International Journal of Current Research and Modern Education (IJCRME)
ISSN (Online): 2455 – 5428 & Impact Factor: 3.165
Special Issue, NCFTCCPS - 2016

HUMAN FINGER VEIN EXTRACTION BYLOCAL BINARY PATTERN

T. P. Kavya* & Dr. Amitabh Wahi**
Department of Information Technology, Bannari Amman Institute of Technology, Sathyamangalam, Tamilnadu

Abstract:

Human Biometrics plays a vital role in the process of Authentication and identification. Despite of having biometrics such as face, voice, iris etc. been used in the existing method whereas in the proposed method finger vein has been used for classification. The proposed system finger vein is more secured while comparing with the existing system, though the vein patterns differ from person to person. In the existing method the finger vein features are derive from IR image at different conditions. The vein feature extraction and authentication algorithm has to be introducedtoachieve the better EqualError Rate (EER), than theprevious recognition algorithm. In the proposed method classification of finger vein is performed by using local binary pattern (LBP) which provides more recognition time.

1. Introduction:

Biometric testimony that uses pattern-recognition techniques based on images of human finger patterns inside the skin.Finger vein recognition is one of multi forms of biometrics used to identify and verify their identity. In present days the usage of digital data is been increased in informationtechnology and more over in all field. Thus it requires more security for protecting its information which is in the need of increasinglyhigher levelsofdata protection. Toconstruct further secured system biometrics plays a vital role in it because users are attracting to techniques such as using keys, PIN numbers, password which are easily hacked by third party. Whereas by using finger vein it differs from person to person alive/dead. Since it is inside the human body it cannot be identified by the intruders though it cannot be recognized.Many researches are been undergoing for the past two decades. The rest of this paper is organized as follows. An overview of the system which proposed here is in Section2. Our recognition method is addressed in Section 3. Experimental outcomes arediscussed in Section 4. Finally, conclusion and future enhancement of the algorithm is described in Section 5.

2. Overview of the System:

The proposed finger-vein classification algorithm contains the following stages: the process of converting the image into black and white. Adding of salt and pepper inside the image and randomly select 5% white (background)pixel and make that pixel into black one.Extract the features from the randomly selected image. Store these extracted features in a i*n matrix form. Then normalize all the feature extracted using min-max method. The feature extracted is local binary pattern (LBP). It is a type of visual descriptor used for classification in computer vision.The biggest challenge that is faced while using this technique is to make the features rotationally invariant. In this paper, local binary pattern variance (LBPV) is proposed to address this challenge and to characterize the local contrast information into the one-dimensional LBP histogram [1]. The LBP feature vector, in its simplest form of it divide the checked window into cells.Each pixel in a cell, correlate the pixel to each of it with thebystanders.Track the pixels along a circle. If the center pixel value is more that of the neighbor's value, make it as' 0'.Or else, make it as '1'. It provides an 8-digit binary number tomeasure the histogram, over the cell, of the frequency of each "number" occurring. This histogram can be seen as a 256-dimensional feature vector. Optionally normalize the histogram.

Combine histograms of all cells. This gives a feature vector for the entire window. Figure 1 show the flow chart of the system.

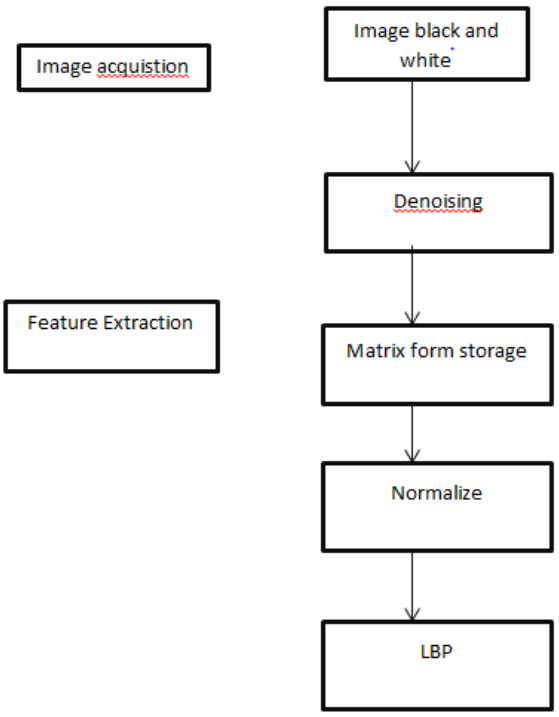

Figure 1: flow chart of the proposed LSB method

3. Proposed Algorithm:

A. Image Pre-Processing:

The grabbed image vein image has held numerous noise and distortion in it. To extract the finger vein the following steps are as follows

1. Read the initial image.
2. Convert the RGB image to the Grayscale
3. Randomly select 5% pixel and make into black one.

Figure 2: Pre-Processing of FingerVeinImage

B. Image Storage:

The extracted image is stored in 1*n matrix form Then normalizes all the feature extracted using min-max method. The feature extracted is local binary pattern (LBP).

