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Palm Vein Pattern Recognition Using Combined Features of DRLTP and WLD.

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ABSTRACT

The person authentication scheme based on palm print biometrics. This security system involves the techniques of pattern recognition. A biometric system is essentially a pattern recognition system that makes use of biometric traits to recognize individuals. In this paper an efficient pattern recognition technique is proposed ,the shape and contrast invariant features are extracted using local ternary pattern and the details about the illumination changes between the pixels is provided by weber local descriptor. These combined features of test image are utilized to match with original templates by using Euclidean distance for making decision on person biometric. Finally the performance of proposed algorithm will be measured with recognition accuracy and it proves that it provides better matching rate than prior approaches.

Keywords: Palm print Image, Preprocessing, LBP, LTP & Webers Local Descriptor, Similarity Measurement

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INTRODUCTION

There are many applications of biometrics being used or considered worldwide. Most of the applications are at the stage of testing, and are optional for end users. An interaction between man and machine is capable of incorporating biometrics. Such situations may fall into a range of application areas such as computer desktops, networks, immigration, law enforcement, telecommunication networks, monitoring the time and attendance of staff. In this paper, we present our initiative work on palm print identification, which is a new attempt and necessary complement to the existing biometrics techniques. Not like hand geometry-based system that measures a hand's size and finger length, palm print is concern with the inner surface of a hand and looks particularly at line patterns and surface shape. A palm is covered with the same kind of skin as finger tips and is larger in size than a fingertip, hence it is quite natural to think of using palm print to recognize a person, but little has been done to palm print-based personal identification. With increasing financial activities and security awareness, followed by the development of science, technology, and the progress of society, traditional authentication, such as passwords, personal identification numbers, smart cards, has been largely incapable of meeting the requirements of convenience, reliability, and security in a wide range of civilian applications. Under such circumstances, biometric identification techniques that take full advantage of intrinsic physiological and/or extrinsic behavioral characteristics of humans, such as face, iris, fingerprint, palm print, hand Shape, and handwriting, or signature, have become a powerful alternative, gaining rapid expansion. In this paper an efficient pattern recognition technique is proposed, the shape and contrast invariant features are extracted using local ternary pattern and the details about the illumination changes between the pixels is provided by weber local descriptor. This paper is organized as follows: Section II deals with the recent literatures in palm print biometrics. The proposed methodology is described in Section III. Results are discussed in Section IV. Conclusions and Future directions are given in Section V.

LITERATURE SURVEY

Two new approaches to improve the performance of palm-vein-based identification systems presented [1]. The proposed approach attempts to more well accommodate the potential deformations, and translational changes by encoding the orientation preserving features and utilizing a novel region-based matching scheme. Analytically it was compared the previously proposed palm-vein identification approaches with the proposed ones on two different databases that are acquired with the contactless and touch-based imaging setup. The performance was evaluated and the improvement in both verification and recognition scenarios also analyze the influence of enrollment size on the performance. The approaches are also compared for its superiority using single image staffing on two different databases. The rigorous experimental results show the databases of 100 and 250 subjects, consistently conforms the dominance of the proposed approach in both the verification and recognition scenario.

A novel approach to personal verification using the thermal images of palm-dorsa vein patterns is presented [2]. The characteristics of the proposed method are that no prior knowledge about the objects is necessary and the parameter scan be set automatically. An infrared (IR) camera is adopted as the input device to capture the thermal images of the palm-dorsa. In the proposed approach, two of the finger webs are automatically chosen as the datum points to identify the region of interest (ROI) on the thermal images. Each ROI, feature points of the vein patterns (FPVPs) are extracted by modifying the basic tool of watershed transformation based on the properties of thermal images. According to the heat conduction law (the Fourier law), multiple features can be extracted from each FPVP for verification. Multi resolution representations of images with FPVPs are obtained using multiple multi resolution filters (MRFs)that extract the dominant points by filtering various features for each FPVP. A hierarchical integrating function is then applied to integrate multiple features and multi resolution representations. The former is integrated by an inter-to-intra personal variation ratio and the latter is integrated by a positive Boolean function. It also introduces a logical and reasonable method to select a trained threshold for verification. Experiments were conducted using the thermal images of palm-dorsa and the results are satisfactory with an acceptable accuracy rate (FRR:2.3% and FAR:2.3%). The experimental results demonstrate that the proposed approach is valid and effective for vein-pattern verification.

Palm vein authentication has high level of accuracy because it is located inside the body and does not change over the life and cannot be stolen. Also An analysis of palm vein pattern recognition algorithms,

techniques, methodologies and systems discusses the technical aspects of recent approaches for the following processes; detection of region of interest (ROI), segment of palm vein pattern, feature extraction, and matching. The results show that, there is no benchmark database exists for palm vein recognition. For all processes, there are many machine learning techniques with very high accuracy.

