on preserving significant unimodal features, but also introducing new multimodal features, was explored. Finally, the code map of the fused features was fed into a nearest neighbor (NN) classifier for verification purposes.

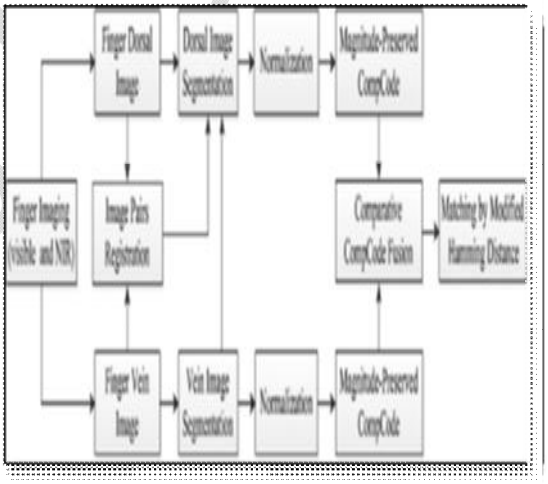

Figure.3.1.Proposed verification frameworks

4. ANFIS CLASSIFIER

In this system we use to combine finger dorsal and finger vein for authentication process. The finger dorsal is finger knuckle it is unique of each persons and same time it is hacked easily so that reasons we combine the finger vein with the finger dorsal for increase the robustness. And we extract those feature by using the Comparative competitive coding method it extract the patterns of the knuckle dorsal and vein and combine that feature for accurate authentication. In same time the ANFIS classifier is one of the best classifier to classify the features at high accuracy.

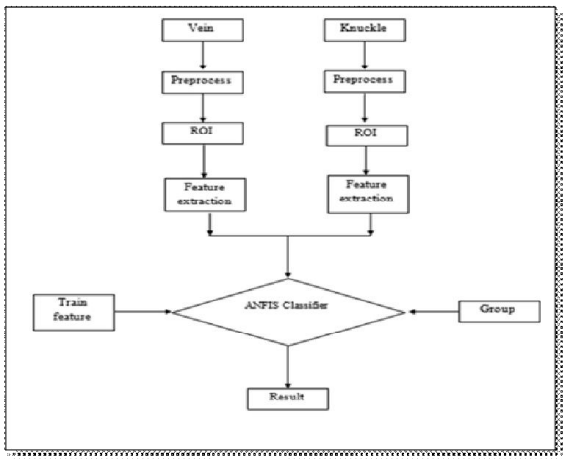

Figure.4.System Architecture

5. CONCLUSION

This paper presents a feature-level fusion system for multimodal personal authentication by using finger vein and finger dorsal images. A user-friendly imaging device for multimodal biometric identification is designed. Based on this device, we have established a finger vein and finger dorsal image database [23]. In considering the inherent positional relationship between finger veins and finger dorsal texture, an ROI extraction algorithm is proposed, which utilizes the positional information of finger vein images to extract the corresponding ROI in the finger dorsal images. In that the two kinds of images contain sample line features in the vertical and horizontal directions respectively, we investigate the junction points for fusion.Therefore, a feature level fusion strategy is proposed to make use of the significant orientation features of the two modalities, discard the less discriminative ones, and add positional information of the fusion features, i.e. junction points. Experimentally, higher recognition accuracy and lower EERs are achieved in comparison to other multimodal and unimodal identification methods, which demonstrate that the attempt in using the intrinsic relationship of texture on both the upper and lower sides of the finger is efficient and promising for multimodal biometrics. Continuous efforts are being made to expand our database and improve the performance in terms of finger rotation. Anfis classifiers are use to classify the feature at high accuracy.

