International Journal of Scientific & Engineering Research Volume 9, Issue 3, March-2018
215
ISSN 2229-5518

Fiddle with Stratum Pattern-Based Personal Identification System

Mrs.V.Venmathi
Assistant Proffessor
Dept. of Electronics and Communication Engineering
SNS College of Engineering
Coimbatore, Tamil Nadu, India
vvenmathi.ece.snsce@gmail.com

Ms. G. Sowmya
Student
Dept. of Electronics and Communication Engineering
SNS College of Engineering
Coimbatore, Tamil Nadu, India
Sowmyaganeshan2919@gmail.com

Ms. K. Sangeetha
Student
Dept. of Electronics and Communication Engineering
SNS College of Engineering
Coimbatore, Tamil Nadu, India
Sangeekaruna97@gmail.com

Mrs. R. Tamilselvi
Student
Dept. of Electronics and Communication Engineering
SNS College of Engineering
Coimbatore, Tamil Nadu, India
Tamilramesh2495@gmail.com

Ms. D. Vishnu Priya
Student
Dept. of Electronics and Communication Engineering
SNS College of Engineering
Coimbatore, Tamil Nadu, India
Vishnupriyad96@gmail.com

***Abstract* – The CMOS camera and IR blaster captures the finger vein of any individual. It can also be used as a security system. In the modern world to fight the high hacking. It searches for matching in the database which is stored in the personal computer. The result will be displayed in the LCD which is interfaced in PIC. The PIC receives the command from the personal computer. The device is designed and tuned to enhance the performance. In this work we introduced Median filter to reduce the noise of the image and CLAHE process to increase the brightness of the image. It gives a low noise image with better visibility of the finger vein. The software tool we used here to detect the finger vein image is MATLAB. The drawback with the fingerprint system is that it can be easily counterfeit, but in the finger vein system, it is highly secured especially for the banking sector.**

Keywords – Finger vein image; median filter; CLAHE filter; illuminance control; sparse representation.

I. INTRODUCTION

In the bio metric trait there are n number of Personal Identification System(PIS) hardware. Earlier, the only high tech unique identification of an individual was fingerprint pattern recognition. However, cracking the finger authentication without a witness is raised in a few places. For example, creating a fake profile of the holder and duplicating the finger print of the respective holder can pass the authentication at that time. So, these types of hacking must be gridlocked permanently. There are many ways to bogus a profile in this current generation. Along with the technology development, the finger print figure is replaced with betterment in recognition by implementing the finger vein acknowledgement. In foregoing article, the finger vein capture was achieved through the self-controlledluminance. Considering that article, we proposed a unique filtering process and enhanced the following parameters like Quality Accuracy, FAR and FRR.The up gradation in the filtering process improves the armour of the device from corruptions and provides faster response. This is achieved by obtaining a Region OfInterest (ROI) from a raw finger vein image and sent to the Median and CLAHE extraction filter. Thereare three sections involved in progress of authentication: image acquisition, pre-processing and matching.

II. THEOREM AUGMENTATION

Math work invented a programming language entitled MATLAB. Initially, algebra programming was done easier. Later on, MATLAB got updated to work both under interactive sessions and as a batch. It includes many library files and software packages. It executes in a smarter way that complex coding gets compiled in a short period of time. MATLAB gets easily interacted with the other programming language as it follows some universal library packages. MATLAB is developed with GUIDE (GUI Development Environment) for graphical charts, waves, etc., It can also provide dynamic change in the graphs.

The elementary image dispensation steps are followed sequentially and universally. The strides are shown below.

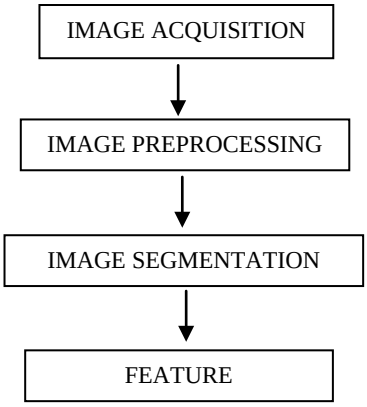

Fig. 1. Typical Process of finger vein identification

a. Image Acquisition

The finger vein image is acquired from the finger vein authentication system. So, it can be passed through whatever processes need to occur afterward. An image acquisition process in image processing is always the first step because without an image no processing is possible. The finger vein image acquired from this acquisition process is unprocessed image; further the image will be undergoing the upcoming processes.

b. Image Pre-processing

In image pre-processing the noise in the image will be reduced and modifying the colour and intensities will be a part of this process.During image acquisition the images will be disturbed by noise. The noise may be due to the illumination or shadows that make Region Of Interest (ROI) appear as a blurred image region.

i. CLAHE Process

CLAHE differs from ordinary adaptive histogram equalization in its contrasting limiting. CLAHE was developed to prevent the over amplification of the noise.

