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Analysis of Diverse Transform for Finger Vein Recognition

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Abstract:- In the field of biometric authentic system finger vein is the promising and securing personal identification and authentication in terms of security and convenience. Finger vein has gained much attention among the researchers because of its accuracy, performance, efficiency and reliability. It helps in low forgery risk, aliveness detection and spoofing resistance. The system has four parts: Finger vein image acquisition, preprocessing, feature extraction and recognition. In every biometric system, the special attention is given to the recognition part. The finger vein recognition system has various parameters like recognition rate, response time, FAR, FFR, EER, mismatch ratio. In this analysis various transforms are taken on finger vein system and analyzed the performance.

Key Words: Finger vein; Recognition; Transforms.

I. INTRODUCTION

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image transmits to extract some useful information from it. It is a type of signal dispensation in which input is image like video frame or photograph and the output may be image or characteristics associated with that image. Usually image processing system includes treating image as a two dimensional signals while applying already set signal processing methods to them.

Biometric is the automated method of identifying persons based on their physiological and behavioral characteristics. Such as face, finger vein, finger print, finger geometry, hand geometry, palm print, Iris, retina, ear, voice, gait, signature and keystroke. Biometric has been widely used in the forensics as well as in civilian applications such as crime detection, banking security, physical access, control information system security, National ID systems, Voters and drivers registrations. Fig.1 illustrated functional diagram of finger vein process. Biometrics has mainly seven factors 1).Uniqueness 2).Universality 3).Performance 4).Measurability 5).Permanence 6).Circumvention 7).Acceptability.

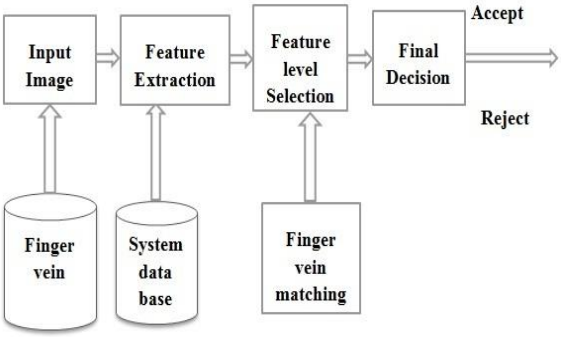

Fig. 1, Functional Diagram of Finger vein process

Why Finger Vein Biometric is introduced?

Finger print detection is easily spoofed biometric using the copy of finger print and sensitive to dirtiness, wetness. Voice recognition is not protected from recorded voice and it depends on the ecological conditions. Face recognition is also not efficient because it is more sensitive to the age and face expression. Iris recognition occupies lots of memory for the data to store up and also very expensive. Users also feel a physiological resistance to the straight application of light interested in their eyes. By considering all the drawbacks in these biometric systems, a new recognition system with high performance is introduced.

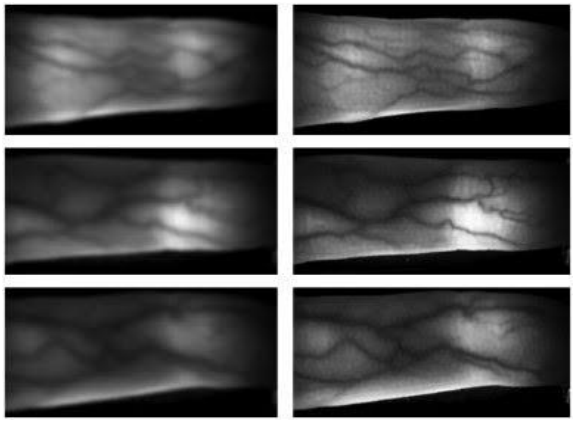

Fig. 2, Finger vein Images

Finger vein biometric is the technology of verifying people using finger vein patterns based on the fact that every individual has different vein patterns. Fig.1, mentioned functional diagram of Finger vein process. The human body veins circulate the blood towards heart. The vein pattern cannot be seen by naked eyes and hence near infrared cameras are used to take finger veins image. Fig.2, illustrated finger vein images. The infrared light with wavelength 740-960nm penetrates the users finger as it is hold over the sensor. The Hemoglobin in blood veins images as black dark lines and other part as bright. Finger vein biometric is secure, reliable and accurate as compare to other biometrics.

II. LITERATURE SURVEY

A) THE FINGER VEIN RECOGNITION BASED ON CURVELET

In this paper author is focusing on the Curvelet, where in all the other wavelet has used for the great deal of progress and achievement, but the singularity information extracted using wavelet is point singularity and the representation based on the wavelet has too much redundancy. Therefore Ridgelet algorithm is used to show the line singularity of finger vein image, but there always a large number of curves in ordinary image. To avoid this case Curvelet transform are used. It uses two discrete algorithms USFFT and Wrapping for Curvelet. To avoid Burr and Truncation after the preprocessing in the finger vein image, USFFT is used. It also clarifies the SVM and NN to get the Recognition rate. SVM has recognition rate of 59.26% and NN has the recognition rate of 57.04%.

