International Journal of Advanced Science and Technology
Vol. 29, No. 6, (2020), pp. 7669-7673

Finger Vein Authentication for Security Purpose

Racha Nikhil[1], Mohit Mirchandani[2], Dr.V.Kavitha[3]

[1]*Dept. of CSE, SRM Institute of Science and Technology, Kattankulathur,603203, Tamil Nadu, India*

[2] *Dept. of CSE, SRM Institute of Science and Technology, Kattankulathur,603203, Tamil Nadu, India*

[3] *Dept. of CSE, SRM Institute of Science and Technology, Kattankulathur,603203, Tamil Nadu, India*

[1]*rachanikhil57@gmail.com*, [2]*mirchandani.mohit30@gmail.com*, [3]*kavithav2@srmist.edu.in*

Abstract

Finger vein recognition is a form of biometric authentication which uses the image of patterns of the finger veins underneath the skin to identify and authenticate. Finger vein verification system is a kind of biometric system used to identify individuals and to check their identity. Finger Vein biometric system is a biometric authentication system that matches the vein pattern in a person's finger to antecedent get information. This technology is currently in development or in use for producing many biometric systems, including MasterCard authentication, car security, attendance and time tracking for employees, network authentication, computer authentication, and ATM machines. The need for simple, helpful, and exceptionally secure authentication frameworks for protecting the ever-increasing amount of data stored on mobile devices. The private data are frequently ensured inside the kind of biometrics which utilizes human physiological or behavioral features for personal identification. The algorithm utilized in this project is SVM using MATHLAB language with a GUI interface.

Keywords: *Finger vein identification, SVM classifier, authentication, Haar wavelet*

1. Introduction

Biometric authentication using blood veins might be a more up to date approach which utilizes the tremendous pattern of veins present underneath an individual's skin. This subdermal pattern is distinct for every individual and this pattern doesn't change after some time with the exception of change in size. As these veins are underneath the skin and have an abundance of distinct attributes, a effort to rehash an identity of a person is a lot harder. Any biometric uniqueness, dependability and invulnerability to fabrication of the vein pattern could make it a decent biometric quality which provides better security and strong highlights for private authentication to guard an individual's private data saved inside the consumers electronics from abuses due to burglary or loss. To unravel this issue, more secure and dependable systems for user authentication utilize biometric technology need to be integrated into consumer electronic devices.

The finger-vein identification system using HAAR wavelet transform provides high security than the prevailing system. The vein recognition system proposes the use of HAAR wavelet transform for feature extraction which covers all the 256 pixels multidimensionally, and produces better accuracy. Results have shown that the proposed

ISSN: 2005-4238 IJAST

framework performs as expected in providing user authentication and also accomplishes great performance in terms of best so-far Vs Iteration. An SVM Classification Algorithm. It Falls Under the Umbrella of Machine Learning.

2. Previous Method

Personal Identification Number (PINs) and passwords were traditionally used in order to provide protection for private data, which can be susceptible to the threat of exposure or can be forgotten. There's an all-encompassing rundown of realistic biometric patterns, and bunch of such frameworks which are created and executed, which may include iris, fingerprint, palm print, gait, voice recognition, etc. With so many different type of biometric verification existing currently, none of them are completely reliable or perfectly safe.

3. Proposed Method

The finger veins image needed for the identification of the subject can be obtained by exposing the subject's finger to Near infrared LED and CCD camera. But due to cost purpose instead of CCD camera and Near infrared LED, we can use a data set obtained from the internet.

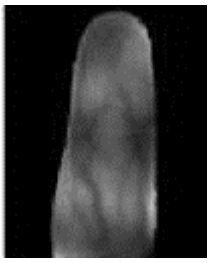

Figure 1. Finger Vein Image

After acquiring the image of the finger vein, pre-processing is done on the input image which includes, Binarization which converts greyscale image into a black and white i.e., into a binary form of 1 and 0. Edge detection: Detects the edges of a finger vein using a SOBEL edge detector, this enables the extraction of ROI(Region of Interest) which enables us to acquire only the important regions of the image. Using ROI helps in reducing the time required for identification by reducing the time spent on unwanted area of the finger vein image. Image enhancement: It is used to improve many different aspects regarding the quality of the finger vein image. It includes qualities like colour, contrast, brightness and noise.

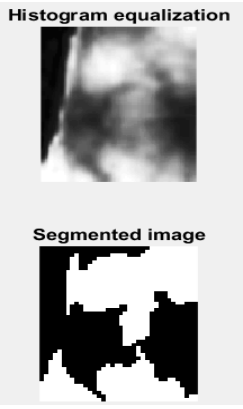

Figure 2. Histogram equalization and Segmented Image

ISSN: 2005-4238 IJAST

Segmentation of the finger vein is done by Automatic Trimap Generation, which separates the foreground part, background part and the blended part of the image.

Following it feature extraction is done using Haar wavelet transform for multidimensional diagnosis of pixels and to produce better results.

