ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 3, Issue 2, pp: (46-50), Month: October 2016 – March 2017, Available at: www.paperpublications.org

3D Palm-print Identification for Faster and More Accurate Matching

[1]Sabeena E.R, [2]Manju C. Thayammal

[1]PG Student, Dept of CSE, [2]Associate Professor, Dept of CSE

Abstract: **A palm-print refers to an image acquired of the palm region of the hand. It can be either online image or offline image. Palm-print contains the information such as texture, and marks which can be used when comparing to one palm to another. Palm-print with larger inner surface of hand contains many features such as principle lines, ridges and textures. Palm-print can be used for person identification and commercial applications with high confidence. 3D palm-print method is used in palm-print identification. Although two-dimensional palm-print identification is accurate, the 2D palm-print images do not have much depth information about the image. The results of three-dimensional palm-print technique have high recognition performance. The three-dimensional palm-print recognition has the capability of avoiding replicas and it is more robust to variations by illumination. The 3D feature is binary and more efficiently computed. It encodes the 3D shape of palm-print to either convex or concave. The 3D palm-print matching used a method for encoding 3D palm-print feature. The state-of -art method is used for online palm-print identification. 3D palm-print uses a new method of feature extraction and Matching. The experimental results are available from contactless and contact-based 3D palm-print databases.**

Keywords: **convex, contactless palm-print matching, encoding, textures, 3D palm-print, 2D palm-print.**

I. INTRODUCTION

A palm-print refers to an image acquired of the palm region of the hand. It can be either an online image or offline image. The palm itself consisting of principal lines, wrinkles and ridges. It differs to a finger print in that it also contains other information such as texture and marks which can be used for comparing one palm to another. Palm-prints can be used for criminal, forensic or commercial applications.

Palm-print matching is a comparison of two given palm-prints and returns either yes or no decision. In palm-print matching two kinds of matching strategies are used.

- One-to-one matching
- One-to-many matching

In one-to-one matching the hamming distance between the codes with same position is returned as the final distance. In one-to-many the code in one template matrix is matched to the neighbourhood of the corresponding code in another matrix and the minimum hamming distance is returned as the final distance.

3D palm-print contains the depth information of the palm surface, while 2D palm-print contains plenty of textures. It uses state-of-art methods. The state-of-art method is used for the highest level of general development of a device, technique achieved at a particular time. The state-of-art method is used for online palm-print identification. The two strategies are

- One-to-one matching
- Binary representation

These two arguments are used to develop a new approach for 2D palm-print reffered to as fast matching. The Ordinal Code, robust line orientation code (RLOC) and the competitive code (Comp Code) can be considered as most competing and state-of-art palm-print identification methods reported in the literature. These methods are highly efficient and suitable for the online palm-print matching and therefore can be considered as competing. During the feature extraction stage, both of the Comp Code and RLOC use six spatial filters to extract dominant texture orientation and generate one feature template. In the matching stage, they use one-to-one matching strategy and one-to-many matching strategy respectively. The feature extraction stage of the Ordinal Code only use two filters to extract feature and for each probe, the processing is repeated three times and therefore three feature templates are generated. In the matching stage, it employs one-to-one matching strategy and the sum of three distances is the final matching distance. These three competing methods using pre-template generation, number of encoding classes for each code and matching strategy. There are two key challenges in accurately matching two palm-print images. The first one is relating to the accurate representation of features which is seriously influenced by the noise introduced on the surface due to sweat, dirt, etc. The other challenge is resulting from inaccurate alignment of matched palm-prints which is mainly contributed from the palm-print deformations due to surface pressure such as stretching, as palm is not a rigid surface.

1.1 A framework for palmprint matching:

In order to comparatively analyse most promising and competing palmprint identification methods in the literature, we firstly present a generalized framework. Assuming that all the palmprint images in the dataset are pre-processed, such as the image normalization and the region of interest segmentation, this framework is generalized to unify feature extraction and matching stage for the palmprint identification. The feature extraction stage consists of pre-template generation followed by their consolidation in encoding stage.

