Volume 5, Issue 6, June 2015 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

An Efficient Minutiae Matching Method for Finger Vein Recognition

Er. Nancy Mantrao, Er. Sukhpreet Kaur
Department of Computer Science and Technology
SUS College of Engineering and Technology,
Tangori (District, Mohali) India

Abstract: - Finger vein Recognition is the most current biometric innovation which uses the vein pattern which is covered up under the human finger for distinguishing proof. Comparing with other traits such as fingerprint, iris and face accuracy is high in finger vein as these patterns are covered up under the skin surface, they give a colossal security thought and are difficult to forge. An efficient method for finger vein recognition is based on minutiae extraction and removal of false pairs to ensure high performance and accuracy. Matching is done by using chi square and may takes less time since it just includes a less minutiae points. The best result is achieved by applying neighborhood operation and distance computation, where the accuracy can be up to 91.67%.

Keywords:-Finger vein, Skeletonization, Minutiae extraction, False Minutiae and Matching

I. INTRODUCTION

Validation in light of finger veins utilizes the pattern of the veins inside the fingers of a human. Contrasted with different characteristics utilizing finger veins has a few satisfaction. The veins are underneath the skin so the vein pattern is contradicting to fabrication as the veins are just discernible in infrared light. Likewise suitable discovery is effortlessly conceivable. Additionally the vein pattern are neither delicate to scrape nor to finger surface conditions, similar to dryness, soil, cuts, and so forth.

Finger vein is broadly considered as a promising biometric example for customized ID, getting bunches of exploration interest and business applications. All in all, finger vein recognition includes four principle techniques: image capturing, preprocessing, feature extraction and matching. Specifically, image capturing envisions veins in a finger. Preprocessing fundamentally improves images. Feature extraction distinguishes the qualities of the vein design for representation and coordinating measures the likeness between two finger vein images for recognition. Given the benefits of finger vein recognition, heaps of systems have been proposed, which fall into three classes as per their feature extraction rules: ROI-based methods, network-based methods, and minutiae-based methods. In ROI based methods it incorporates arrangement of images and after that features are removed from non-vein region which decreases the lessening execution and this method need bigger format prompts low preparing pace. It incorporates LBP, LDP and LLBP. LBP (local binary pattern) is a feature extraction scheme in which grey level of center pixel to its neighboring pixel is compared. This approach lead by minutiae based alignment and having distance matching. LDP (Local Binary Pattern) is additionally a strategy for highlight extraction. LBP is quicker than LDP yet LDP results better than LBP. LLBP is local line binary pattern whose area is a square formed. It comprises of two segments even and vertical and twofold code is incorporated in LLBP.

In Network based systems Firstly, finger vein systems are fragmented and after that separated from sectioned network. Finger vein images division results and fulfilling because of low nature of finger vein pictures. It incorporates RLT, Maximum Curvature, Even Gabor with Morphological (EGM) and Mean Curvature. RLT (Repeated line tracking) extracts the finger vein pattern from blurred image by using line tracking and starts from various positions. Disadvantage of this method is noise is also tracked. Maximum curvature concentrates centerlines of veins so this pattern is exact. Mean curvature is used to find minimum and maximum curvature.

Minutiae based method is a component point discovery. Subsequent to applying skeletonization end and bifurcation points are resolved for vein upgrade. Post processing includes evacuation of faked minutiae to get accurate result but if recognized image with faked minutiae obtained then identification becomes inaccurate.

Matching is done by using key point descriptors known as SIFT and SURF. Minutiae methods include SIFT (scale invariant feature transform) and MHD (modified Hausdorff distance).SIFT is utilized to recognize the sub-districts in finger vein images and apply matching. SURF (Speeded up robust features) used to acquired key points. MHD proposed to analyze two binary images and does not oblige point correspondences between two points. Distance Measure HD of threshold value is seen to be 0.43.

The most difficult issues is that, the correspondence of two correspondence of two minutiae points which are difficult toward acquire coming about because of revolution, interpretation and deformity of finger vein images. SIFT (Scale invariant Feature Transform) showing poor execution. Reason is that false combines could be recognized. MHD is

profoundly delicate to direct move of finger vein images. For the existing minutiae based methods, the precision is for the most part unacceptable and their minutia correspondences are obscure or incorrect. Papers based on minutiae methods focuses their consideration on minutiae and its ghastly representation, and have not said anything on the evacuation of false minutiae. Vicinity of faked minutiae is a difficult issue in the distinguishing proof procedure and subsequently it ought to be uprooted. To beat these issues new strategy should be proposed to guarantee high performance and accuracy. Thus, this paper endeavors to research a strong matching technique for finger vein recognition, to cure the limits of existing solutions.

