

Palm Based Recognition System: A Review

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Abstract- There are certain biometric features through which a human can uniquely identified. Some of them are fingerprint, iris, face and palm print. Fingerprint based authentication is more prevalent than the others, but palm print is newly introduced feature through which a system can be introduced that can works like fingerprint authentication system. As the palm of a hand covers more area of skin which contains additional details for comparison and provide more accurate results. In some cases, like investigation of a criminal, use of palm print are more preferable than that of finger prints to maintain detailed database. Use of palm print enables the security system to cross check the identity of a criminal, even if he tries to stupefy the police authority by hiding his finger prints. Various systems are already developed to recognize palm prints and lots of techniques have been developed to extract the features of palm print. Few of them are Local Binary Pattern, Gabor filter, Weber's Local Descriptor and many more. Authentication system based on palm prints can be implemented in both mode either by touch based or touch-less.

Keywords-Palm Print, Authentication, Crease, Touch, Touch-less.

1. INTRODUCTION

Biometric is the computerized use of behavioral individuality to validate and identify a person. Detection of palm print is done by extracting an image from the region of palm of the hand. The unique features contained by a palm are its chief lines, wrinkles and epidermal ridges. It contains information such as surface, indents and marks which can be utilize to spot an individual human being. Palm print recognition system may use scanning devices or a camera to process the image of palm. In the system of palm print verification, feature is taken out from the middle part of the palm image and later that

feature is being match with template stored in the database or a palm image which has been captured at the time of enrollment. There are so many techniques have been proposed till now, let it be more precise in the next section.



Fig. 1.1 Palm Prints [9]

2. LITERATURE SURVEY

S.No.	Author / Title	Publication/Year	Findings
1	Anil Singh Parihar ¹ , Amoy Kumar ² , Om Prakash Verma ³ , Ankita Gupta ⁴ , Prerana Mukherjee ⁵ , and Deepika Vatsa ⁶ / Point Based Features for Contact-less Palmprint Images	IEEE / 2013	They used Harris and SIFT methods to recognize palm print. This system uses only the middle part of a palm for unique crease measurements and later matching with trained database images. This system acquires some false acceptance rate which does not possess good authentication system.
2	Allen George, G.Karthick, Dr.R.Harikumar / An Efficient System for Palm Print Recognition using Ridges	IEEE / 2014	Based on few principal lines which are also known as flexion. Certain principal lines are thenar, hypothenar, and interdigital. This system has 5.7143 FRR (False Rejection Rate) which is very less as it should be. FRR means unauthorized users will not get access. More FRR means system has high proficiency to reject false users.
3	Indrayani Awate and Prof. B.A. Dixit / Palm Print Based Person Identification	IEEE / 2015	Based on Canny edge detection method to detect edges presented on palm. In this system, the image of palm will be preprocessed for the enhancement of the image by the help of morphological technique. This system uses

S.No.	Author / Title	Publication/Year	Findings
			PolyU palmprint database.
4	Gaurav Jaswal, Ravinder Nath, Amit Kaul / Texture based Palm Print Recognition using 2-D Gabor Filter and Sub Space Approaches	IEEE / 2015	Based on texture information extracted from palm by using Gabor filter. In terms of calculating the difference between the images can be calculated by Euclidean distance between them. The accuracy of the system is an average of 83.12 % which is bit lesser.
5	Aishwarya D, Gowri M Saranya R K / Palm Print Recognition Using Liveness Detection Technique	IEEE / 2016	Based on Weber's local descriptor algorithm to extract the information from palm. Euclidean distance formula has been used for calculating false rejection rate as well as false acceptance rate which calculates the accuracy of the system. System follows the principal lines, datum points, wrinkles and ridges.
6	Shivkant Kaushik1, Rajendra Singh2 / A New Hybrid Approach for Palm Print Recognition in PCA Based Palm Print Recognition System	IEEE / 2016	Based on hybrid approach for palm print recognition. Hybrid approach means that there are three image processing techniques have been used to extract the information from palm. This system also uses Gabor filter for preprocessing the data from palm image. In the phase of feature matching K-Nearest Classifier has been used.
7	Shalini Agarwal, Pawan Kumar Verma and Mohd Aamir Khan / An Optimized Palm Print Recognition Approach using Gabor filter	IEEE / 2017	Based on SVM classification method to generate feature vectors and experiment performed on polyU palm print database. This system possesses the ridge lines, wrinkles, principal lines for feature extracting and matching. Gabor filter has also been used for preprocessing the palm image for better outcomes.
8	Srijith Rajeev and Sos Agaian / 3-D Palmprint Modeling for Biometric Verification	IEEE / 2017	Based on 3D depth information, 3-D technologies has made it easier to capture and store 3-D images. This system uses low pass filter for smoothing or denoising the palm print image. System uses 3D ROI instead of 2D ROI for mapping correct region of information that palm contains.

