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A Review on Touch-less Biometric Fingerprint Authentication

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***Abstract*—** In recent years, there is new technique which has been introduced i.e. touch-less fingerprint authentication system which may replaces the biometric device or scanner which is considered as unhygienic as well as costly. As we know that authentication system possess by a combination of username and password and this combination may be hacked because anyone of your friends or relative may perform brute force attack by guessing your password which may related to your personal details. But fingerprint cannot be stolen or copied that is why fingerprint authentication is the best authentication system. Everyone has distinct fingerprint and no one can authenticate or unauthorized access without your existence. So, on having this feature biometric device or scanner has been introduced in past years and now it is to be replaced by the touch-less fingerprint authentication or recognition system. This recognition can be perform either by webcam or by hand held device i.e. mobile. The purpose of this paper is to review the existing touch-less fingerprint systems and how much they are reliable and effective as compare to their results.

***Keywords*—** Touch-less, Fingerprint, Mobile, Minutiae, Authentication, etc.

I. INTRODUCTION

Biometric fingerprint authentication system contains highest security parameters in the field of identical verification. Everyone has unique fingerprint and no one can steal this identity. Those systems which are based on biometric fingerprint are highly secure as compare to all other security system. There are so many devices have been introduced which may acquire fingerprint either by touch based device or touch-less. This touch-less technique is new one and very promising. This technique is also based on the features extraction as traditional biometric system is. We calculate minutiae and perform verification on that basis. Here Fig. 1.1.1 and Fig. 1.1.2 are example of touch-less fingerprint device as shown in the figure.

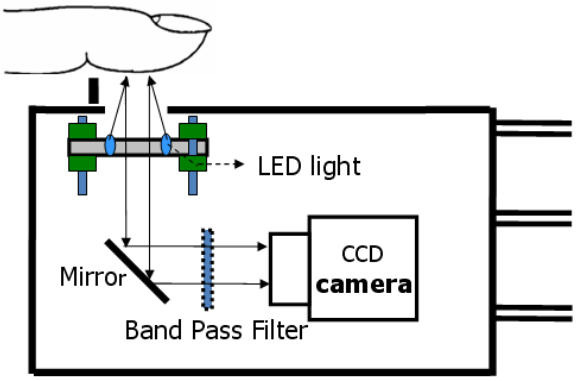


Fig. 1.1 Touch-less Fingerprint System

Fig. 1.2 Touch-less Fingerprint Device

II. RELATED WORK

In [1] paper they proposed a system which is workable with web camera of PC and Laptops. They illustrated biometric fingerprint scanner is costly as well as unhygienic. User will be asked to put your finger in front of webcam and it will get an image of your finger and it will extract minutiae by processing Euclidean space. System removes the spurious minutiae and Euclidean distance has been saved for future matching. But the problem is that the quality of webcam is not good as it can extract fingerprint at all because there is no focus system in webcam as well as there is no stabilization control.

