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PALM PRINT RECOGNITION USING SPIHT AND PCA TECHNIQUE

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ABSTRACT:

Biometric identification is the study of physiological and behavioral attributes of an individual to overcome security problems. Palm print recognition is a biometric authentication method based on the unique patterns of various characteristics in the palm of people's hand. In this paper we are going to propose a method for palm print recognition using the similarity of left and right palm print along with the fused image of left and right palm print. Palm print recognition has the advantages of high precision, fast speed, low price, easy to be accepted by users and so on.In our proposed method we are going to implement palm print recognition system based on SPIHT and PCA. Initially SPIHT (Set partitioning in hierarchical trees) decomposition is applied on images to extract spectral features. SVM has been applied for spatial feature extraction.

Keywords:Biometric authentications, feature extraction,palm print recognition.

1. INTRODUCTION:

Biometricsallows a person to be identified and authenticated based on a set of recognizable and verifiable data, which are unique and specific to them. Biometric authentication is a process of comparing data for the person's characteristics to that person's biometric template in order to determine resemblance. The existing techniques are palm print analysis with Eigen palm and Fisher palm, Principle coding method, Sift based identification. But these are only based on spectral domain which doesn't includes spatial features in this techniques. Compare to other biometric technologies, although palm print verification has a much shorter history, it has many advantages over currently available features, such as stable lines, rich texture characteristics, low-resolution imaging, low cost capture devices, easy self –positioning, and user-friendly interface, etc. Thus palm printrecognition is a very interesting research area. A lot of work has already been done in this area, but there is still a lot of scope to make the systems more efficient. Here, we have tried to analyze the already existing systems and thereby propose a new approach.

1.1 WHY BIOMETRIC AUTHENTICATION?

Biometric authentication is a security process that relies on the unique biological characteristics of an individual to verify that he is who is says he is. Biometric authentication systems compare a biometric data capture to stored, confirmed authentic data in a database. Both samples of the biometric data match, authentication is confirmed. Typically, biometric authentication is used to manage access to physical and digital resources such as buildings, rooms and computing devices. In addition to the security provided by hard-to-fake individual

biological traits, the acceptance of biometric verification has also been driven by convenience: One can't easily forget or lose ones biometrics.

1.2 PALM PRINTRECOGNITION:

In recent years, palm print image recognition algorithm is also emerging, such as the recognition algorithm based on line features, the improved finite Radon transform algorithm, the texture-based recognition algorithm, the recognition algorithm based on the directional feature, the sub space-based recognition algorithm, the correlation filter based recognition algorithm, image recognition algorithm based on local descriptors and so on. This has played a great role in the development of palm print recognition. In reality, palm print acquisition device is not perfect. During the acquisition process, it will be disturbed by random factors such as illumination, hand position, posture, dust, humidity, pressure and so on. We need to deal with the palm print image shown in figure 1.1. In our proposed method the palm print recognition system based on SPHIT and PCA. Data base has been created with samples of left and right palm images. The applied Image preprocessing steps are RGB to gray scale conversion, Image resizing, Image enhancement. Initially SPHIT (Set partitioning in hierarchical trees) decomposition is applied on images to extract spectral features. Again SVM has been applied for spatial feature extraction. Then these features are compared with test image's feature using minimum distance classifier.

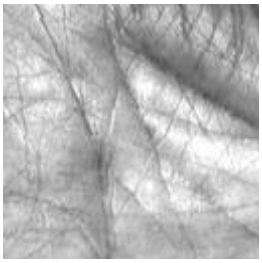


Fig 1.1 palm print image

- Accuracy of recognition is high.
- We concentrate on both spatial and spectral feature for comparison.

2. LITERATURE REVIEW:

[1]PALM PRINTRECOGNITION USING IMAGE PROCESSING

The primary objective of this paper is to present a palm print recognition system using minimum resources. The system is implemented by means of the transforms used in image processing. Palm print recognition is implemented using three algorithms namely Kekre's Fast Codebook Generation (KFCG), Discrete Cosine Transform (DCT) and Fourier Descriptors (FD). The paper also deals with the comparison of these techniques. All images in the data base are converted to gray level images before processing. Thus we have observed that the palm print recognition system can be implemented using various transforms in image processing. Today we are living in the information age, where because of advent of the technology there is a situation like information explosion. Images have giant share in this information. More précised retrieval techniques are needed to access the large image archives being generated, for finding relatively similar images. Here in this paper a novel image

retrieval technique is proposed. We have used KFCG algorithm to generate codebook which is very fast as it does not involve any Euclidian distance computation. This technique for CBIR has far less complexity as compared to using full DCT. The computational complexity of proposed method is 99% less for the image with size of 640x480 compared to full DCT. This results into only 1% time requirement per query image for retrieval, as compared to full DCT. The proposed technique avoids resizing of images for feature extraction, which is necessary in case of applying any transform technique directly on image. Using KFCG the computation time is reduced significantly as compared to DCT and Fourier Descriptors. We have also observed that the overall accuracy increases by making use of the OR logic. This system can be improved in future by implementing it online.

