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HUMAN IDENTIFICATION BASED ON FINGER VEINS- A REVIEW

P. GOPINATH

Assistant Professor, Sengunthar Engineering College, Tiruchengode, Tamil Nadu, India

ABSTRACT

Finger vein is an important biometric technique for personal identification and authentication. The finger vein is a blood vassal network under the finger skin. The network pattern is distinct for each individual, unaffected by aging and it is internal. i.e, inside human skin which can always guarantee more security authentication. In this proposing study to an analysis of different techniques for Finger vein feature extraction. The basic and important principle, different feature extraction techniques and performance measuring are briefly analyzed. Most of the existing work is functionally described and compared in three parts, i.e. Finger vein image acquisition, pre-processing and feature extraction.

KEYWORDS: Image Acquisition Device, Preprocessing, Feature Extraction, Finger-Vein Biometrics

INTRODUCTION

Personal human identification and authentication based technology are used in broad range of systems for functions such as online banking, automatic teller machines for transaction, login for PC's, driver identification, e-commerce systems and many more.

Biometric technology is based on identification of individuals either by physical characteristics such as finger prints, iris, finger vein, face or even hand geometry and the behavioral characteristics such as voice, signature and other typing pattern.

WHY FINGER VEIN?

Compared with other biometric traits, the finger-vein has the following merits,

- The vein is hidden inside the body and is mostly invisible to human eyes, so it is difficult to forge or steal.
- The non-invasive and contactless capture of finger-vein ensures the convenience for the user, and is thus more acceptable.
- The finger-vein pattern can only be taken from a live body. Therefore, it is a natural and convincing proof that the subject whose finger-vein is successfully captured is alive.

Vein recognition technology is categorized into two types: one is hand vein recognition, and the other is finger vein recognition [8]. Both technology has their own merits, compared to the hand vein recognition, the equipment of finger vein recognition requires higher technological needs. The characteristics of finger-vein includes high protection, uniqueness, living body identification, internal characteristics, non-contacting, small sample file, a higher level of security and so on.

Finger Vein Identification Steps are given as follows: Finger vein image acquisition, Pre-processing of image, Feature extraction, matching and verification.

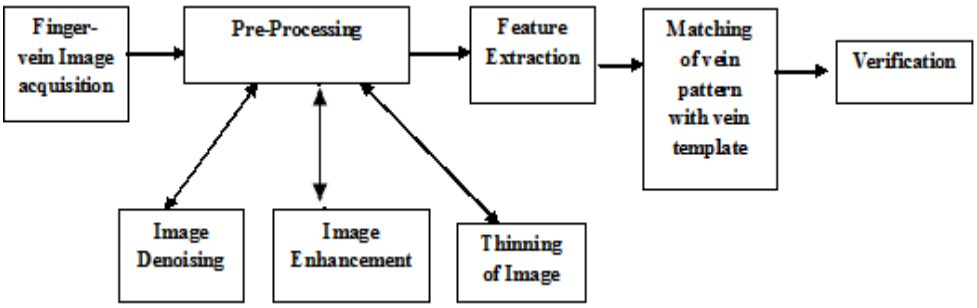

Figure 1: Functional Diagram of Finger-Vein Biometrics

Finger Vein Image Acquisition

A special imaging device is used to obtain the infrared image of the finger. An infrared light irradiates the backside of the hand and the light passes through the finger.

A camera located in the palm side of the hand captures this light. The intensity of light from the LED is adjusted according to the brightness of the image. As haemoglobin in the blood absorbs the infrared light, the pattern of veins in the palm side of the finger are captured as shadows. Moreover, the transmittance of infrared light varies with the thickness of the finger. Since this varies from place to place, the infrared image contains irregular shading.

Pre-Processing

Image pre-process can be done for later analysis and use of an image. The role of pre-processing module is to prepare the image for feature extraction by enhancement, segmentation, filtering, thinning etc.

Image Denoising

The Median filter is used for noise reduction. Removing noise from an image improves the results for the image later processing such as edge detection on an image.

Image Enhancement

The image enhancement is an essential step for higher image quality to get better matching performance. In this objective of enhancement is to process an image so that the result is more. The image given will be crop out and enhanced and filtering will be done. Filtering is to reduce the noise and filter out those unwanted object by using histogram technique where enhancing the image quality.

Thinning

Thinning is one types of morphological function It is used to remove selected foreground pixels from a binary image. This function used to join up the output of edge detector by shrink all lines to a single pixel thickness. In this process have more accuracy for matching function.

Feature Extraction

During this process morphological is used with the structuring element small object from the image will be removed and morphological method or other equivalent method will be applied for further process of matching.

Verification

After the extracted image will be given to verification stage. In this stage the vein template image and input image should be compared. Then the matching original image is to be identified.

LITERATURE SURVEY

Feature Extraction of Finger-Vein Patterns Based on Repeated Line Tracking and its Application to Personal Identification

Image has been captured using infrared light, which contains vein pattern as well as the irregular shading caused by various thicknesses of the bones and muscles.

In this paper, authors have proposed a personal identification technique based on patterns of veins in a finger. To get the vein pattern from blurred original image, line tracking operation based on randomly varied starting points was carried out repeatedly.

Authors have shown the results with equal error rate of 0.145% and the response time of 460ms. This result shows that the proposed technique is effective for personal identification.

Finger Vein Recognition Using Local Line Binary Pattern

In this paper, a new technique has been proposed for personal identification based on finger vein image.