Table No. 2.1 Literature Survey

3. PROBLEM IDENTIFICATION

Among all developed techniques for palm print recognition, most of them rely on Gabor filter for preprocessing palm print images and feature extraction is based on ridge patterns, principal lines, wrinkles, etc. Extracting only dark or principal lines and make comparison on that basis is not effective at the rate of accuracy. Most of the systems contain false acceptance rate which possess system towards failure. Instead of that it requires a system that has no false acceptance rate along with best level of accuracy that can accept only true credentials. Harris and SIFT based method has less accuracy in the field of biometric system where it is mandatory to provide 100 % of false rejection rate with high level of accuracy. This system acquires some false acceptance rate which does not possess good authentication system.

Few systems are based on principal lines such as thenar, hypothenar, and interdigital having 5.7143 FRR (False Rejection Rate) which is very less as it should be. FRR means unauthorized users will not get access. More FRR means system has high proficiency to reject false users.

Some systems are based on Canny edge detection method to detect edges presented on palm which has 91% of precision rate which should be high for better accuracy because if a single user will get access by its fake input then system will become fail.

Gaurav Jaswal, Ravinder Nath, Amit Kaul proposed a system which is based on Gabor filter and the accuracy of the system is an average of 83.12 % which is bit lesser. If true user will be rejected then there is no issue but if unauthorized user will get access then the whole system will become failed.

One of the systems is based on Weber's local descriptor algorithm to extract the information from palm and later compare it with the template which has been stored in the database. Euclidean distance formula has been used for calculating false rejection rate as well as false acceptance rate which calculates the accuracy of the system. System follows the principal lines, datum points, wrinkles and ridges.

Shivkant Kaushik1, Rajendra Singh2 proposes a system which has been proposed in this paper is based on hybrid approach for palm print recognition. In the phase of feature matching K-Nearest Classifier has been used. Accuracy is bit higher as compare to the earlier systems but still has some error rate which trails the system towards failure.

Shalini Agarwal and her team proposed a system which has been proposed in this paper is based on SVM classification method to generate feature vectors and experiment performed on polyU palm print database. Proposed method has 94.52 % of the accuracy which is not enough for better authentication system.

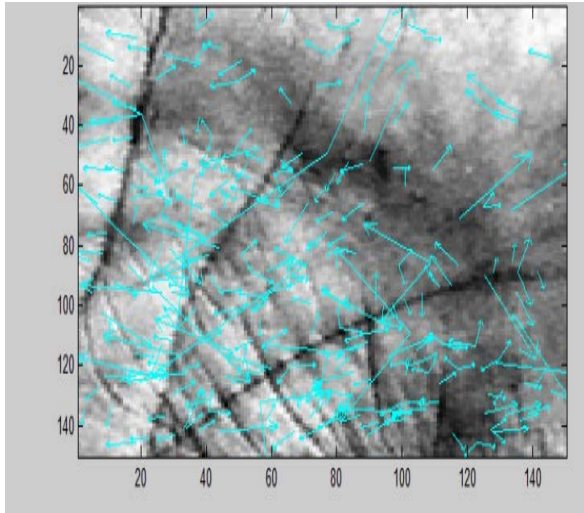


Fig. 3.1 SIFT Method [1]

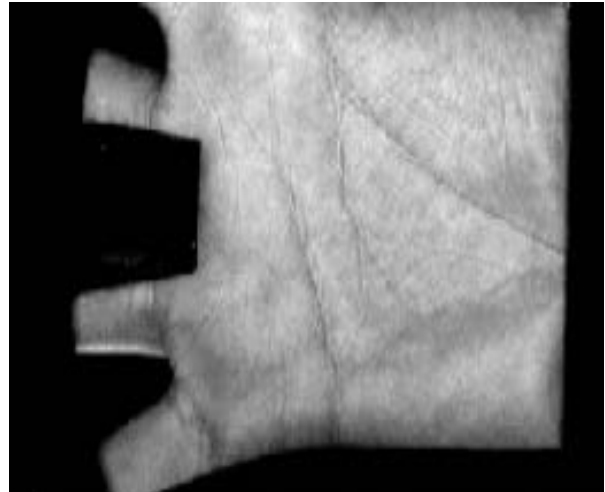


Fig. 3.4 Image of Palm-Print [3]