C. Local Binary Pattern:

The extracted image is local binary pattern. It works on local features-

- LBP operator: summarizes the local special structure of an image.
- LBP is defined as an ordered set of binary comparisons of pixel intensities between the center pixel and its eight surrounding pixels. Each pixel of an image is labeled with an LSB code-First it divide the image into several blocks and it starts calculating the LSB histogram for each block after that it will combine every LSB histogram for that image then the LSB histogram is made for one vector

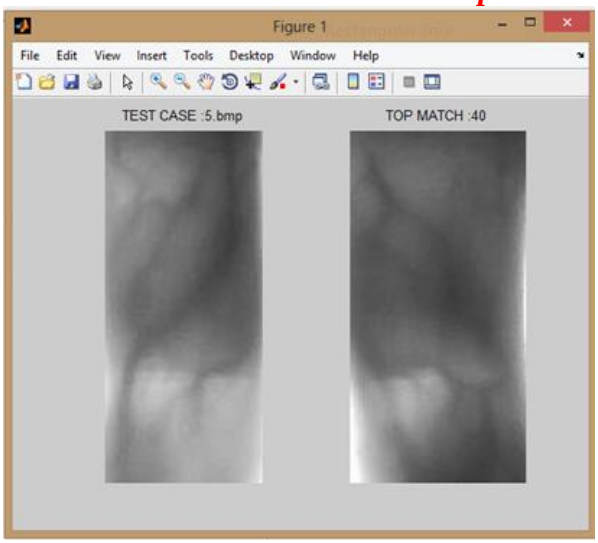

Figure 3: Finger Vein Images LSB

4. Experimental Results:

A. Dataset for the Experiment:

The Dataset has been archived form different organizations [5]. In thedataset thathadtakenfori=theprocessingcontains a setof 2110finger samples.Eachsample havingthe dimensionof170 x 76Gray scale image. The datasetcontains106setswhere each sitemap has is the 36 finger image of different dimensions. From thearchiving data of finger-veinbasedpersonal authenticationsystemvein image feature is stored and provided insection2, Because of the blankness in the common finger-vein image database for finger-vein recognition, we foraminate database which contains 4500 finger-vein images from 100 individuals. Each person give 45 finger-vein images from three different fingers: forefinger, middle finger and ringfinger of the righthand.Allimagesare capturedusinga homemade image acquisitionsystem.The grabbedfinger-veinimagesare 8-bitgray images with a resolution of 320×240.

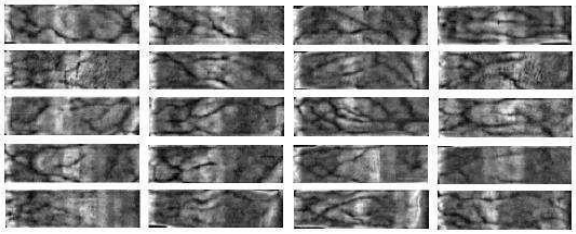

Figure 4: Finger-vein images from different fingers after preprocessing

B. Comparison with Previous Methods:

Miuraetal [8] used a database that contained 1356 different infrared images of fingers. These images were achieved from personsworkingintheirlaboratoryaged20 to 40, approximately 70% of whom were male. Song's [1] finger vein image dataset contained 5000 images together using an infrared imaging device they constructed. Seven images were taken for each of 105 fingers. Compared withthese databases, ours is greater and the data-collection interval is longer. Thus, ourdatabase is morestimulating.Moreover, oursystemis implementedonageneralDSPchip.Table1 show thatthe average times required for feature extraction and matching in our systemare225msand12ms, respectively. For the whole system, plus the time for image capturing, the time required for the authentication of a user is less than 0.8s. Our Feature extraction algorithm achieves a success factor of 5 and recognition rate as 70 indicating that our method significantly out performs previous methods. The following

table 1 shows the success factor and recognition rate for 4500 samples with the pixels of 5% to 40%.

Method	Sample Images	%	Success Factor	Recognition Rate
Our method	1500	5	5	70
	1500	10	5	50
	1500	15	2	20

Table 1: Recognition Rate and Response Time

5. Conclusion and Future Enhancements:

In this paper we introduced a Local Binary Pattern to extract the finger vein images. It can obtain all the points on the LBP of vein in the image and increase the information of the feature. By using this method, we not only use the mutual information among different vein branches, but also treat every vein branch with independence. The propone algorithm to extract finger-vein images by viewing various parameters like vein width, position, length, pixels and crossing of veins. Our system is suitable for mobile devices and ATM's because of its low computational complexity and low power consumption. The advantage of this proposed system is more secured and confidential. The future work is to compare it with more vein samples with curve let transformation.

6. References:

1. Zhi Liuand Shangling Song,"An Embedded Real-Time Finger- Vein Recognition Systemfor Mobile Devices", IEEE Transaction son Consumer Electronics,vol.58,no.2,pages.522-527, May,2012.
2. W. Song,T. Kim,H. C.Kim,J.H. Choi, H. Kong and S.Lee,"Afinger-vein verification system using meancurvature", PatternRecognitionLetters, vol.32,no.11, pp. 1541-1547, 2011.
3. Li,H.B.; Yu,C.B.; Zhang, D.M.Study on finger vein image enhancement based on ridge let transformation. J. Chongqing Univ. Posts Telecommun. Nat. Sci. Ed. 2011, 23, 224–230.
4. Wang, K.J.; Liu, J.Y.; Popoola Oluwatoyin, P.; Feng, W.X. Finger Vein Identification Based on2-DGaborFilter.In Proceedings of the 2nd International Conference on Industrial Mechatronics and Automation, Wuhan, China, 30–31 May2010; pp. 10–13.
5. D.Wang, J.Li, and G.Memik,"User identification based on finger vein patterns for consumer electronics devices", IEEE TransactionsonConsumerElectronics,vol.56, no. 2, pp. 799-804, 2010.
6. http://www.fujitsu.com/global/about/rd/200506.fingervein.html(accessedon2010-12-27).