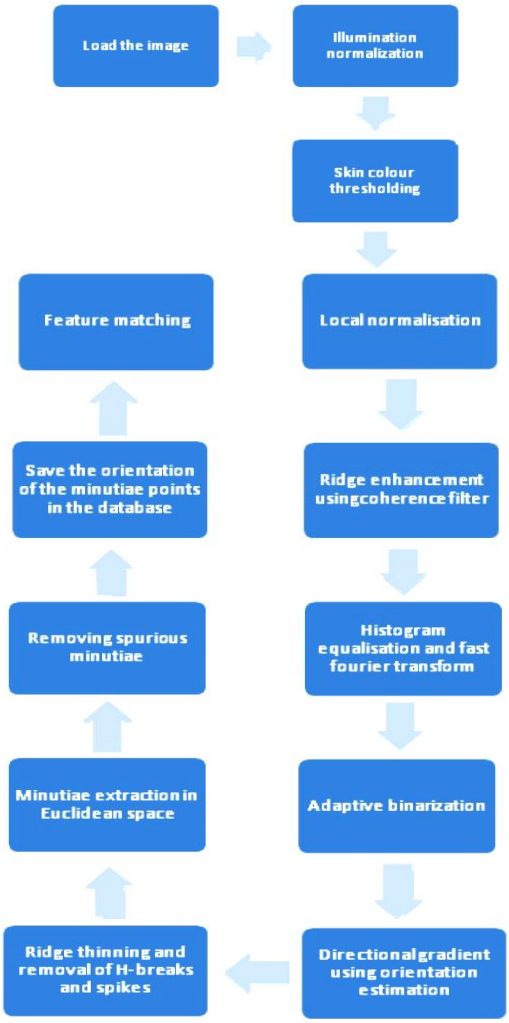


Fig.2.1 Block Diagram of Present System

This system has been implemented in MATLAB image processing toolbox and because of low resolution of image coherence filter with anisotrpic diffusion methods is used. The above block diagram shows how image enhancement has been done and how filter has been used for removing spurious minutiae.

Fig.2.2 shows one user's finger under six different lighting conditions

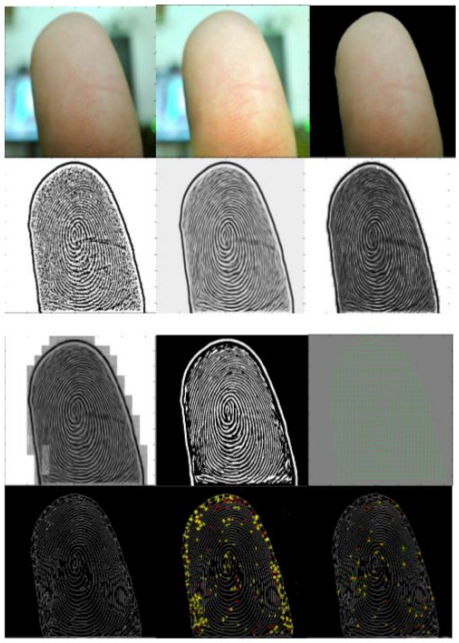


Fig. 2.3 Various stages of the recognition process shown with a sample

In [2] paper they proposed a system which is based on fingerprint authentication system, is has been analyzed that the combination if username and password is often weak because it can be hacked so because of that it has lesser security as compare to biometric fingerprint. Biometric fingerprint is a unique feature and best identity for everyone, so if we go through this biometric authentication system then we provide best security system. But installing a biometric device is also a costly and tough task.

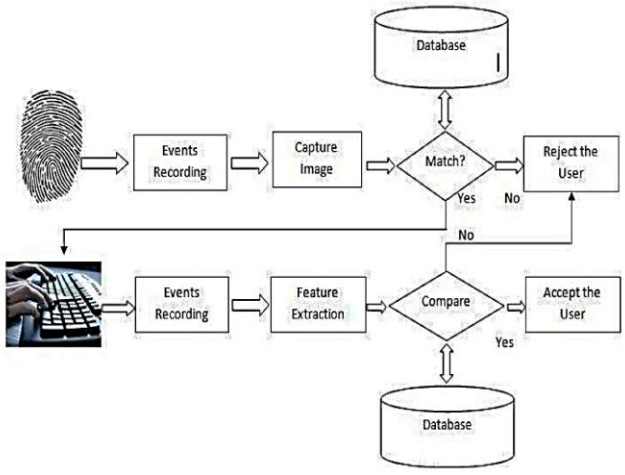


Fig. 2.4 Biometric authentication system using fingerprint and keystroke dynamics

In [3] paper proposed the enhanced technique for touchless fingerprint authentication using MATLAB. They used

histogram equalization and Fourier Transform to enhance the captured image of finger for image enhancement. The target was to improve the quality of image to calculate proper minutiae for fingerprint recognition using camera. But the problem is that sometime image could not be processed due to damaged pixel of an image which generated false recognition.