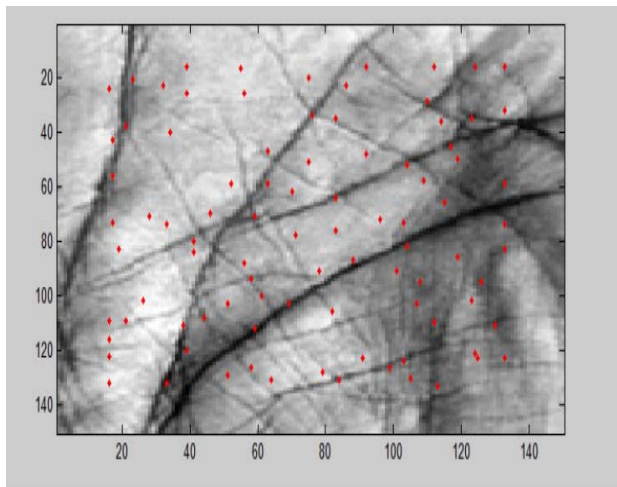


Fig. 3.2 Harris Method [1]



Fig. 3.5 Graphical user Interface for Palm print Recognition [4]

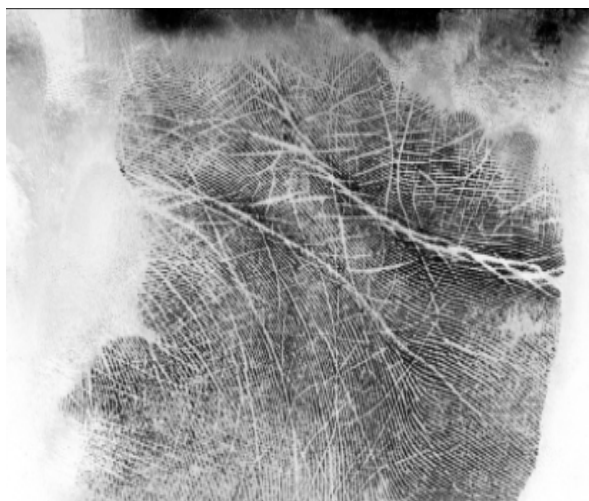


Fig. 3.3 Ridges Present in the Palm [2]

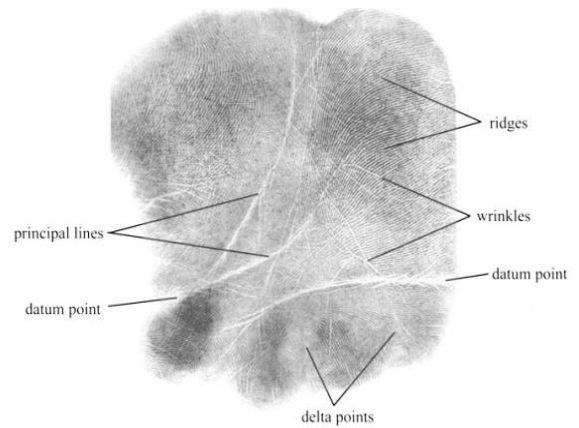


Fig. 3.6 Palm Features [5]

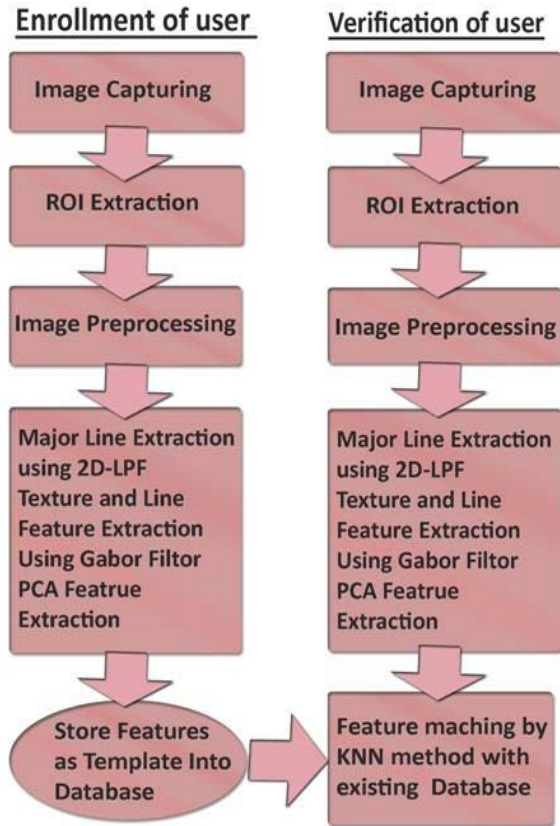


Fig. 3.7 Approach Steps [6]

