ISSN:2249-5789
Rupesh Pawar et al , International Journal of Computer Science & Communication Networks,Vol 5(2),88-91

BIOMETRIC AUTHENTICATION USING FINGER KNUCKLE

Rupesh Pawar, Beena Ballal, Ashwinkumar Padale, Rohan Sawant and Amar Garje
Vidyalankar Institute of Technology (VIT),
Wadala (India) – 400037
rupesh.pawar@vit.edu.in beena.ballal@vit.edu.in ashwinkumar.padal@vit.edu.in rohan.sawant@vit.edu.in
amar.garje@vit.edu.in

Abstract **-** Finger-knuckle-print is one of the emerging biometric traits. The region of interest is the area where the maximum information is centered, for a finger knuckle it is the area surrounding the knuckle region. In this method we present a novel approach for segmentation of Region of interest (ROI) of a finger-knuckle-print using gradient field orientation & its local field strength. The finger knuckle print refers to the inherent skin patterns that are formed at the joints in the finger back surface. Recently it has been found that the finger knuckle print is highly rich in textures and can be used to uniquely identify a person. This is a new approach for personal authentication using Finger-Knuckle-Print through a novel texture descriptor, Local Directional Pattern (LDP). The image is encoded with Local Directional Pattern, which enhances the information as each pixel is represented as a binary code. The Finger-Knuckle-Print is divided into smaller areas and LDP histograms are extracted from each block, which are used to graphically represent the information.

Keywords— Finger Knuckle, Local Directional Pattern (LDP), Contour extraction, Region of Interest, Minutiae

I. INTRODUCTION

"Finger print Knuckle recognition system" is a smarter way to provide security not only to our home's but also in our daily appliances. A camera system is a type of scanning system which is used to scan the finger print and extract the image. The use of biometrics has become a key component to a person's security. Biometrics deals with the authentication of individuals based on their biological or behavioural characteristics such as fingers, hands, eyes and voice using prints, geometry and pattern recognition.

Finger knuckle has emerged as a promising modality for biometric identification. Patterns extracted from finger knuckle surface have a high discriminative power, because they have more features than palm surface. The line structures on the surfaces are stable and remain unchanged throughout the life of an individual. Human hand-based biometric information is very reliable and can be successfully used for recognizing individuals. Several methods have been suggested for personal authentication using lines on the outer surface of finger.

II. OBJECTIVE

This project proposed a new approach for finger-knuckle-print (FKP) recognition. In traditional FKP recognition systems, the region of interest (ROI) is extracted from the image of the whole hand and the directions of the fingers being imaged are not restricted. The result maybe incorrect because that the shape and surface of the fingers may vary greatly [2].

Moreover, if the direction of the finger being imaged is not restricted, there may be severe rotation transform between intra-class FKPs. To overcome these drawbacks, web develop a new data acquisition scheme as well as an efficient personal authentication named as Finger knuckle recognition system which reduces the error to a great extent because the shape and surface of knuckle remains does not vary so fast as compare to inner finger print of palm.An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it.

III. PROBLEM STATEMENT

A. One of the disadvantage with LBP is that it derives a total of 256 patterns out of which 58 are the Uniform LBP (ULBP) and remaining are Non Uniform LBP (NULBP).The ULBP holds the fundamental characteristic and most of the textures predominantly contain ULBP[5]. The disadvantage with ULBP is one should consider 58 pattern features for any classification or retrieval etc. The ULBP approaches completely ignored the NULBP and grouped them into miscellaneous class. This leads to lot of complexity. So to overcome the disadvantage we have include a technique of LDP. The image is encoded with Local Directional Pattern, which enhances the information as each pixel is represented as a binary code. The Finger-Knuckle-Print is divided into smaller areas and LDP histograms are extracted from each block, which are used to graphically represent the information.

B. Another factor is of **Security** which is a major issue of concern; it becomes necessary to protect our data by implementing such a technique which is not easy to decode by the hacker's. Also Statistics show another major chunk of robbery due to improper way of security system. Even if the thief is trying to hack or decode the system, with the help of this LDP system it may be saved on providing proper security to the system.