Fig. 2.5 Original fingerprint Image

Fig. 2.6 Enhanced image after histogram equalization

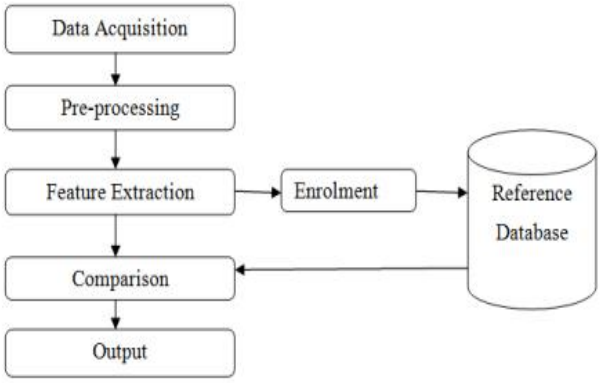


Fig. 2.7 Block Diagram of Present System

The block diagram of present system shows how data has been acquired from the image and it get preprocessed for feature extraction which can be enrolled in database and later it can be compared and respected output will be shown.

In [4] paper also pointed the disadvantage of biometric device and instead of that a fully touch-less fingerprint recognition system has been proposed. 3-D model has been used in this paper to capture the 3-D image of a finger and process that 3-D image for feature extraction. This model improves the recognition and remove the robustness of the image. It has the highest accuracy as compare to the previous all. This paper uses external circuit camera to capture the image as well as LED array for better accuracy.

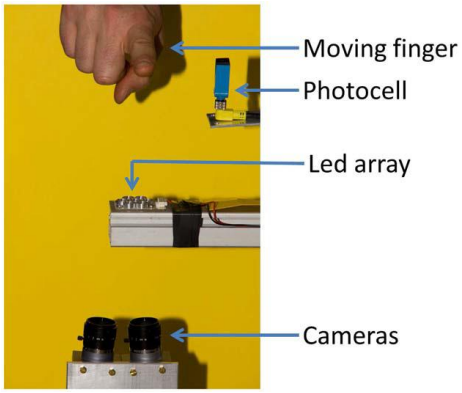


Fig. 2.8 Example of the biometric acquisition process. The acquisition is based on two-view images captured simultaneously during finger movement and without support guides

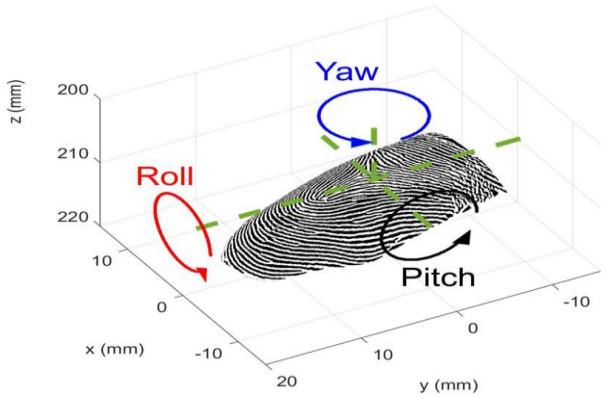


Fig. 2.9 Rotations of the finger with respect to the optical center of Camera

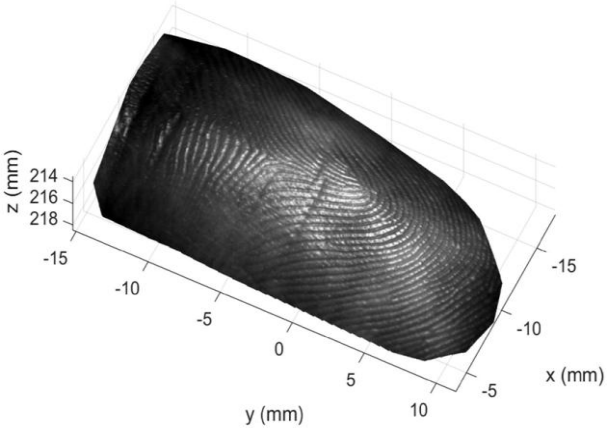
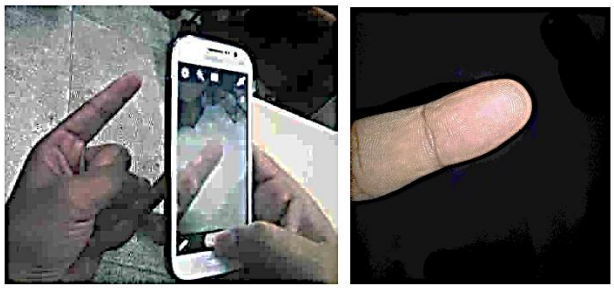