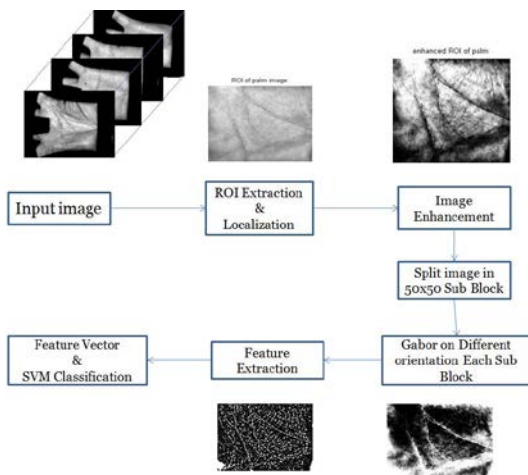


Fig. 3.8 Proposed Methodology to reduce false rejection of palm print [7]

3-D technologies has made it easier to capture and store 3-D images. This system uses low pass filter for smoothing or denoising the palm printing image. System uses 3D ROI instead of 2D ROI for mapping correct region of information that palm contains. This system is based on textural graph of palm print image to exact the features and later comparing it with the samples.

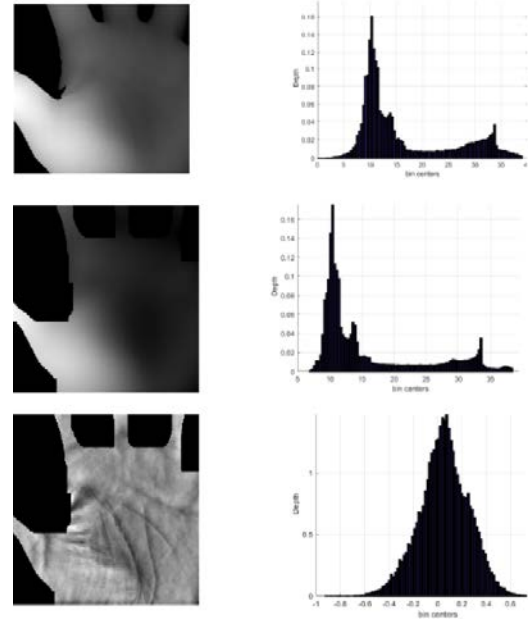


Fig. 3.9 Preprocessing 3D Palm Print [8]

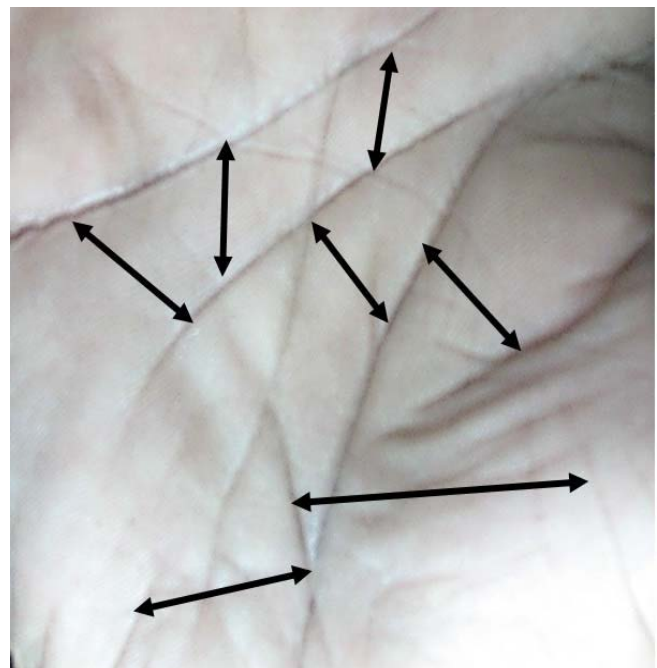


Fig. 3.10 3D Palm Print Euclidean Distance [8]

4. CONCLUSION & FUTURE SCOPE

Thus the survey of all these systems concluded at a point that palm print based authentication now introduced with high level of accuracy but having some error rate which requires overcoming with newly introduced algorithm that does not possess any false acceptance rate. This concept of palm print authentication system can replaces so many systems that are based on fingerprint; it can work with touch-less device which will work more frequently as compare to touch based devices. So, this is the new era of authentication system which provides high level of accuracy.

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