II. BLOCK DIAGRAM OF FINGER VEIN RECOGNITION

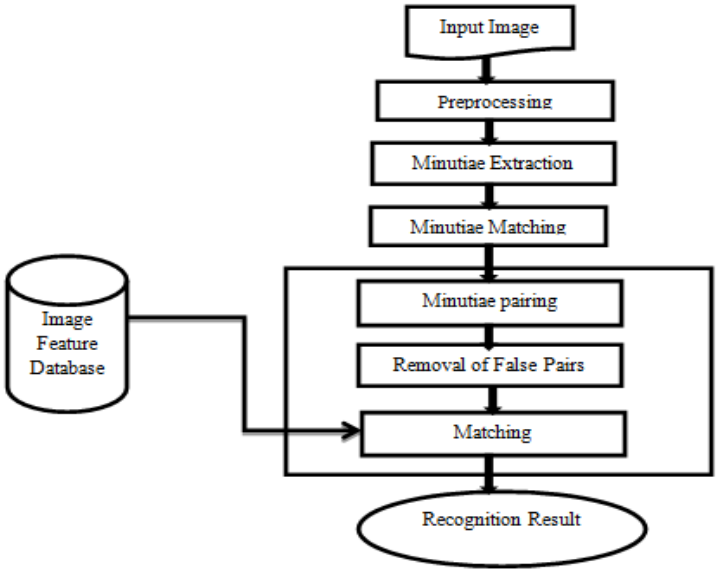

Fig 1: Block diagram of the implement method

(a) Preprocessing: - Finger vein image preprocessing systems can be assembled into routines for arrangement of the finger position and into techniques to enhance the regularly uneven and poor differentiation of the images. After enhancement of finger vein binarization of image is done to extract vein pattern.

(b) Skeletonization: -In image processing associated structures can be decreased to a binary skeleton. These skeletons are 1-pixel width structures which hold the topology of the divided picture. A few skeletonization strategies are there furthermore, one strategy for thinning which is additionally executed in MATLAB is utilized here.

(c) Minutiae extraction: -After skeletonization minutiae extraction is done to determine branch points and endpoints by using morphological operators.

(d) Minutiae matching:-it includes three phases Minutiae pairing, False removing and matching. In Minutiae pairing branch points and end points are paired.At that point we registered the distance based system for spurious details evacuation. We processed the end to end, branch to branch, end to branch Euclidean separation for each minutia and minutiae having less distance than threshold value are eliminated. Matching procedure is done by chi square test and may takes less time since it just includes a less minutiae points. Chi square test is done by using

$$X^2(X,Y)=\frac{1}{2}\sum_i \frac{(x_i-y_i)^2}{(x_i+y_i)},$$

Where, $X = \{x_i | i = 1,2, \dots, N\}$ *and* $Y = \{y_i | i = 1,2, \dots, N\}$

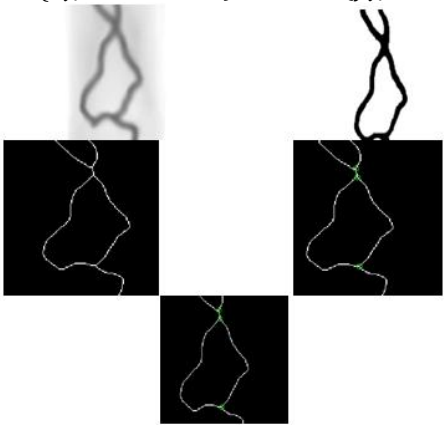

Fig 2.Finger vein images: (a) Preprocessing (b) Binarization (c) Skeletonization (d) Minutiae points (e) After removal of false pairs.

III. RESULTS AND DISCUSSIONS

After the removal of false pairs Matching is done by using chi square test to ensure high performance and accuracy.