IV. BLOCK DIAGRAM

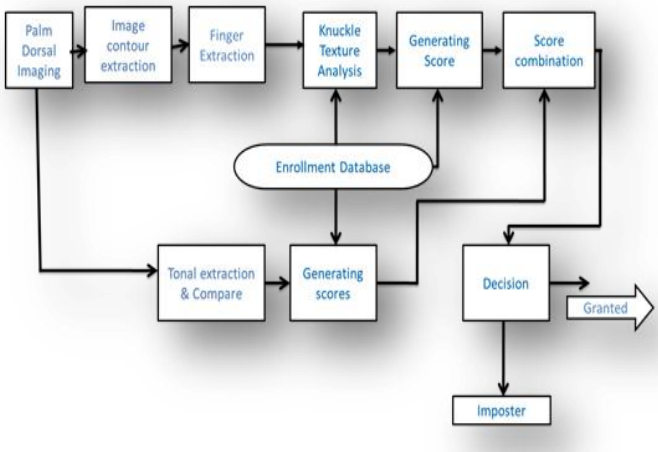


Fig.1 Block diagram of Finger Knuckle system

V. PROPOSED SYSTEM

Finger Knuckle biometric authentication proposed a system which takes into account the above stated problems and provide a solution to it. It consists of two parts· First will be the installation and proper arrangement camera system and second will be studying the analysis using the Matlab code. Data from the camera will be transmitted to the Matlab screen by connecting it to laptop via USB. According to the various parameters we have stored, it will compare the data with the authorized user data in the database and according to that it will do the further process of access and denied.

VI. PRACTICAL SETUP

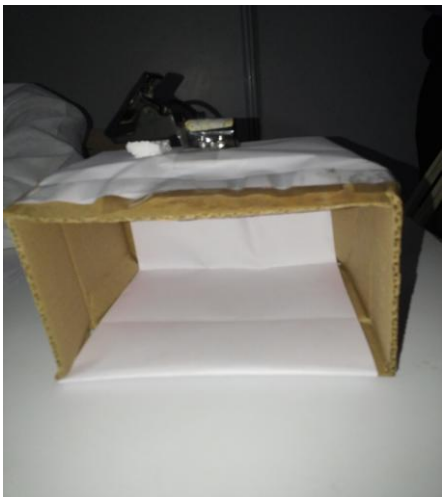


Fig. 2 Practical Setup Front View

Fig. 3 Practical Setup Top View

VII. METHODOLOGY

i. Image Acquisition :

A. An acquisition system has been developed for the collection of finger-back images as there is no public database available to date for such images. A very user-friendly, peg-free imaging system is constructed and shown in figure 2.

B. This imaging system uses a digital camera focused against a white background under uniform illumination. The camera has been set and fixed at a distance of 20 cm from the imaging surface.

C. Non-uniform illumination cast shadows and reflections at the hand boundaries which significantly reduces the performance. Therefore, the image acquisition is uniformly illuminated by a fixed light source above the hand.

D. The resolution of the acquired image is 1600×1200 pixels. Each subject is requested to place the hand on the support with their back hand facing the sensor.

E. The subject can visualize the placement of their hand from the live-feedback on small plasma display. The acquisition of a sample image is shown in figure 2(b). The reason for choosing white background is that the finger back texture is often dark and requires relatively simpler pre-processing as compared to with those images acquired with dark background.

ii. Image Pre-processing:

A. Each of the acquired hand images are firstly subjected to thresholding operation to obtain the binarized image.

B. The resulting binarized image contains small sporadic dots that generate spurious results in the extraction of finger geometry features.

C. These spurious pixels are also observed due to the hairs at the finger boundaries. Therefore morphological erosion operation using a 3 × 3 structuring element is employed on the binarized images to remove sporadic dots.
D. This operation also helps to smoothen the image contour. Then the boundary of the resultant image is extracted using contour tracing figure 3(c).
E. Even after removing small contours, we ensure that correct contour boundary is extracted by employing only the largest possible contour in the image because hand contour is the largest contour.

iii. Finger Extraction:

A. Finger Extraction Block will extract the outlines of fingers from the palm dorsal & another output of Palm dorsal is given to image contour extraction.
B. Through the segmented finger region, the region of interest is located & it will compare with database image for authentication.