The $T1$, $T2$ . . . describe the intermediate results usually generated by the convolution operation between filters and the pre-processed probe. Encoding of these multiple intermediate results generates the final feature template which can effectively characterize the palmprint image. The encoding operation is usually some kind of voting technique, like max or min operation. The two matching strategies used are (a) One-to-one and (b) one-to-many matching strategy. Supporting Tk represents the max value over other pre-templates, then k is marked as the feature of current position.

The probe template, regarded as feature, is matched to templates generated from the gallery. Each template can be seen as a feature matrix, each entry on the matrix is an encoded feature code. The feature code is generated by voting scheme from several pre-templates. Distance between the two templates is defined as the sum of distance between such codes. There are two kinds of prominent template/feature matching strategy successfully used in the literature, *i.e.* (a) *one-to-one* and (b) *one-to-many* matching strategy. For one-to-one matching strategy, the Hamming distance between the codes with same position is returned as the final distance. For one-to-many matching strategy, the code in one template matrix is matched to the neighbourhood of the corresponding code in another matrix, and the minimum Hamming distance is returned as the final distance.

Table 1.list of Abbreviation

2D	Two Dimensional
3D	Three Dimensional
LCD	Liquid Crystal Display
RLOC	Robust Line Orientation Code
ROI	Region OF Interest

II. RELATED WORK

In two dimensional palm-print identification the images can be easily forged which will threaten the security of palm-print authentication system. Two dimensional images are easily affected by noise such as scrabbling and dirty in the palm. Due to misalignment of matched palm-print the matching time also gets increased [1]. 2D palm-print contains plenty of textures while 3D palm-print contains depth information of the palm surface [3]. The 2D palm-print identification cannot identify the convex and concave images. In order to overcome these drawback three dimensional palm-print identification systems is developed.

ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 3, Issue 2, pp: (46-50), Month: October 2016 – March 2017, Available at: www.paperpublications.org

In the verification experiment, each sample is matched to the other samples to generate genuine score [2]. The comparison between this method and orientation-feature conforms that the proposed method is significantly more accurate, efficient and results in small template size.

III. PROPOSED SYSTEM

One-to-one matching strategy and binary representation of features is expected to be more accurate. In proposed system the state-of-art method is used for online palm-print identification. The goal is to improve the performance of two dimensional palm-print identification. 3D palm-print recognition is more convenient to collect and user friendly. After the 3D depth information of the 3D palm-print is obtained, a sub-area called Region Of Interest (ROI) of the 3D palm-print is extracted. Initially the image is captured by infrared sensor which senses the hand. When the hand is detected multiple light patterns are projected to the palm surface. Pre-processing is very important for the performance of character segmentation. These two methods can also be unified in our general palm-print identification framework.

A. Capturing of image:

The device consists of infrared sensor to sense the hand. When the hand is detected multiple light patterns are projected to the palm surface. The system uses computer controlled LCD projector to generate arbitrary strip pattern. To distinguish between strips they are coded with different brightness. The quality of image produced by ant sensor is determined by the characteristics of the light present at the time of exposure. In order to record color information each pixel needs to be shown one color of light through a filter. Three different coloured filters are used to record and reconstruct the image as red, green, blur. These primary colors of light can be mixed in different quantities to form any other color of light. An array with a pattern of red, green, and blue filters is therefore placed in front of the image sensor to achieve color information.

In the palm-print identification for image acquisition, placed his/her palm and captured an image from a webcam or digital image. In the image, the fingers should be clearly separated from each other in order to obtain complete palm of the individual, and the background should be clean. Ideally the placement of the palm on the surface at verification and enrolment should be identical one, special marking provided on the surface of the finger where palm should be placed. Capturing good image which increase the accuracy. So taking snapshot of image is very important step in this method.