The DUCT algorithm in the Curvelet has the overall recognition rate of 91.89%.The most important problem in the finger vein recognition is the acquirement of high quality finger vein image, if this issue is resolved the algorithm based on the Curvelet will have a better performance.

B) DRIVER IDENTIFICATION USING FINGER-VEIN PATTERNS WITH RADON TRANSFORM AND NEURAL NETWORK

In this paper author uses the biometric for driver identification using the finger vein technology along the neural network. In the system Radon transform is used for the feature extraction along the neutral network technique. Radon transform is the information of an image in a high valued coefficient in the transformed domain neural network is used to develop training and testing modules.

Four testers are used for taking samples using Radon Transform for the projection of the image matrix in specified direction the angles is set from 0 to 30 in increments which has 30 projections which is used for the Radon transform. The mean coefficients are also taken for the Radon transform's four tests in 10 times. The PNN (Probabilistic Neural Network) has the identification rate of 99.2%.

C) FINGER VEIN RECOGNITION USING DISCRETE WAVELET PACKET TRANSFORM BASED FEATURES

In this paper author is using the discrete wavelets packet transform for extracting the Finger veins features. The DWPT without HH sub band decomposition applied on ROI of 96x64 size finger veins image up to third level. Standard deviation and average energy for each decomposition levels are used for vector database.

The Euclidean, City block and Canberra distance classifies are used for the classification of finger vein image. The Recognition rate of Euclidean in the proposed system is 88.58%.The Recognition rate of city block in the proposed system is 89.95%. The proposed system's Canberra has the recognition rate of 92.33%. The Recognition rate of the proposed system is higher than the DWPT and DWT.

D) RESEARCH OF FINGER VEIN RECOGNITION BASED ON FUSION OF WAVELET MOMENT AND HORIZONTAL AND VERTICAL 2DPCA

In this paper proposed a new method of finger vein recognition based on the characteristics of wavelet transform(WT), wavelet moment (WM), horizontal and vertical two dimensional principal component analysis ((2D)2PCA). Initially actual images are separated into low frequency and high frequency components along Wavelet transform (WT), and extracted the images using the wavelet moment. Next the low –frequency components of the image is extracted by (2D)2PCA. Then the feature matrixes of the test images are compared with training image using nearest neighbor method. In the last stage compare the match scores of WM and the feature matrixes. The experiment results should be produced high recognition rate and robustness using the method of WM and WT-(2D)2PCA.

In this method reduce the low recognition rate through single feature recognition. The recognition rate of the proposed method is higher than those of 2DPCA, (2D)2PCA, WT-(2D)2PCA respectively. In this paper author mainly focused on three parameters they are "Recognition rate", "Training time" and "Recognition time". The Recognition rate of WM& WT-PCA is 91.78 and WT-(2D)2PCA is 91.44. The Training time of WT-

PCA is 9.32 and WT-(2D)2PCA is 2.58.The Recognition time of WM& WT-PCA is 0.4165 and WT-(2D)2PCA is 0.1107. The amount of data of WM & WT-PCA algorithm is 3-4 times than that of WM & WT-(2D)2PCA algorithm.

E) FAKE FINGER-VEIN IMAGE DETECTION BASED ON FOURIER AND WAVELET TRANSFORMS

In this paper the author points the drawback of Finger vein biometric which is fake finger vein image. It is resolved by author using five steps: First the fake images are detected and printed on the different papers. Second the image of finger vein taken at a single shot. Third is by using the software handling without any special hardware. Fourth is the Fourier transform frequency and spatial domain which is used to detect the finger vein image. Frequency characteristics are measured by Haar and Daubechies wavelet transform which is used to find the fake finger vein images. Fifth is the detecting of
accuracy of Finger vein image by Combining the
Fourier, Haar and Daubechies wavelet transforms.
The Fake finger vein images were effectively detected.

III. PERFORMANCE ANALYSIS

Ref	Method	Performance
[1]	Curvelet Transform	Recognition rate:91.89%
[2]	Radon Transform	Identification Rate using PNN network:99.2%
[3]	Discrete Wavelet Packet Transform	Recognition rate:92.33%
[4]	WM& WT-$(2D)^2$PCA	Recognition Rate:91.44%
[6]	Shearlet Transform	Recognition Rate: 95.59%

F) THE FINGER VEIN RECOGNITION BASED ON SHEARLET

Author mentioned a problem in wavelet transform (i.e.) singularity information extracted using wavelet is point singularity and it have too much redundancy. It can be overcomes by Ridgelet, Curvelet but author is proposing a multi-scale geometric analysis (MGA) which is discrete separable Shearlet transform. In this paper, DSST (Discrete Separable Shearlet Transform) is chosen as the image decomposition and feature extraction tool, which is a fast implementation of shearlet and has a better performance than other MGA method. The image extraction is recognized through the kurtosis value energy value and Hu invariant moment. In contrast MHD feature is used but DSST has a better performance than the wavelet Ridgelet and Curvelet performance.

