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STUDY OF DIFFERENT TECHNIQUES FOR HUMAN IDENTIFICATION USING FINGER KNUCKLE APPROACH

Supreet Kaur, Sanjna Singla***

***Department of Computer Science and Engineering,*
Punjabi University Regional Centre for Information Technology and Management, Mohali, Punjab, India
**Department of Computer Science and Engineering,*
Punjabi University Regional Centre for Information Technology and Management, Mohali, Punjab, India

Abstract: There are different biometric modalities used to identify person which includes palmprint, face, fingerprint, iris and hand geometry. Apart from these biometric modalities, finger knuckle print also used as one of the cost effective biometric identifier. Finger knuckle print is defined by the back side of fingers. On the back side of fingers there are three joints named as Metacarpophalangeal (MCP) joint, Proximal InterPhalangeal (PIP) joint, distal InterPhalangeal (DIP) joint. The joint which connects hand with the fingers is known as MCP joint and the pattern generated on MCP joint is referred as second minor finger knuckle print. The joint in the middle of finger is known as PIP joint and the pattern generated on this joint is referred as major finger knuckle print. The joint on the tip of finger is known as DIP joint and the pattern generated on this joint is referred as minor finger knuckle print.

Keywords: matching, biometrics, knuckles, accuracy.

I. INTRODUCTION

Biometric features are used to recognize the individual's identity by using different characteristics of person. These features remain consistent during person whole life. There are different biometric modalities used to identify person which includes palmprint, face, fingerprint, iris and hand geometry. Apart from these biometric modalities, finger knuckle print also used as one of the cost effective biometric identifier. Finger knuckle print is defined by the back side of fingers. On the back side of fingers there are three joints named as Metacarpophalangeal (MCP) joint, Proximal InterPhalangeal (PIP) joint, distal InterPhalangeal (DIP) joint. The joint which connects hand with the fingers is known as MCP joint and the pattern generated on MCP joint is referred as second minor finger knuckle print. The joint in the middle of finger is known as PIP joint and the pattern generated on this joint is referred as major finger knuckle print. The joint on the tip of finger is known as DIP joint and the pattern generated on this joint is referred as minor finger knuckle print. There are situations exist like in forensic imaging and on the scene of offence when second minor finger knuckle print can only be used as a biometric identifier. Until now, less work has been done for second minor finger knuckle print recognition and also less accuracy has been achieved. As benefits of this biometric identifier, the efficient work needs to be done so this work will focus on identify the humans by using second minor finger knuckle patterns.

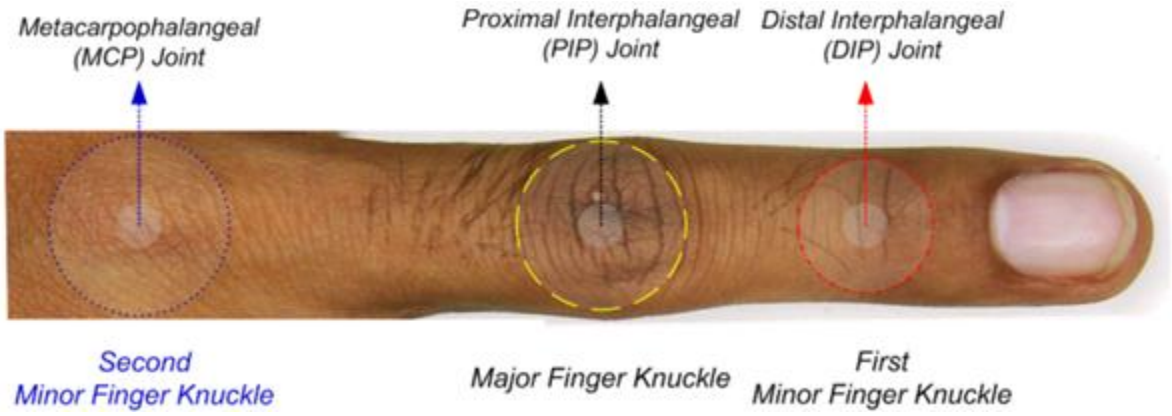

Figure 1: Sample finger dorsal image[1]

II. LITERATURE SURVEY

Kumar and Z. Xu [1] has explored the possibility of using second minor finger knuckle patterns to identify humans. The patterns formed on Metacarpophalangeal (MCP) joint are referred as second minor finger knuckle patterns. The feature extraction and matching has been done using three different techniques band limited phase only correlation, local radon transform and ordinal representation. This paper evaluated the 80% accuracy over middle finger knuckle pattern with band limited phase only correlation.

L. Zhang, L. Zhang, D. Zhang et al. [2] have presented an effective approach by combining local and global features of finger knuckle print to identify humans. The orientation information extracted by the Gabor filters was taken as the local feature. Then scale of Gabor filter is increased to infinity to achieve Fourier transform of image. The Fourier transform coefficients are used as global features and matching distance of two finger knuckle pattern is a weighted average of local and global matching distances.

A. Kumar [3] has investigated the pattern generated on Distal InterPhalangeal (DIP) joint referred as minor finger knuckle print. The results are generated by using different feature extraction and matching methods which includes local binary patterns, improved local binary patterns and 1D log Gabor filter.

Kumar and C. Ravikanth [4] has simultaneously extracted the finger knuckle texture and geometrical features. The problem of finger rings and changing hand position are successfully investigated. The efficient results are obtained by fusion of different techniques as principal component analysis (PCA), linear discriminant analysis (LDA) and independent component analysis (ICA).

L. Zhang et al. [5] have constructed the device for the acquisition of finger knuckle images. For the feature extraction and representation of finger knuckles, orientation information is extracted by using Gabor filter.

A. Kumar and Y. Zhou [6] has proposed the simultaneous acquisition of finger veins and low resolution finger print images have been performed. Using the webcam and near infrared imaging (NIR) setup finger texture and finger veins are simultaneously achieved. This paper integrates the two score level approaches that are holistic and nonlinear fusion.

E. S. Shameem Sulthana1 and S. Kanmani [7] has presented the scale invariant feature transform (SIFT) as feature descriptor. The proposed work has shown the improved performance on the issue of storage and computational cost involved in SIFT with FKP based authentication.

K. Usha and M. Ezhilarasan [8] has proposed a new method for recognition of finger knuckle pattern which is based on geometric and texture feature analysis. The oriented features are extracted from geometric analysis and texture feature analysis is done by Curvelet transforms and principal component analysis.

Mahesh Kumar, N.B. and K. Premalatha [9] has extracted the local features from finger knuckle print by using symmetric discrete orthonormal stockwell transform (SDOST) and then scale of SDOST is increased to infinity to obtain Fourier transform coefficients which is taken as global information.

Muzhir Shaban Al-Ani, Maha Abd Rajab [10] has proposed the identification of humans by using fingerprint**.** Biometrics is used for identification of individuals based on their physical or behavioural characteristics. Biometrics has gained importance in today's world where information security is essential. Hand geometry is one of the most well-known biometrics that implemented in many verification systems with various feature extraction methods. Hand biometrics are extensively used for personal authentication. This paper is implemented to compute features extraction using two dimensional discrete cosine transform (2D-DCT). The evaluation of the system performance is calculated using matching metrics correlation.

CONCLUSION

After the survey it has been found that there are various techniques exist for biometrics to authenticate person identity. Also sufficient work has been done on different biometric modalities except on second minor finger knuckle print. By considering the benefits of second minor finger knuckle pattern like in forensic imaging further this work can be extended.

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