B. Feature extraction:

The process of separating objects of interested from uninterested segment is called segmentation. Partitioning digital image in to multiple segments is called super pixel. It is used to analyse the image. Region of interest is done by intensity value of pixel. It is used to determine the area. The Region of Interest is a subset of samples within a dataset identified for a particular purpose. In binary representation 0's and 1's are used. The 0's are considered as uninterested region and 1's are considered as interested region. Image segmentation is typically used to locate objects and boundaries in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixel with the same label share certain characteristic. There are two types of binary representation.

- Principal line based
- Coding based

Principal line based is used to view only the principal lines. In coding based, the filter called Gobar filter is used. Gobar filter is used to extract the required feature. In this six filters are used to calculate the feature matching. In 3D palm-print identification the principal component analysis is used to split the image. The ordinal code, robust line orientation code (RLOC), competitive code is considered as the palm-print identification methods. For feature extraction feature e, the comp code and RLOC use six spatial filters to extract dominant texture and then generate one feature template. The ordinal code use two filters to extract the feature extraction and the processing is repeated three times. Therefore three feature template is generated. The sum of three distances is the fine distance. The matching strategy used is one-to-one matching.

A lot of translation and rotational information variation observed in contactless images of the palm. So, more stringent pre-processing steps are required to extract the features for stable and aligned ROI. For observing more clearly ROI

ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 3, Issue 2, pp: (46-50), Month: October 2016 – March 2017, Available at: www.paperpublications.org

images a nonlinear enhancement pattern should be obtain and it get from pre-processing steps which is recover a fixed size ROI from the acquired images. Pre-processing is used in different palm-print images and to segment for the feature extraction. In this for extracting the feature on palm of the palm-print Gabor filter is used. With the help of these extracting features some key point on the palm for ROI.

C. Matching and Identification:

The one to one matching strategy is used in this method. Since the feature is binary representation, the Hamming distance is the matching distance between two features.

3D palm-print recognition is more convenient to collect and user friendly. After the 3D depth information of palm is obtained, a sub-area called the Region of Interest (ROI) of the 3D palm-print image is extracted. Initially the image is captured by infrared sensor which senses the hand. When the hand is detected multiple light patterns are projected to the palm surface. The system use computer controlled LCD projector to generate arbitrary strip pattern. In order to distinguish between strips they are coded with different brightness. Pre-processing is very important for the performance of character segmentation. These two methods can also be unified in our general palm-print identification framework. For surface code, one intermediate pre-template related to curvature is firstly generated. The classification strategy is applied on the intermediate result to generate the final feature code. Orientation-feature is exactly same as the Comp Code which introduce in previous section. A unified framework for the palm-print identification and use this framework to argue that (a) one-to-one matching strategy and (b) binary representation of features is more accurate and effective strategies for the palm-print identification. This also provides theoretical justification for the effectiveness of binary features to support the second argument. These two arguments are used to develop a new approach for 2D palm-print matching (referred as to fast matching).

The experimental results also demonstrate other key advantages in addition to improving the matching accuracy, which lies in significantly reduced template size, significantly reduced feature extraction time and the matching time, making it most suitable palm-print matching approach to-date, especially for large scale and online applications. These two arguments are evaluated for the 3D palm-print matching and used to propose a new method of 3D palm-print feature extraction and matching.