A new approach was proposed[3] to extract features from the dorsal hand vein pattern. The modified Weber Local Binary Pattern (WLBP) is feature descriptor extracted, which effectively combines the advantages of WLD and LBP. WLBP feature vector consists of two components: Differential Excitation and LBP. The Differential excitation component derived based on Weber's law, which extracts the local salient patterns. LBP is highly discriminative, computationally efficient, and extracts the local micro-patterns. By computing the two components, it was obtained by two images: differential excitation image and LBP image, from which a 2D histogram for WLBP is constructed. Histogram of Oriented Gradients (HOG) feature is also extracted from same image. The method in this fuses WLBP feature and HOG feature and an estimation were done for the hand dorsal vein recognition. Results show that fusion those features achieve better than WLBP. Test is piloted on NCUT database, which shows that proposed fusion of WLBP and HOG is more effective and powerful texture descriptor.

METHODOLOGY

Vein Pattern Analysis using Discriminative robust local ternary pattern and Weber's local descriptor. Proposed method presents robust palm vein recognition using hybrid texture descriptors such as discriminative robust local ternary pattern and Weber's local descriptor for improving the recognition accuracy. In ROI Selection, entropy filter is used to extract the desired foreground region from background. Then, local threshold is used to extract the vein pattern for its texture analysis. Two textures descriptors called Weber's local descriptors and DRLTP are proposed to extract the features about texture for recognizing with original templates.

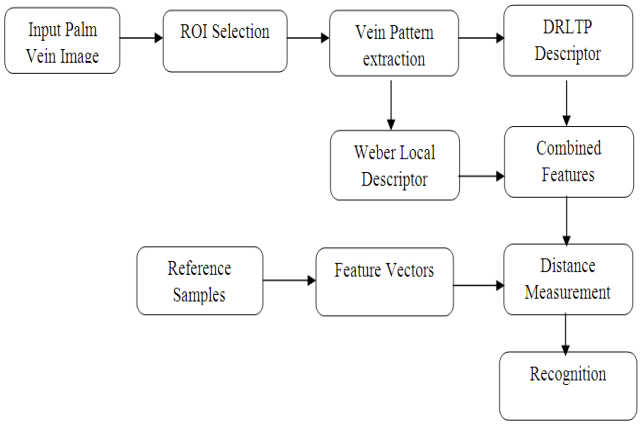

Figure 1: Proposed methodology

DRLTP is used to provide the shape and contrast invariant features of an object. WLD provides details about illumination changes between the pixels. Euclidean distance will be used to match the features of test and original templates for making decision on person biometric.

Vein Pattern Detection

Palm vein pattern is extracted using image segmentation technique using local threshold algorithm. The goal of image segmentation is to cluster pixels into salient image regions, i.e., regions corresponding to individual surfaces, objects, or natural parts of objects. In computer vision segmentation refer to the process of partitioning a digital image to multiple segments. The goal of segmentation is to simplify the depiction of an image into incredible, which is more significant and easier to analyze Image segmentation and is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain visual characteristics.

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Local Ternary Pattern

LBP is sensitive to noise and small pixel value fluctuations. LTP solves this using 2thresholds to generate codes. It is more resistant to **small** pixel value variations and noise compared to LBP. RLBP cannot be applied to ULBP and L LBP of LTP. For a pair of object/background intensity inverted patterns, their ULBP codes are not complements. Similarly, their LLBP codes are also not complements. From the two LTP codes, it is observed that the 2 patterns are simply intensity inverted. However, their corresponding ULBP codes are not complements. Similarly, their corresponding LLBP codes are also not complements. The ULBP and LLBP codes are not complements..

Euclidean Distance

Euclidean distance measures the similarity between two different feature vectors using .

$$ED=\sqrt{\sum_{j=0}^{i}(FVi,j}\text{-FVi,j})^2 \quad \text{--------(1)}$$

Where J is the length of the feature vector, Fvi is the feature vector for individual i.

RESULTS AND DISCUSSION

A set of original images with the extracted feature values are stored in the data base shown in figure 2.The objective analysis of data base image features are shown in Table 1.

Figure 2: A set of data base images

Table 1: Objective analysis of the data base image features

	Dataset Features							
Contrast	5.921517	5.804146	5.811229	6.011032	6.08930071	5.88339058	6.026968	5.931772
Correlation	1.813246	1.914721	1.796136	1.786816	1.865953084	1.924147698	1.991827	1.948154
Homogenity	28.15724	19.43081	27.67058	24.51907	18.92155204	21.92575286	13.04078	22.40131
Energy	6.419719	6.581981	6.386401	6.405118	6.539113988	6.587602016	6.736678	6.578623
Entropy	2.923978	4.159437	2.754102	2.367622	3.915767673	4.423905375	5.945038	4.201859
Skewness	-618.851	-658.774	-594.956	-606.39	-661.8034301	-634.0221441	-660.287	-907.243
Kurtosis	4010.884	4586.741	3942.114	3970.081	4439.734976	4512.514019	4670.164	5754.843

An input test image is given for which the vein pattern analysis is done by using local ternary pattern and weber local descriptor and then the features of test image obtained.

Figure 3: A set of input test images

The features obtained from the input test image are compared with the features of data base images and then similarity measurement is done. A set of input test images are shown in figure 3.

CONCLUSION

An efficient pattern recognition technique is proposed, contrast features like shape, contrast invariant are extracted using local ternary pattern. Weber local descriptor provides the information of illumination changes. These collective features of test image are utilized to match with unique templates by using Euclidean distance for making decision on person biometric. The concert of proposed algorithm measures recognition accuracy and it proves that it provides better matching rate than prior approaches.

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