[2] PALM PRINTRECOGNITION SYSTEM

In this paper, several existing palm printrecognition algorithms have been studied and analyzed. A simple approach to preprocessing and ROI extraction has been discussed. The available databases have also been analyzed and the most efficient of all will be used for the development of the proposed system. Several existing methods have been reviewed for palm printrecognition. In the proposed approach, instead of using the whole palm printimage at a time, dominant spectral features have been extracted such as the major lines. This approach helps in increasing the performance and accuracy of the system. A lot of work has to be done with the feature extraction algorithms as well as the matching algorithms. The aim of working on the palm printrecognition system is to develop a system with increased speed and accuracy.

[3] BIOMETRIC PALM PRINTRECOGNITION SYSTEM: A REVIEW

Several existing methods have been reviewed for palm printrecognition. Palm print acquisition using CCD based scanner is recommended. Palm code, fusion code, competitive code and the theory of coding method are recommended. Palm print recognition is an emerging field and only limited works were carried out which paves way for the researchers to invent new methods to reduce the error rates and to improve the accuracy and speed of the system. The future work can be extended to apply gaussianization, the feature normalization method on the high resolution images where multiple features can be extracted.

[4] BIOMETRIC PALM PRINTS FEATURE MATCHING FOR PERSON IDENTIFICATION

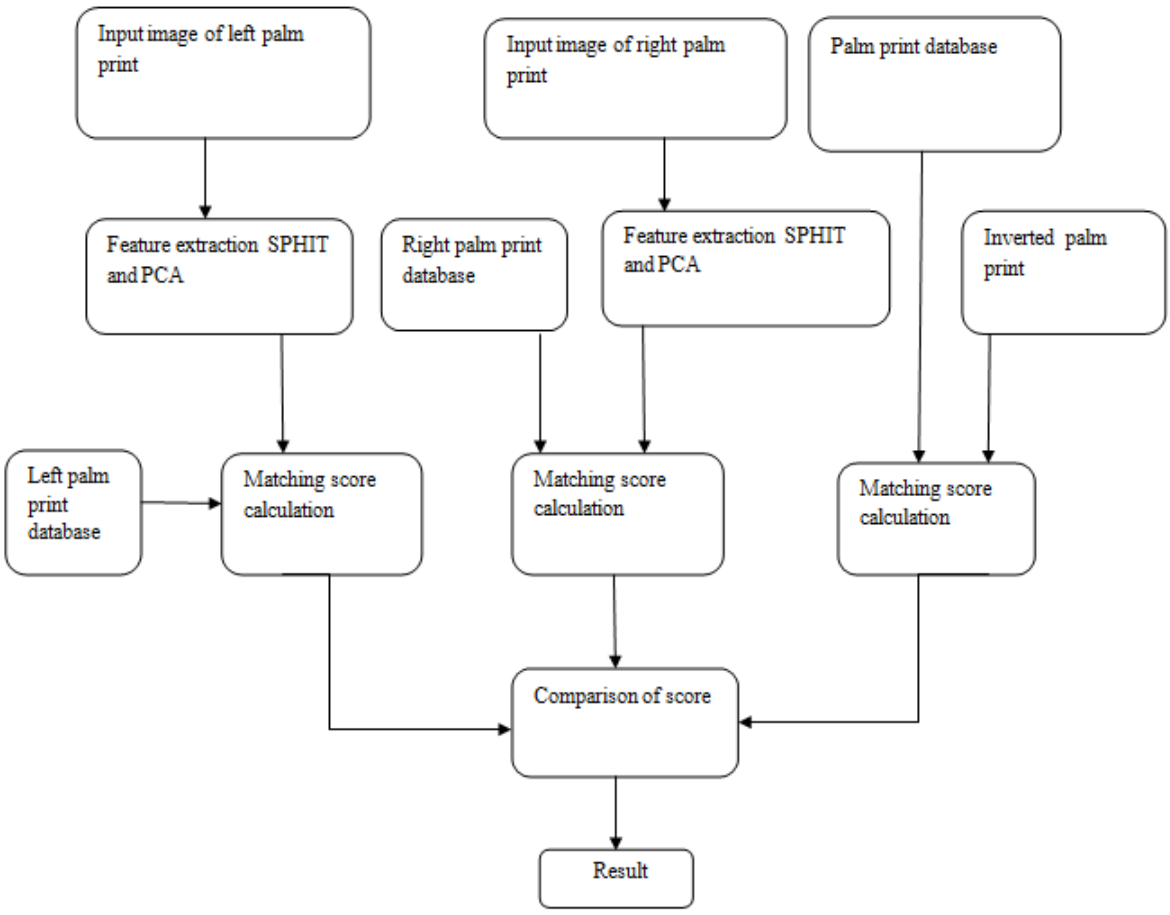
The biometric use of palm prints uses ridge patterns to identify an individual. Palms of hands epidermal ridges, thought to provide a friction surface to assist with gripping an object on surface. Palm print identification systems measure and compare ridges, lines and Minutiae found on the palm. Palm print is a unique and reliable biometric characteristic with high usability. The biometric use of palm prints uses ridge patterns to identify an individual. The introduction is followed by the problem definition; in which general concepts and methods of palm print recognition is introduced. Then some of the palm prints recognition methods and system are introduced. The work discusses about the feature extraction and selection on the basis on the statistical measurements and properties of a palm print image for Biometric Palm print Recognition System. The proposed work discusses about the basic statistical properties of palm print image. The experimental work is performed by

