

A Survey of Multispectral Palmprint Identification Techniques

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Abstract- *The palmprint is physiological biometric widely used for identification of individuals. Multispectral palmprint systems are good solution because it can provides more discriminative information for person identification. Multispectral palmprint identification systems for large database and used for protecting palmprint system and users privacy. This paper reviews to the palmprint identification methods for palmprint image acquisition, preprocessing, palmprint related fusions, feature extraction and feature matching.*

Keywords- Multispectral, Palmprint identification, Image acquisition, Fusion, Feature extraction, Feature matching.

1. Introduction

The Biometric identification is the method of identify the person by using the human's characteristics. The biometric technology is used to measure the two types of characteristics are physiological characteristics and behavioral characteristics. Behavioral characteristics measure the behavior, mood and action produced by human such as signature, sound, posture, voice, keystroke etc. Physiological characteristics measure human body parts of the person which are unique such as fingerprint, face, iris, palmprint, retina etc [v]. The palmprint biometric has more advantages than other types of biometric system. The palmprint identification device costs lesser than the iris recognition device. The palmprint biometric system more accurate than fingerprint biometric system. The palmprint biometric system more acceptable than face recognition system [vi]. The palmprint has following characteristics:

- Uniqueness
- Reliability
- Security
- Performance

There are four stages of typical palmprint identification system. They are as follows

- Image Acquisition
- Preprocessing
- Feature Extraction and matching
- Fusion

In image acquisition, collect palmprint images. The image preprocessing is consider two important parts, palmprint image align and region of interest of palmprint for feature extraction. In feature extraction stage extract the feature from the preprocessed palmprint. In feature matching stage extracted features of

palmprint images are comparing with database stores registered templates [iv].

2. Literature Survey

There has been a growing demand for high accuracy and robust biometric systems in recent years. Numbers of techniques are available till date for palmprint identification, each of which comes with advantages and disadvantages. Few of them are studied here:

Xingpeng Xu and Zhenhua Guo [i] proposed quaternion model is employed for multispectral biometrics system. Multispectral images are sampled by using DWT and PCA is used for features extraction. Features are matched by using Euclidean Distance.

Zhenhua Gout, Lei Zhang and David Zhang [ii] proposed a hyperspectral palmprint image system which is used for correct feature band selection. The (2D) 2PCA is used for feature extraction and select the best feature band.

A. Meraoumia, S. Chitroub, A. Bouridane [iii] proposed multispectral palmprint technology used 1D log Gabor filter for extracting the features and palmprint features are matched by using hamming distance.

D.Zhang, W.K. Kong, J. You and M. Wong [iv] proposed online palmprint identification system which is used 2D Gabor phase for feature extraction and features are matched by using Hamming Distance.

K P Shashikala and K.B. Raja [v] proposed palmprint identification system which is used poly U database, preprocessing is done by applying DWT and DCT. The features are extracted by using QPCA and matched using Euclidean Distance.

3. Methodology

3.1 Image Acquisition:

Palmprint can be collected by using CCD based palmprint scanners, video cameras, Digital cameras and Digital Scanner. CCD-based palmprint scanners capture high quality palmprint images and align palms accurately. Digital and video cameras can be used to collect palmprint images without contact and video cameras can also captured palm images but can cause recognition problems [vii].

3.2 Preprocessing:

Preprocessing is used to collect distortions, align different palmprints, and to crop the region of interest for feature extraction. Preprocessing commonly focuses on five steps

binarizing the palm images, Boundary tracking, Identification of key points, establishing coordination system, extracting the central part. The first two steps are common for any preprocessing algorithm. Third step has different variations such as tangent based, finger based to detect the key points between fingers. The tangent based method considers the edges of two fingers holes on binary image which are to be traced and the common tangent of two fingers holes is found to be axis. The middle point of the two tangent points is defined as the key points for establishing coordinate system [vii].

3.3 Feature Extraction and Matching:

The palmprint images features can be extracted for matches. In palmprint identification, the system identifies an individual by searching the templates of all the users in the database for a match. Identification algorithms are accurate and fast. The feature extraction and matching methods are classified into 4 categories are Line-based, Subspace based, Statistical-based and Coding based [vi].

The line-based approaches either develop edge detectors or employ the existing edge detection methods to extract palm lines. The palm lines are either represented in other format for matching or matched directly [vi].

Sub space based method is also called appearance based approach, generally involve principal component analysis (PCA), Linear discriminant analysis (LDA) and independent component analysis (ICA). The subspace coefficient are considered as features. In addition to applying PCA, LDA and ICA directly to palm print images, researchers also used wavelets, Discrete cosine transform and kernel method [vi].

Statistical approaches are classified into local and global statistical approaches. Local Statistical approaches transforms images into another domain and divide the transform into several small regions. Local statistics such as means and variances of each small region are calculated and regarded as features [vi].

Coding approaches encode the filter coefficient as feature using Gabor filters. Daugman, the inventor of Iris code, has demonstrated that the bitwise hamming distance allows real-time brute force identification in large databases [vi].

3.4 Fusion:

Fusion is a promising approach that may increase the accuracy of systems. Many biometric traits including fingerprint, palm vein, finger surface, face, iris, and hand shape have been combined with palmprints at score level or at representation level. Combining other hand features such as hand geometry and finger surface with palmprints allows these features and palmprints to be extracted from a single hand image. Only one sensor is needed. Researchers have examined various fusion rules including sum, maximum, average, minimum, SVM, neural networks etc. Researchers fuse appearance based, line based and texture based features from palmprints. The fusion

increases accuracy, but it increases computation costs and template sizes and reduces user acceptance [xx].

4. Conclusion

There are number of methods and techniques for palmprint identification, each of which comes with some advantages and disadvantages. In this paper we have studied the various existing methods and techniques used for palmprint identification system. The techniques discussed above are useful for image acquisition, preprocessing, feature extraction, fusion and feature matching. This paper does an extensive survey on the technique to achieve good speed and accuracy.

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