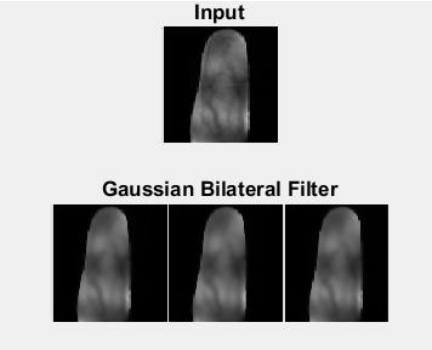

Figure 3. Gaussian Bilateral Filtering

In the last step the image is matched with the database images using two techniques.1) SURF (speed up robust feature).2 Cross validation and graph matching. If an image matches, the device will unlock, otherwise not.

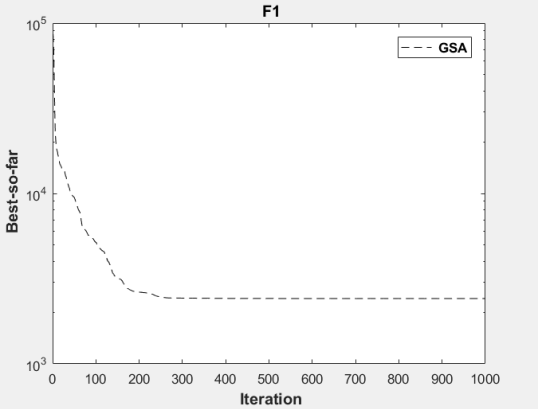

Figure 4. GSA Graph

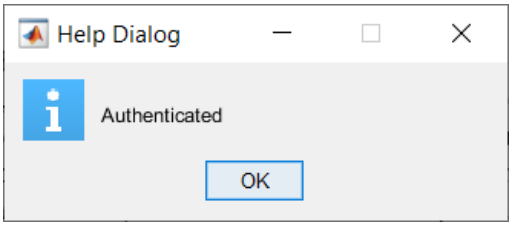

Figure 5. Authentication Result

4. Literature Survey

1. In 2011,"**A.Yuksel, B.Sankur and L.Akarun"[1],** presented biometric authentication using hand veins which were based upon geometry and appearance methods. Biometric identification using vein patterns of the blood vessels is a latest methodology that utilizes the huge system of veins present underneath an individual's skin. The vein pattern present in the fingers and hands are considered to be distinct to every person and

ISSN: 2005-4238 IJAST

these patterns do not change over time with the exception to their size. Hence, any endeavour to replicate the identity of a person is very difficult.

2. In 2012**, "Zhi Liu and Shangling Song"[5],** presented the advancements in consumer electronics. This paper presented the interest for convenient, simple and exceptionally secure framework for protecting the continuously increasing amount of data being stored on mobile devices. Considering this new found need to for protecting our data and biometrics, which use human physiology or behavioural patterns to provide authentication. However, most of the current biometric system either have high time complexity or high space complexity or sometimes both, this is a huge issue on mobile devices as they lack the space and computational power of computers. This paper also proposes an real time embedded finger vein authentication for providing authentication on mobile devices.

3. In 2013, "**Peter M. Corcoran",** Presented "Biometrics and Consumer Electronics: A Brave New World or the Road to Dystopia?" Repeated authentication by a device is still far better us. There are numerous difficulties and hindrances out and about ahead. Nevertheless, with the correct benchmarks and a few upgrades and provision of field test for the existing technologies, it is still a feasible vision—and an alluring dream for some. With these advancements in biometric technology, a future where our devices will "know" isn't that far away.

4. In 2014, "**Yiding Wang, Ke Zhang and Lik-Kwan Shark"[4],** presented a multiple key pointsets of the images of the dorsal hand veins. This paper uses near-infrared image of the dorsal hand veins for the biometric identification by coordinating the key points which are extracted by scale invariant feature transform.

5. In 2015, **"Yiding Wang, Wei Xie and Lik-Kwan Shark"[4],** has introduced an access control framework which utilizes biometrics using both hardware and software. The equipment was implemented using existing with fewer number of components to empower simpler and less complex installation. The product was executed by lessening the quantity of complex image processing chore before feature extraction, and furthermore utilizing proficient feature extraction. (See example below)

5. Conclusion

The present study proposed a finger vein recognition with SVM algorithm and Haar wavelet transform in feature extraction method. The images from 8 fingers is taken from the database and we got the output whether the finger vein is authorized or unauthorized. In this paper we have examined the special attributes of finger vein verification technology as well as its future advancement. As society turns out to be more information intensive and globalized, the significance of security advances in different sectors will keep on developing consistently. The upsides of finger vein verification in precision and

ISSN: 2005-4238 IJAST

usability relies extensively upon microcomputers, image sensors and other such semiconductor gadgets, and hence there is incredible expectation put in the headway of semiconductor technology.

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ISSN: 2005-4238 IJAST