using MATLAB software; a software for image processing. The experiment is carried over the PolyU_2D palm print image database. The statistical values are computed. The statistical property and their values are found to be distinct for the various palm print image sample from PolyU_2D palm print image database and were displayed in table 1.2. By using these values the image sample can be trained and their statistical values can be stored in database. The experimental result shows recognition rate of total success rate of 100% and false acceptance rate and false rejection rate 0%.

[5] A SURVEY OF PALM PRINTRECOGNITION

Our first suggestion is Han's work, which is a very complete work. We especially appreciate his palm printscanner described in this work that can collect images of whole hands and use pegs for hand placement. For verification, we recommend Hennings-Yeomans et al's correlation filter approach. They employ many user-specific techniques to optimize accuracy. For real-time large database identification, Kong's PhD dissertation is our suggestion because it contains PalmCode, Fusion Code and Competitive Code and the theory of coding methods. In addition to Kong's work, we also recommend to read the original IrisCode paper, which is the foundation of all coding methods. For fusion, we do not emphasize on any paper in our 18 list because it is well-known that fusion can improve accuracy. Biometric fusion is in fact an application of information fusion and combined classifiers. Many excellent papers have been published in these two fields. For security, we also do not emphasize on any paper because the literature of palm printsecurity is very small. In face recognition literature, many researchers design algorithms based on prior knowledge of the face. To optimize the recognition performance in terms of speed and accuracy, we expect that more algorithms are designed based on the prior knowledge of palmprints. Different template formats may require different measures for template protection. More research should be put into security and privacy issues. For biometric fusion, the authors recommend combining Iris Code − the commercial iris recognition algorithm and Competitive Code or other coding methods for high-speed large-scale personal identification because these algorithms share a number of important properties (e.g. high speed matching). Even though IrisCode does not accumulate false acceptance rates when the number templates in database increases, its false reject rate still increases. Some issues in using palmprints for personal identification have not been well addressed. For instance, we know that ridges in palmprints are stable for a person's whole life but the stability of principal lines and wrinkles has not been systemically investigated.

3. FUNCTIONAL BLOCK:



3.1 STEPS:

PRE-PROCESSING

Palm images acquired are pre-processed to extract its features. The principal lines are significant and minutiae and textures are used as unique information in forensic. The pre-processing steps involve converting the image to binary, extracting the region of interest and segmenting, key point detection and establishing the coordinating system. The pre-processing can be summarized as

• Low pass Gaussian filter is applied to smoothen the palm image.

• Binaries the palm image with a proper threshold.

• Apply morphological operations

• Trace the boundary of palm image to identify and fix the keyPoints

• Find the orientation of palm image and find the coordinateSystem to crop the region of interest

IMAGE RESTORATION:

Restoration process attempts to reconstruct or recover an image that has been degraded by using prior knowledge of the degradation phenomenon.

IMAGE SEGMENTATION:

Before we extract the information the image has to be subdivided into parts.

IMAGE ENHANCEMENT:

Processes of adjusting digital image so result are more suitable for display or further image analysis.

RECOGNITION:

Process of categorization of given input data to identifiable class using salient feature extracted from data.