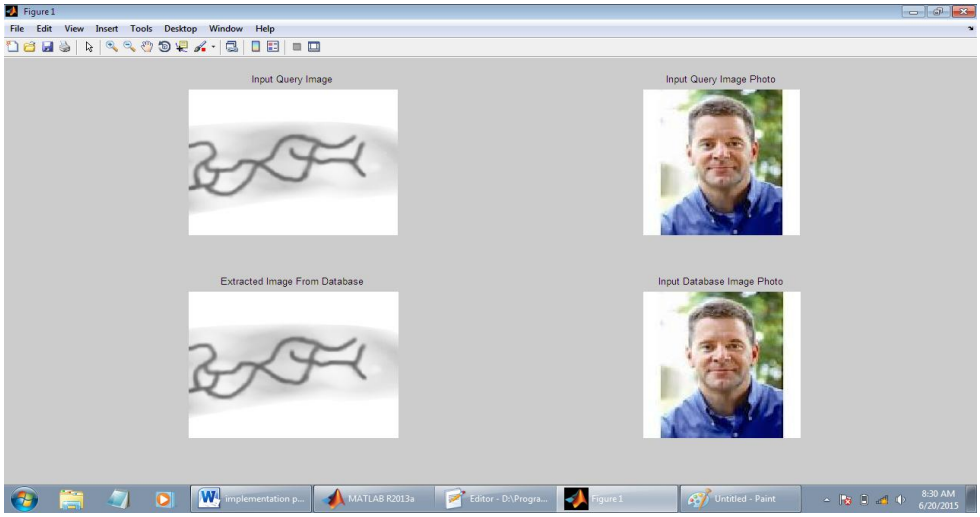

Fig 3.Results Analysis for different images.

There are 150 images available in database acquired from SDULMA-HMT Database. By using this database 90% of images are recognized and The images of dimensions 364 x 456 are stored in JPEG format. The width of blood vessel is 5-21 pixels. Minutiae extraction is determined by using morphological operators and Matching is used as provided in MATLAB.

IMAGES	Sensitivity	Specificity	+ predictive value	-Predictive value	Recognition Rate
IF	0.5000	0.5000	0.3333	0.6667	0.3333
MF	0.5000	0.5000	0.9167	0.0833	0.9167
RF	0.5000	0.5000	0.5833	0.4167	0.5833
LF	0.5000	0.5000	0.8333	0.1667	0.8333

IV. CONCLUSION AND FUTURE SCOPE

This paper presents an efficient minutiae matching method for finger vein recognition. It involves three stages minutiae pairing, false removing and matching. By using morphological operators we have successfully eliminate false minutiae to make our identification more accurate. Matching is done by chi square test to ensure high accuracy. Retrieval of images is costly and difficult. Further work should be concentrated in adopting a better method to retrieve images is inexpensive and elementary.

ACKNOWLEDGEMENT

The creators might especially want to thank the mysterious analysts for their accommodating proposals. Our gratitude to the Shandong University for permitting us to utilize "Finger Vein Database" they had gathered. The work is bolstered by the Shandong Natural Science Funds for Distinguished Young Researcher under Grant no.JQ201316, the National Natural Science Establishment of China under Grantno.61173069.

REFERENCES

[1] K.Y. Shin, Y.H. Park, D.T. Nguyen, and K.R. Park "Finger-Vein Image Enhancement Using a FuzzY Based Fusion Method with Gabor and Retinex Filtering" 2014.

[2] A. Kumar and Y. Zhou."Human identification using finger images".IEEE Transactions on Image Processing.

[3] SujataKulkarni, Dr.RdRaut "Finger Vein Recognition"IOSR,2014

[4] YoungHo Park and Kang Ryong Park, "Image Quality Enhancement using Direction and Thickness of vein lines for Finger Vein Recognition", INTECH, 2012

[5] A. Kumar, Y. Zhou, "Human identification using finger images", IEEE Trans. Image Process,2012

[6] Miura, N., Nagasaka, A., Miyatake, T.: "Feature extraction of finger-vein patterns based on repeated line tracking and its application to personal identification" 2012

[7] Christophkauba, JakobReissig and Andreasuhi. "Preprocessing Cascades and fusion in Finger Vein Recognition",2014

[8] Xiaoming Xi, Gong ping Yong, Yilong Yin, XianjingMeng "Finger Vein Recognition with Personalized Feature Selection" Sensors, 2013.

[9] PandillapalliGowtham, Ch. sindhu, C. Sudheer Kumar, Ch .Chandra Sekar "Identification of Finger Images using Score-Level Fusion" International Journal of Engineering Science Invention",2013

[10] Preethy Prabhakar, Tony Thomas, "Finger vein Identification based on Minutiae Feature Extraction with spurious Minutiae Removal",2013

[11] DunTan,JinfengYang,YiHuaShi,ChenghuaXu, "A Hierarchical Framework for Finger Vein mage Classification"IAPR,2013

[12] KritiJandrotia, NamitaKakar, "Person Verification with the help of Finger Vein",IJARCSSE,2013

[13] FiekeHillerstrom, Ajay Kumar,RaymondVeldhuis, "Generating and Synthetic Finger vein Images" ,2014

[14] AmrutaP.Dharmadhikari, S.R. Ganorkar, "Human Identification Using Finger Images"IJRET,2014

[15] Jose Anand, T.C Arul Flora, Anu Susan Philiup, "Finger Vein Based Biometric Security System"IJRET