c. Features Extraction

Feature extraction is done to reduce the size of the image. It is also used to solve common computer vision problems such as object detection and recognition, content based image retrieval, face detection and recognition and texture classification. The processed image is given to the personal computer.

i. Line Tracking Method

Detection of moving objects and motion based tracking are important components of many activities. The detection of moving objects uses a background subtraction algorithm based on Gaussian mixture models. Each track keeps count of the number of consecutive frames, where it remained unassigned. If the count exceeds a specified threshold assumes that the object left the field of view and it deletes the track.

ii. Maximum curvature Method

The maximum curvature method is one of the promising methods for finger vein verification. It scans the curvature of the vein image profiles within a finger for feature extraction.

iii. Region of Interest

A region of interest samples within a dataset identified for a particular purpose. ROI is commonly used for medical imaging. It is used in image processing for compressing image with better quality.

d. Accuracy

((Tp+Tn) / (Tp+Fp+Tn+Fn))*100

i. Sensitivity

(Tp/(Tp+Tn))*100

ii. Specificity

(Tn/(Tn+Fn))*100

III. OPERATIONAL METHODOLOGY

A finger vein image is considered as input for demonstration.The CMOS camera captures the image of the finger with the help of IR blaster which is placed in front of CMOS camera. The finger is placed in-between the two devices. The user is prompted to attach the captured image once the program is in run mode.The user manually feeds the captured image into the MATLAB program. The system relatively proceeds occasionally to match with the database stored in the personal computer. Within a minute, it pageants the result whether the user is authorised person or not. The sample raw captured image is shown below.

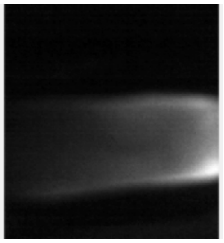

Fig. 2. Captured input image

The median filter removes the noise from the captured image and provides the result of the denoised image. The denoised image is publicized below.

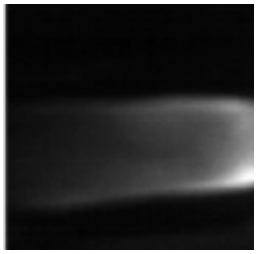

Fig. 3. Median Denoised Image

The median processed image helps in figuring out the finger outline clearly. Followed by CLAHE filter, the histogram graph provides the accurate representation of the distribution of finger vein patterns. The histogram also helps in matching process. The sample histogram graph is shown with respect to the sample raw image.

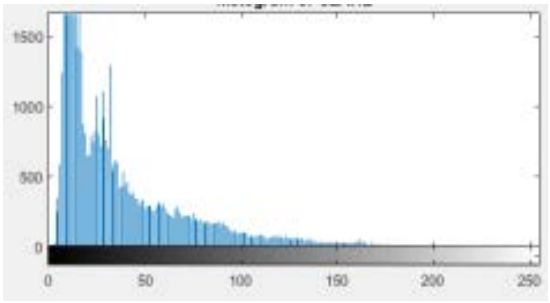

Fig. 4. Histogram of CLAHE

The preprocessed output will be shown in the same window. The output determines whether the individual is an authorised or unauthorised. The illustration preprocessed output image is shown.

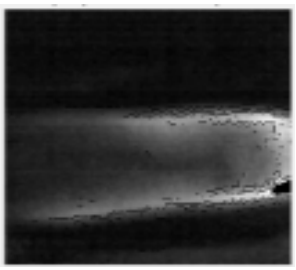

Fig. 5. Pre-processed Sample Output

The source code also generates a window of figures which exhibits the enhanced image, Region Of Interest (ROI) image, maximum curvature method, repeated line tracking method, vein texture output, Gabor filter output. The sample figure is shown below.

Fig. 6. ROI image of raw input

The Gabor filter output provides the frequency and orientation of the finger vein. The demo of Gabor filter output and vein texture is shown below.

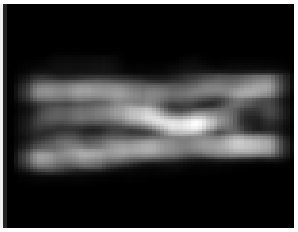

Fig. 7. Gabor filter Output

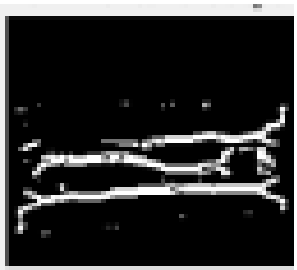

Fig. 8. Vein Texture Output

The above shown figures are the images generated after each sections of filter. The CLAHE and median filter is the alteration introduced in the project which supports and improves the quality of the finger vein pattern.