4.SPIHT ALGORITHM

The SPIHT algorithm is an efficient algorithm for still image compression. Images decomposed by wavelet transform have self-similarity across levels. This similarity is exploited by SPIHT algorithm to establish Spatial Orientation Trees (SOT).The SPIHT algorithm orders the wavelet coefficients by magnitude and transmits them from the most significant bit (MSB) to the least significant bit (LSB). It partitions the coefficients or the sets of coefficients into significant or insignificant coefficients. Individual significant coefficients are added to the List of Significant Pixels (LSP), and insignificant coefficients to the List of Insignificant Pixels (LIP) while sets of descendant coefficients to the List of Insignificant Sets (LIS). When a LIS entry contains one or more significant pixels for a certain threshold value, it is partitioned into significant pixels, insignificant pixels, and insignificant sets. Whenever the algorithm determines the significance of a coefficient, it produces one bit for the information. The number of bits from significant tests is the same as the number of entries in the LIP and the LIS, and the number of sign bits produced corresponds the number of entries that are added to the LSP. Once a pixel enters the LIP, the pixel generates one bit for every bit plane to show whether it is significant or not.

5. RESULT AND DISCUSSIONS:

The rapid development of information and network technology, information security shows unprecedented importance. Biometrics is more and more widely used because of its unique stability, uniqueness and convenience. Palm printrecognition, as a new biometric technology, is widely concerned by researchers at home and abroad due to its simple sampling, rich image information, high user acceptance, hard forgery, and little noise interference. However, as the palm print recognition technology started late, it is still in thestage of learning and borrowing other biometric identification technologies.The applied Image preprocessing steps are RGB to gray scale conversion, Image resizing, Image enhancement. Initially SPHIT (Set partitioning in hierarchical trees) decomposition is applied on images to extract spectral features. SVM has been applied for spatial feature extraction. Accuracy of recognition is high.

6. CONCLUSION

The overall success rate in palm print recognition is around 70% for our database. The algorithm was implemented only on optical scanned prints. With optical scanned prints in database and ink prints as query the algorithm was not much efficient because of the lack of training. It has been found that changing the database also improves the classification process. The number of database prints is an important criterion. The palm print of individual person varies in size and patterns and thickness of ridges and valleys. The palm print of people from various ethnic groups varies. An algorithm for compressing the huge database of palmprints has to be

developed and the database of the feature vectors have to be coded to provide a simpler database structure to reduce the complexity in calculations.

REFERENCES:

[1]. Kumar and D. Zhang, "Personal authentication using multiple palm printrepresentation," *Pattern Recognit.*, vol. 38, no. 10, pp. 1695–1704, 2005.

[2]. W. Jia, D. Huang, and D. Zhang, "Palm printverification based on robust line orientation code," *Pattern Recognition.*, vol. 41, no. 5, pp. 1504–1513, May 2008.

[3]. Z. Guo, D. Zhang, L. Zhang, and W. Zuo, "Palm printverification using binary orientation co-occurrence vector," *Pattern Recognit. Lett.*, vol. 30, no. 13, pp. 1219–1227, Oct. 2009.

[4]. Y. Xu, D. Zhang, J. Yang, and J.-Y. Yang, "A two-phase test sample sparse representation method for use with face recognition," *IEEE Trans. Circuits Syst. Video Technol.*, vol. 21, no. 9, pp. 1255–1262, Sep. 2011.

[5]. L. Zhang, M. Yang, and X. Feng, "Sparse representation or collaborative representation: Which helps face recognition," in *Proc. IEEE Int. Conf. Comput. Vis.*, 2011, pp. 471–478.

[6]. Ping Zheng, NongSang,Huazhong University of Science and Technology, Wuhan, 430074, P. R. China, *Using Phase and Directional Line Features for Efficient Palm printAuthentication*, 2018.

[7]. Ajay Kumar, *Towards More Accurate Matching of Contactless Palm printImages under Less Constrained Environments*, Citation information: DOI 10.1109/TIFS.2018.2837669, IEEE Transactions on Information Forensics and Security,2018.

[8]. Mouad M. H. Ali, A. T. Gaikwad and Pravin L. Yannawar , *Palm printIdentification and Verification System*, Department of CS&IT, Dr. BabasahebAmbedkarMarathwada University,2018.

[9]. P. Gopinath, Dr.R.Shivakumar ,*Analysis of Diverse Transform for Finger Vein Recognition*, International Journal of Recent Research Aspects ISSN: 2349-7688, Vol. 5, Issue 1, March 2018, pp.163-166.

[10]. GauravJaswal ,AmitKaul and RavinderNath, G. Jaswal (B) · A. Kaul · R. NathSignal Processing and Biomedical Instrumentation Laboratory, *Multimodal Biometric Authentication System Using Hand Shape, Palm Print, and Hand Geometry*, 2019.

[11]. Yong Xu, *senior member, ieee*, lunkefei, *student member*, Discriminative and robust competitive code for palm print recognition, IEEE transactions on systems, man, and cybernetics: systems 2016.