Fig. 2.10Example of a dense 3-D model with a superimposed texture image obtained by the proposed method

In [5] paper they developed a system against biometric scanner because they took an image of finger using hand held device i.e. mobile's camera. User has freedom to put his finger in any direction and camera will get an image of your finger and extracted information from that. It can work with your mobile camera which does not need any external

device. But the problem is that fingerprint is very sensitive and it requires clear image of your finger to extract the minutiae, so it may give false minutiae extraction if image is not clear.



(a) Fingerphoto Acquisition (b) Fingerphoto Image

Fig. 2.11 Finger photo Acquisition

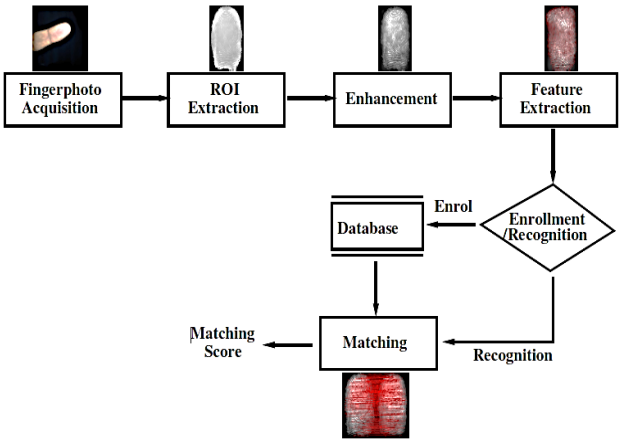


Fig. 2.12 Block Diagram the Proposed System

III. METHODOLOGY

Existing system is not intelligent enough to sense whether the image which is acquiring is appropriate or not at real time. We need a system that increases the camera performance and toke appropriate image of finger through which minutiae can be extracted with highest accuracy. But existing system are based on image processing, it enhances the image after acquisition. That is why these systems are lacking somewhere which is required to overcome.

IV. CONCLUSION AND FUTURE SCOPE

Here, we reviewed certain researches which are based on touch-less fingerprint recognition or authentication system, going to replace the existing biometric device or scanner which is costly. Some of the researches are based on touch-less fingerprint recognition device and some are based on hand held device i.e. mobile. There are so many techniques have been applied in these papers to enhance the image quality for better minutiae extraction. A better minutia produces better result and the current proposed concept of touch-less fingerprint recognition or authentication system get enhanced by improving the real time vision of mobile camera in term of stabilization, autofocus, region of interest etc. We can enhance the system for better accuracy and cost effective.

REFERENCES

[1] R. Lathwal, V.K. Saroha, "*A Study on Biometric Technology and Access Control System: Network Security*", International Journal of Computer Sciences and Engineering, Vol.2, Issue.7, pp.31-35, 2014.

[2] A.K. Bhatia, H. Kaur, "*Security and Privacy in Biometrics: A Review*", International Journal of Scientific Research in Computer Science and Engineering, Vol.1, Issue.2, pp.33-35, 2013.

[3] N. Liu, "*Research and Application of Fingerprint Recognition Based on MATLAB*," The Open Automation and Control Systems Journal, vol. 7, no. 1, pp. 1107–1111, Sep. 2015.

[4] R. Donida Labati, A. Genovese, V. Piuri, and F. Scotti, "*Toward Unconstrained Fingerprint Recognition: A Fully Touchless 3-D System Based on Two Views on the Move*," IEEE Transactions on Systems, Man, and Cybernetics: Systems, vol. 46, no. 2, pp. 202–219, Feb. 2016.

[5] K. Tiwari and P. Gupta, "*A touch-less fingerphoto recognition system for mobile hand-held devices*," 2015 International Conference on Biometrics (ICB), May 2015.