IV. HARDWARE ENACTMENT

The physical components also assist in the application of security purposes. The hardware plays a major role in vigilant in real time. There are two set of hardware devices which carries respective operation provided from the personal computer. The hardware trail is signified below in the form of block diagram. Initially, the personal computer is armed with the camera application, projected by the finger vein device. In the other hand, Peripheral Interface Controller (PIC) microcontroller is connected with the personal computer through RS232 communication medium. The PIC is programmed to receive information from the personal computer and act according to the customary characters. The hardware components connections are shown below in the form of block diagrams.

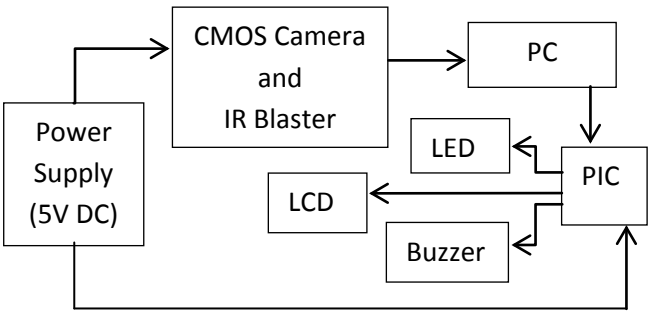

Fig. 9. Circuit illustration

The constant DC power supply of 5V is provided to the IR blaster and PIC micro controller. Once the power supply is fed to the circuit, it executes the initial instructions with the help of some library files and waits for the response from RS232 medium. The LCD display is provided for an easier identification of information. The result computed by the MATLAB, sends the information to the PIC through COM port, where decision is taken by the micro controller. In case of authorised, the LCD display prints “Authorised” and simultaneously green LED is turned ON for 2 seconds. In case of unauthorised access, the LCD display prints as “Unauthorised”, the red LED turns ON and Buzzer sounds for 2 seconds.

In general, the personal computer and MATLAB plays a major part in complete governs of this device. The COM port of the device and personal computer is checked for proper number. The max 232 bridges the PIC micro controller and personal computer.

V. CONCLUSION

The device is built with CLAHE and median filter for a proper brightness and enhancement. Later on, the device will be optimised to work faster and better. In future, the increment in RAM size and processor frequency generates the output at a lesser time. The enrolment and matching program will be attached together in forthcoming updates. The filter can be modified for a better enhancement. The bugs are reduced in this device after a long study and research. The development is under survey for optimization.

VI. REFERENCES

[1] G. Betta, D. Capriglione, M. Corvino, C. Liguori, and A. Paolillo, "Face based recognition algorithms: A first step toward a metrological characterization," IEEE Trans. Instrum. Meas., vol. 62, no. 5,pp. 1008-1016, May 2013.

[2] H. Sellahewa and S. A. Jassim, "Image-quality-based adaptive face Recognition," IEEE Trans. Instrum. Meas., vol. 59, no. 4, pp. 805-813, Apr. 2010.

[3] A. K. Jain, A. Ross, and S. Prabhakar, "An introduction to biometric Recognition," IEEE Trans. Circuits Syst. Video Technol., vol. 14, no. 1, pp. 4-20, Jan. 2004.

[4] T. Matsumoto, H. Matsumoto, K. Yamada, and S. Hoshino, "Impact of Artificial 'gummy' fingers on fingerprint systems," Proc. SPIE, vol. 4677, pp. 275-289, Apr. 2002.

[5] W. D. Jones, "Computerized face-recognition technology is still easily Foiled by cosmetic surgery," in Proc. IEEE Spectr. Blog, 2009. http://spectrum.ieee.org/computing/embedded-systems/computerizedfacerecognition-technology-foiled

[6] F. A. Adesuyi, O. Oluwafemi, A. I. Oludare, A. N. Victor, and A. V. Rick, "Secure authentication for mobile banking using facial recognition," (IOSR-JCE) J. Comput. Eng., vol. 10, no. 3, pp. 51-59, 2013.

[7] K. S. Noh, "A study on the authentication and security of financial settlement using the finger vein technology in wireless internet environment," Wireless Pers. Commun., vol. 89, no. 3, pp. 761-775, 2016.

[8] S. Joardar, A. Chatterjee, and A. Rakshit, "A real-time palm dorsa subcutaneous vein pattern recognition system using collaborative Representation-based classification," IEEE Trans. Instrum. Meas., vol. 64,no. 4, pp. 959-966, Apr. 2015.

[9] A. Kumar and K. V. Prathyusha, "Personal authentication using hand Vein triangulation and knuckle shape," IEEE Trans. Image processes, vol. 18, no. 9, pp. 2127-2136, Sep. 2009.

[10] M. Kono, H. Ueki, and S. Umemura, "Near-infrared finger vein patterns for personal identification," Appl. Opt., vol. 41, pp. 7429-7436, Dec. 2002.