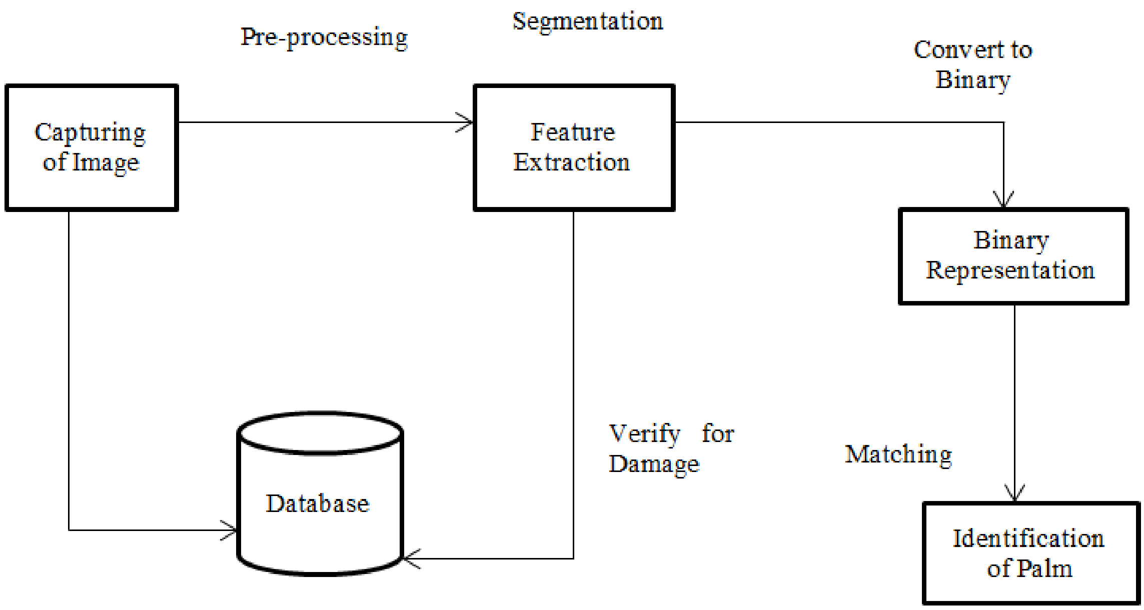

Fig.1.Architecture diagram

The Fig.1 explains the system architecture of palm-print identification. The palm-print image is captured using the sensor contained device. Using pre-processing technique the noise is removed. The image is segmented to extract the feature and finally the palm-print matching is identified.

ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 3, Issue 2, pp: (46-50), Month: October 2016 – March 2017, Available at: www.paperpublications.org

IV. CONCLUSION

The paper presented a general framework for 2D and 3D palm-print recognition. Several state-of-art 2D and 3D palm-print identification methods can be unified into this framework. This framework is used to introduce two arguments for palm-print matching. The statistical model analysis and the experimental results on several publicly available 2D palm-print databases have been employed to support these two arguments. Our proposed methods not only achieves superior performance but also results in significantly reduced template size, the feature extraction time and the matching time. These also validate these two arguments for the 3D palm-print database and use them to develop a novel 3D palm-print feature representation. The experimental results on two publicly available contactless and contact-based databases suggest the proposed method is significantly faster, more accurate and results in the least template size. However it is not difficult to observe that our method of 3D palm-print identification is more accurate and also significantly faster which is primarily due to the simplicity of the feature extractor. One-to-one matching strategy is employed on both of these methods.

Advantages:

- It reduces the template size.
- One-to-one matching strategy not only achieves superior matching accuracy but also significantly reduces the computation time.
- It contains depth information.

Disadvantages:

- It is difficult to extract the feature of 3D image accurately.
- It cannot be accurately perform the matching process for 3D image
- It cannot be reduce the template size.

REFERENCES

[1] W. Jia, D.-S. Huang, and D. Zhang, "palmprint verification based on robust line orientation code", pattern recognit., vol. 31, no. 5, pp.1504-1513, may 2008.

[2] A.Kumar and D.Zhang, "Hand geometry recognition using entropy-based discretization," IEEE Trans. Inf. Forensics security, vol. 2,no. 2,pp. 181-187, jun.2007.

[3] W. Li, L. Zhang, and D. Zhang, "Three Dimensional palmprint recognition", in proc. IEEE int. Conf. Syst., Man Cybern., oct. 2009,pp.4847-4852.

[4] Z.Sun, T.Tan, Y.Wang, and S. Z. Li, "ordinal palmprint representation for personal identification [representation read representation]," in proc. IEEE Comput. soc. Conf. Comput. Vis. Pattern Recognit., vol. 1. Jun. 2005, pp.279-284.

[5] L.Zhang, Y.Shen, H. Li, and J. lu,"3D palmprint identification using block-wise features and collaborative representation," IEEE Trans. pattern Anal. Mach. Intell.,vol. 37, no.8, pp.1730- 1736, Aug.2015.