VIII. RESULTS

GUI for authentication

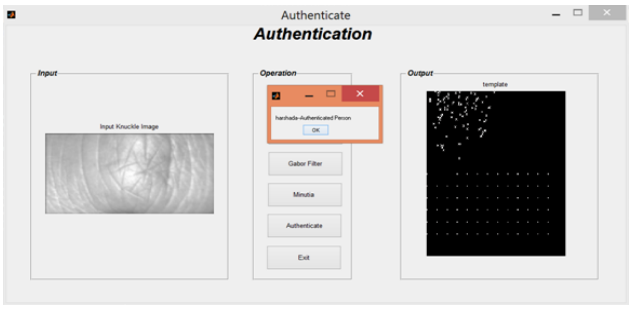


Fig. 4 Valid Authentication Result

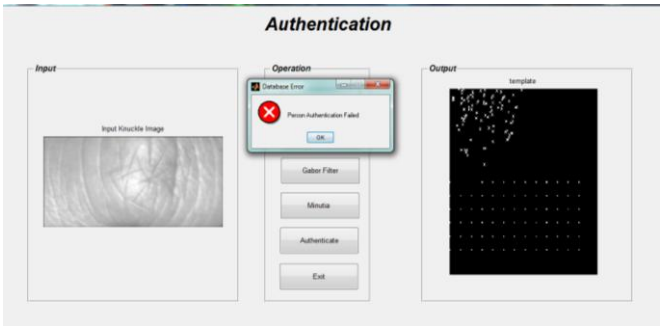
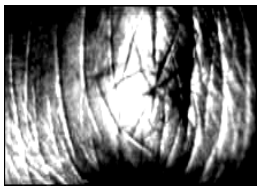


Fig. 5 Invalid Authentication Result

Images in minutia process

Input Image

Normalised image



binarized

minutiae points on input image

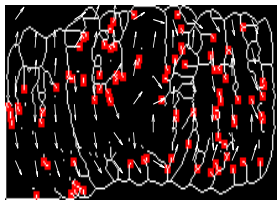


Fig. 6 Minutia Process

IX. HARDWARE REQUIRED

A. Laptop with in built MATLAB SOFTWARE

B. Camera with High resolution

C. Along with chord attaching to the Laptop

D. A Phillips CFL

E. White paper

X. SOFTWARE REQUIRED

MATLAB Software: (Version- v2012b)
Image Acquisition Toolbox.

CONCLUSION

This paper has presented a new approach of Local directional pattern (LDP) for personal authentication using finger knuckle back surface. This system compares the user knuckle with the database knuckle from the captured knuckle by using web camera, the contour part of two images. It has shown the matching percentage as 1 or 100%, if both are perfectly matched. Otherwise the result falls around 80% if both are not matched, which signifies that those two knuckles are of different person and the access get denied.

For higher accuracy, threshold value is set as 95%.

REFERENCES

[1]. http://www4.comp.polyu.edu.hk/~csajaykr/tifs08.pdf, Personal Authentication using Finger Knuckle Surface Ajay Kumar, Ch. Ravikanth. IEEE Transactions on Information Forensics and Security, vol. 4, no. 1, pp. 98-110, March. 2009

[2]. http://worldcompproceedings.com/proc/p2012/IPC3644.pdf, Finger Knuckle Print Based Authentication, Ankur Jain, Richa Gupta, Madasu Hanmandlu

[3]. http://dl.acm.org/citation.cfm?id=2577900.

[4]. http://link.springer.com/chapter/10.1007%2F978-3-642-27872-3_15#close.

[5]. books.google.co.in/books?id=2hQw4HdU8lwC&pg=PA768&lpg=PA768&dq=zhang.

[6]. http://research.ijcaonline.org/volume101/number16/pxc3898836.pdf, Image Retrieval based on LBP Transitions, International Journal of Computer Applications (0975 – 8887) Volume 101– No.16, September 2014.

[7]. http://www.ijcaonline.org/archives/volume98/number18/17283-7641 Finger Knuckle Print Recognition Techniques-A Survey, Esther Rani P , Shanmugalakshmi R 1, Department of Electronics and Communication Engineering, Kalaingar Karunanidihi Institute of Technology, Coimbatore 2. The International Journal Of Engineering And Science (IJES), Volume 2.