**Review Article** 

**Dental Or Forensic Dentistry** 



## PALM PRINTS 'LINES DO TELL'- AN INNOVATING PARAPHERNALIA AS BIOMETRIC AUTHENTICATION

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ABSTRACT Authentication in personal identification using palm print method provides valuable evidence in one's identification. It has been investigated over years by different methods employed by both high resolution images which are further processed by different computerized techniques and software systems and low resolution images which have attracted many researchers attention. This paper proposes a brief introduction about palm prints its different methods employed and the current classification system which is less time consuming followed for research to be carried out for biometric authentication and scientific evidences which is useful for civil and commercial applications.

# KEYWORDS : authentication, palm print, identification, images, biometric, resolution

## INTRODUCTION

The term 'forensic' means 'court of law'. Forensic Dentistry is defined as a branch of dentistry that in the interest of justice deals with the proper handling and examination of dental evidence and proper evaluation and presentation of dental findings.<sup>1</sup> Forensic odontology has always being a key role in crime investigations, mass disaster, victims from fire and accidents like motor vehicles. There are various methods which are employed in forensic odontology such as cheiloscopy, bitemarks, rugoscopy, radiographs, photographic study, tooth prints and molecular methods<sup>2</sup> both manually as well as in individual specific digitalized systems in today's era. One of the upcoming innovative tool is Palm print which is also showing significant importance unlike other parameters in forensic odontology as a biometric authentication.

Biometric refers to in Greek 'bios' means life, 'metron' means measure, Authentication is the act of establishing or confirming something as authentic that is it is made about a thing to be true.<sup>3</sup> Biometric is a technology of analyzing and measuring biological data by using this technique a person's identity could be determined without any knowledge.<sup>4</sup>

#### PALM PRINT

Personal Authentication is the key to reliability and security in today's society.<sup>5</sup> Palm print is relatively added as a new biometric feature and one of the reliable physiological characteristic that can be used to discriminate between individuals.<sup>6</sup> Palm is the inner surface of the hand between the wrist and fingers.<sup>7</sup> It is defined as a print on a palm which is mainly composed of palm lines (principal lines) and ridges.

Principle lines are defined according to their position and thickness:  $^{\rm 8}$ 

- Heart line
- Head line
- Life Line

The ridges on the palmar surface develop in utero during first and second trimester of pregnancy. The flows and patterns which emerge on the palm is the result of growth stresses and strains on the skin surface at the time of development of friction ridge as a result the resulting patterns is displayed on the palms due to growth stresses and size and shape of volar pads.<sup>9</sup> Palm prints can be taken in to consideration as one of the reliable means of distinguishing a man from his fellows because of its uniqueness and stability.<sup>7</sup> It differs in identical twins, different geological position, nationality, gender and age which can be used as an outstanding investigation for identification of an individual.<sup>11,12</sup>

## PALM PRINT TRAIT

- Palm print image consist of information such as the ridges and palm lines which can ensure recognition accuracy.
- Authenticity of an identity at a low cost.
- No requirement of any personal information.
- Easily captured low resolution images.
- Prints can be used for various study and research purposes.
- Non-invasive procedure.
- Suitable for forensic applications such as criminal detection, personal identification of missing person or culprits hiding their identity.
- Impossible to fake.
- Unique do not change during life time of a person.
- Has larger surface area so details can be easily obtained.
- Palm prints include other features like palmar flexion creases, tri radius these feature points are extracted from online palm print images of palm lines for verification used as high resolution images.
- Researchers utilize different types of sensors to collect palm print images like CCD based palm print scanners, digital cameras, digital scanners and video cameras.<sup>11-15</sup>

## METHODS ON LITERATURE BASED SURVEY

- Extraction of some feature points on palm lines from offline palm print images for verification purposes.  $^{\rm 16}$
- Use of 2-D Gabor filters to extract texture features and employed these features to an online palm print recognition systems.<sup>17</sup>
- Use of Sobel and morphological operations to extract from palm prints line like features.  $^{^{18}}\,$
- High quality acquisition device which collects largest contactless palm print image database and proposed collaborative representation compcode (CR\_Compcode) for print recognition.<sup>19</sup>
- Gabor Amplitude Phase model and Adaboost algorithm for palm print representation.  $^{\mbox{\tiny 20}}$
- 3D images are extracted by means of Gaussian curvature image to establish palm print data sets by structured light imaging methods.<sup>21</sup>
- High resolution images up to 400dpi or more includes two
  methods for recognition minutiae based and regional

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fusion based method. Images are captured by acquisition module which is then fed in to recognition module for authentication further which includes stages like preprocessing, feature extraction, template extraction and matching database.