REFERENCES

[1] D. Zhang, W.K. Kong, J. You, M. Wong, Online palm print identification, IEEE Transaction on Pattern Analysis and Machine Intelligence 25 (9) (2003)
[2] Z.N. Sun, T.N. Tan, Y.H. Wang, S.Z. Li, Ordinal palmprint representation for personal identification, in: IEEE Computer Society Conference on Computer
[3] C. Ravikanth, A. Kumar, Biometric authentication using finger-back surface, in: Proc. CVPR, 2007, pp. 1–6.1041–1050
[4] D. Zhang, Z. Guo, G. Lu, L. Zhang, Y. Liu, W. Zuo, Online joint palmprint and palmvein verification, Expert Systems with Applications 38 (3) (2011)2621–2631.
[5] A. Kumar, C. Ravikanth, Personal authentication using finger knuckle surface, IEEE Transactions on Information Forensics and Security 4 (1) (2009) 98–109.
[6] A. Morales, C.M. Travieso, M.A. Ferrer, J.B. Alonso, Improved finger-knuckle-print authentication based on orientation enhancement, IEE Electronic Letters 47 (6) (2011) 380–381.
[7] A. Kumar, C. Ravikanth, Personal authentication using finger knuckle surface, IEEE Transactions on Information Forensics and Security 4 (1) (2009) 98–110.
[8] A. Kumar, Y. Zhou, Human identification using finger images, IEEE Transactions on Image Processing 21 (4) (2012) 2228–2244
[9] L. Zhang, L. Zhang, D. Zhang, H. Zhu, Online finger-knuckle-print verification for personal authentication, Pattern Recognition 43 (7) (2010) 2560–2571
[10] A. Kumar, K.V. Prathyusha, Personal authentication using hand vein triangulation and knuckle shape, IEEE Transactions on Image Processing 18 (9) (2009) 2127–2136.
.[11]C.L. Lin, K.C. Fan, Biometric verification using thermal images of palm-dorsa vein patterns, IEEE Transaction on Circuits System Video Technology 14 (2)
(2004) 199–213.
[12]L. Wang, G. Leedham, A thermal hand-vein pattern verification system, Pattern Recognition and Image Analysis, Lecture Notes in Computer Science 3687 (2005) 58–65.
[13]L. Wang, G. Leedham, S. Cho, Minutiae feature analysis for infrared hand vein pattern biometrics, Pattern Recognition 41 (3) (2008) 920–929.
[14] A. Kumar, K.V. Prathyusha, Personal authentication using hand vein triangulation, in: Proc. SPIE Conf. Biometric Technology for Human Identification
[15]Y.B. Zhang, Q. Li, J. You, P. Bhattacharya, Palm vein extraction and matching for personal authentication, Computer Science Lecture Notes 4781 (2007) 154–164.
[16]Y. Zhou, A. Kumar, Human identification using palm-vein images, IEEE Transaction on Information Forensics and Security 6 (4) (2011) 1159–1274.
[17] N. Miura, A. Nagasaka, T. Miyatake, Extraction of finger vein patterns using maximum curvature points in image profiles, IEICE Transactions on Information and Systems E90D (8) (2007) 1185–1194.
[18]N. Miura, A. Nagasaka, T. Miyatake, Feature extraction of finger-vein patterns based on repeated line tracking and its application to personal identification, Machine Vision and Applications 15 (4) (2004) 194–203.
[19] J. Yang, X. Li, Efficient finger vein localization and recognition, in: 20th International Conference on Pattern Recognition (ICPR), 2010, pp. 1148–1151.
[20] J. Yang, J. Yang, Multi-channel gabor filter design for finger-vein image enhancement, in: Fifth International Conference on Image and Graphics(ICIG), 2009, pp.87–91.
[21] J. Yang, Y. Shi, Finger-vein ROI localization and vein ridge enhancement, Pattern Recognition Letters 33 (12) (2012) 1569–1579.
[22] J. Yang, X. Zhang, Feature-level fusion of fingerprint and finger-vein for personal identification, Pattern Recognition Letters 33 (5) (2012) 623–628.
[23] Tsinghua Finger-vein Finger-dorsal Image Database, 2012,<http://www.sz.tsinghua.edu.cn/labs/vipl/thu-fvfdt.html>.

Author Biography:

Kumar Charlie Paul, Principal of A.S.L Pauls College of Engineering & Technology. Had did many National and International Conferences and published many papers in journals. He also guided many students for their Ph.D project works. Having more than 23 years of experience in teaching field.