Authors have used Local Line Binary Pattern (LLBP) technique for feature extraction. The LLBP technique has an advantage of having straight line neighbourhood shapes. But in Local Binary Pattern (LBP) technique, the neighbourhood shape is a square one. Authors have compared the result of proposed scheme with LBP technique and shown that LLBP gives better performance.

Images for 204 fingers have been considered for the experiment. Those images were captured by their own prototype device. Time requiring for feature extraction in LLBP technique is less than the LBP technique [2]

A Novel Approach for Human Identification through Finger Prints

In this paper, Authors have shown that, Finger print is an efficient technique for personal identification. The proposed technique is faster algorithm, less complex than previous algorithms and also it rejects image noises and reflections. The Homogenization avoids specularities in the images. Bit plane slicing, morphological manipulations and standard deviations helps to calculate radius and midpoint of the image. The accurate inner boundary can be recognized using radius and midpoint of the image. The finger print which is in polar form (polar coordinate system) is converted into linear form (Cartesian coordinate system). The secret code is formed from middle row of the enhanced image. Then, it is converted to Hexadecimal code. The pattern matching is done using hamming code distance. It gives 1690 different fingerprint codes. It overcomes the noises created by pupil in the image [3]

A Multi Biometric System Using Combined Vein and Finger Print Identification

In this paper, a multi Biometric system for finger print identification is proposed. A compact system which is based on a CMOS finger print sensor is used as a biometric sub-system. This sub system can be directly interfaced to the finger print sensor and to an external PC to store the finger print templates. In addition the biometric sub system, a vein image extraction system is used. This system has a set of light emitting diodes that produces near infrared light which penetrates the body Tissue. The infrared light is reflected in the haemoglobin in the blood and an image of the vein pattern is revealed. A CCD (Charge Coupled Device) camera uses a rectangular shape of silicon to receive the incoming light and it captures the image of the vein pattern through the reflected light. Then the camera image is processed by the proposed algorithm to construct a finger vein pattern.

This pattern is digitized and used as a template for biometric authentication for identifying individuals; the templates are extracted from the finger and matched with the entries in the database. The design of the proposed system is based on two biometrics identifiers called fingerprint and vein patterns [4]

Extraction of Finger-Vein Patterns Using Maximum Curvature Points in Image Profiles

In this paper, a new method has been developed to robustly extract the precise details of the veins by calculating local maximum curvatures in the cross-sectional profiles of a vein image. In this method, the centrelines of the veins can be extracted consistently without being affected by the variations in the width and brightness of the vein.

This method rectifies the problems found in previous methods by checking the curvature of the image and focusing only the centrelines of veins. The centrelines are obtained by observing the positions where the curvatures of the cross-sectional profile are locally maximal. This method of finding the maximum curvature positions is against the variation in width and brightness of the vein. The positions are interconnected with each other and finally the vein pattern is detected. [5]

Finger Vein Recognition Algorithm Using Phase Only Correlation

In this paper, authors have proposed algorithm finger vein recognition with low complexity in the image pre-processing section, where finger vein extraction is not included. In the proposed, authors have implemented phase-only correlation (POC) function at the matching stage with less complex pre-processing technique. They have done the experiment using a set of finger vein images captured by a low cost device [6]

PERFORMANCE ANALYSIS

Reference	Title	Technique Used	BER
[1]	Feature extraction of finger-vein patterns based on repeated line tracking and its application to personal identification	Line Tracking	0.145%
[5]	Extraction of finger-vein patterns using maximum curvature points in image profiles	Local maximum curvatures points	0.0009%
[6]	Extraction of finger-vein patterns using maximum curvature points in image profiles	Phase only Correlation	0.9803%

CONCLUSIONS

In this study we consider fundamental principle, various feature extraction technique and performance evaluation metrics. This present system deals with the study which related to different technique of finger vein feature extraction for biometric authentication and identification. Available work in literatures and commercial utilization deals with the study and implementation of experiences in different finger vein, features extraction. This technique offers different levels of performance in finger vein robustness, security and accuracy.

REFERENCES

1. Naoto Miura, Akio Nagasaka, Takafumi Miyatake “Feature extraction of finger-vein patterns based on repeated line tracking and its application to personal identification” Springer-verlag 2004.
2. Bakhtiar Affendi Rosdi, Chai Wuh Shing and Shahrel Azmin Suandi “Finger vein recognition using local line binary pattern” Sensors ISSN 1424-8220, 2011.

3. Prof G.Ramaswamy, Vuda Sreenivasarao, Dr.P.Ramesh, D.Ravi kiran "A Novel approach for human identification through fingerprints" International Journal of computer applications (0975-8887) Volume 4-No.3, July2010.
4. Hatim A.Aboalsamh "A Multi biometric system using combined vein and fingerprint identification" International journal of circuits, systems and signal processing Issue 1,Volume 5, 2011.
5. Naoto Miura, Akio Nagasaka "Extraction of finger-vein patterns using maximum curvature points in image profiles" IAPR conference on machine vision applications, Tsukuba science city, japan 2005.
6. Nurhafizah Mahri, Shahrel Azmin Sundi@suandi, Bakhtiar Affendi Rosdi "Finger vein recognition algorithm using phase only correlation" IEEE 2010.
7. Iram Malik,Rohni Sharma "Analysis of Different techniques for finger-vein feature extraction" International journal of computer trends and technology(IJCTT)-Volume 4, May 2013.
8. Ujwala D. Podgantwar, Prof.U.K.Raut "Exraction of Finger-Vein Patterns Using Gabor Filter in Finger vein image Profiles" International journal of Engineering Research and Technology(IJERT)-Volume 2, June-2013.