All of these authentication methods require that the input should be matched against available number of prints in data base which is too many in number and time consuming.<sup>13,14</sup>

Recent researches are now done in low resolution images of 150 dpi or less that generally extract principal lines and also helpful for commercial and civil applications.<sup>11</sup>Avoiding such computational complexity which is too high practically and time consuming Wu et al <sup>8</sup> classified algorithm of low resolution palm prints using principal lines and number of their intersections which has attracted many researchers attention and is the focus of the paper.



Fig. 1 (A)



Fig. 1 (B)



Fig. 1 (C)



Fig. 1 (D)



Fig. 1 (E)



It has been classified in to six categories.8

**Category** 1: Palmprints composed of no more than one principal line (Fig.1A)

**Category 2**: Palmprints composed of two principal lines and no intersection (Fig.1B)

**Category 3**: Palmprints composed of two principal lines and one intersection (Fig.1C)

Category 4: Palmprints composed of three principal lines and no intersection (Fig.1D)

Category 5: Palmprints composed of three principal lines and one intersection (Fig.1E)

**Category 6**: Palmprints composed of three principal lines and more than one intersection (Fig.1F)

#### CONCLUSION

In today's era there is various frame work in forensic odontology for individual identification and authentication unlike other parameters palm prints is playing a principal role. This paper is composed of a review on computational complexity and low resolution image processing method which is acquiring many researchers attention as a biometric tool in personal authentication.

### REFERENCES

- Balachander N, Babu Aravindha N, Jimson S, Priyadharsini C, Masthan K M K. Evolution of forensic odontology: An overview. J Pharm Bioallied Sci. 2015; 7:176–180.
- Kavitha B, Einstein A, Sivapathasundharam B, Saraswathi TR. Limitations in forensic odontology. Journal of Forensic Dental Sciences 2009;1:8-10
   Bhattacharaya D, Ranjam B, Alisherov F, Choi M, Biometric Authentication: A
- Bhattacharyya D, Ranjan R, Alisherov F, Choi M. Biometric Authentication: A Review. International Journal of u- and e- Service, Science and Technology 2009;2:13-27
- R Malathi, R Jeberson. An Integrated Approach of Physical Biometric Authentication System. Procedia Computer Science 2016;85: 820-826
- Chauhan A, Gandhi R. Role of Latent Palm Prints Present on Documents in Establishment of Individuality. Int J Cur Res Rev 2018;10:11-15
- Debta FM, Debta P, Bhuyan R, Swain SK, Sahu MC, Siddhartha S. Heritability and correlation of lip print, palm print, fingerprint pattern and blood group in twin population. J Oral Maxillofac Pathol 2018;22:451-457
- Shu W, Rong G, Bian Z. Automatic Palmprint Verification. International Journal of Image and Graphics 2001;1:135–151
- Wu X, Zhang D, Wanga K, Huanga BO. Palmprint classication using principal lines. Pattern Recognition 2004;37:1987-1998
- Maceo A, Carter M, Stromback B. Palm Prints. Encyclopedia of Forensic Sciences.2013;4:29-36
- Kong A, Zhang D, Kamel M. A survey of palmprint recognition. Pattern Recognition 2009;42:1408-1418
- Chauhan A. Latent Palm Prints- an Appraisal of Concealed individualize Evidence and Its Aspect in Forensic Investigation. J Forensic Sci & Criminal Inves. 2017;6:1-3
- Zhong D, Du X, Zhong K. Decade progress of palmprint recognition : A brief survey Neurocomputing 2018;1-13
   Fang Li, Leung M, Shikhare T, Chan V, Choon K. Palmprint Classification ,
- Fang Li, Leung M, Shikhare T, Chan V, Choon K. Palmprint Classification, IEEE International Conference on Systems, Man and Cybernetics 2006
- Rekha V, Sunil S, Rathy R. Heritability and Correlation of Lip Prints and Palmprints in South Kerala Population. Oral Maxillofac Pathol J 2015;6:544-549
- Duta N, Jain A, Mardia K. Matching of Palmprint, Pattern Recogn. Lett.2002; 23:477–485.
- Zhang D, Kong W, You J, Wong M. Online Palmprint Identification, IEEE Trans. Pattern Anal. Mach. Intell 2003;25:1041–1050
- Han C, Cheng H, Lin C, Fan K, Personal authentication using palm-print features. Pattern Recognition 2003;36: 371–381
- Zhang L, Li, L, Yang A, Shen Y, Yang M. Towards contactless palmprint recognition: a novel device, a new benchmark and a collaborative representation based identification approach. Pattern Recognition 2017; 69: 199-212
- JuFu F, ChongJin L, Han W, Bing S. High resolution palm print minutiae extraction based on Gabor feature. Sci. China-Inf. Sci. 2014;57:1-15
- Zhang D, Lu G, Zhang L, Luo N. Palmprint recognition using 3-D information, IEEE Trans.Syst.Man Cybern. Part C-Appl. Rev.2009; 39: 505-519

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Fig. 1 (F)