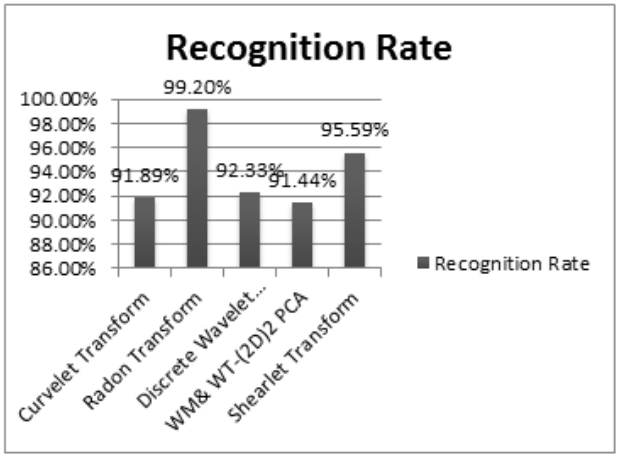

Fig.3, Graphical Representation of Recognition rate

IV. CONCLUSION

Biometric technology will stay forever. When compare to various biometric identification, finger vein is the more securable. Finger vein technology has its own application in many areas such as door Locking system, personal identification, online banking etc., Existing Technologies have various finger vein Recognition techniques. This analysis reviews the various approaches for recognition in transforms and provides different level of Performance, Security and accuracy.

REFERENCES

[1]WangKejun,YangXiaofei,TianZheng,DuTongchun,"The Finger Vein Recognition Based on Curvelet",Chinese Control Conference,July 28-30,Nanjing,China.

[2] Jian-Da Wu,Siou-HuanYe,"Driver Identification using Finger Vein patterns with Radon Transform and neural

network",Expert systems with applications, Elsevier 36(2009)5793-5799.

[3] Santhosh P.Shrikhande,H.S.Fadewar,"Finger Vein Recognition Using Discrete Wavelet Packet Transform Based Features",International Conference on Advances in Computing,Communications and Informatics(ICACCI) IEEE,978-1-4799-8792-4,2015.

[4]FengxuGuan,KejunWang,HongwaiMo,HuiMa,JingyuLiu,"Research of Finger Vein Recognition based on fusion of Wavelet Moment and Horizontal and Vertical 2DPCA",IEEE,978-1-4244-4131,2009.

[5] Dat Tien Nguyen, Young Ho Park, Kwang Yong Shin, Seung Yong Kwon, Hyeon Chang Lee,

[4]FengxuGuan,KejunWang,HongwaiMo,HuiMa,JingyuLiu,"Research of Finger Vein Recognition based on fusion of Wavelet Moment and Horizontal and Vertical 2DPCA",IEEE,978-1-4244-4131,2009.

[5] Dat Tien Nguyen, Young Ho Park, Kwang Yong Shin, Seung Yong Kwon, Hyeon Chang Lee, Kang Ryoung Park," Fake finger-vein image detection based on Fourier and wavelet transforms",Elsevier,Digitalsignal processing,2013.

[6] Xiaofei Yang, Chunhua Yang, Zhijun Yao ," The Finger Vein Recognition Based on Shearlet"IEEE, 978-1-5090-2860-3,2016

[7] MrunaliJadhav,PriyaM.RavaleNerkar,"Survey on finger Vein Biometric Authentication System",NCETACT,International Journal of Computer Applications(0975-8887),2015.

[8] IramMalik,RohiniSharma,"Analysis of Different Techniques for Finger Vein Feature Extraction",International Journal of Computer Trends and Technology(IJCTT),Volume 4 Issue 5,May 2013.

[9]S.Vinothkumar,R.Sanmugasundaram,D.Divya,S.Padma Sarath, "A Survey of Finger Vein Extraction Techniques and Its Applications",International Journal of Engineering Research & Technology(IJERT), ISSN:2278-0181,Volume 3, Issue 2,February,2014.

[10] G.Gowsica,L.Latha,"A Survey on Biometric Authentication Techniques Using Finger Vein",International Journal of Science and Research(IJSR),ISSN:2319-064,Volume 3,Issue 11,November,2014.

[11]K.Syazanaitqan,A.R.Syafeeza,N.M.Saad,Norihan Abdul Hamid and WiraHidayat Bin MohdSaad,"A Review of Finger-Vein Biometrics Identification Approaches",Indian Journal of Science and Technology,Volume9(32),ISSN:0974-5645,August,2016.

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