D.Arthi *et al*, International Journal of Computer Science and Mobile Applications,
Vol.6 Issue. 3, March- 2018, pg. 50-54 **ISSN: 2321-8363**
Impact Factor: 5.515

Survey on Recognition of Human Using their Physical Traits

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Abstract— This paper presents an approach to identify an individual based on their intrinsic physical traits. Extraction of highly distinctive texture patterns for better classification. This paper provides an overview of current fingerprint and finger-vein research, algorithms designed for real-time identification in large database. We develop and investigate holistic and non linear fusion and evaluating them.

Keywords— Fingerprint recognition, finger-vein recognition, fusion, hand biometrics, multispectral finger identification, personal identification, vascular biometrics.

I. INTRODUCTION

Measurement of people's unique physical and behavioral characteristics i.e., biometrics is increasingly used for commercial purposes. Fingerprinting is the oldest form of biometric verification. The imperfections in the friction ridges and valleys which are commonly referred to as minutiae or level-2 fingerprint features due to high individuality. Learning about such minutiae features requires image resolution more than 400 dpi[dots per inch]. The utilization of such feature from webcam images or at a distance, deserves attention in civilian or forensic application.

II. LITERATURE REVIEW

A. Human Identification using Finger-vein Images

This paper presents a new approach to improve the performance of finger-vein identification systems presented in the literature. The proposed system simultaneously acquires the finger-vein and low-resolution fingerprint images and combines these two evidences using a novel score-level combination strategy. We examine the previously proposed finger-vein identification approaches and develop a new approach that illustrates it superiority over prior published efforts. The utility of low-resolution fingerprint images acquired from a webcam is examined to as-certain the matching performance from such images. We develop and investigate two new score-level combinations, i.e., holistic and nonlinear fusion, and comparatively evaluate them with more popular score-level fusion approaches to ascertain their effectiveness in the proposed system. The rigorous experimental results presented on the database of 6264 images from 156 subjects illustrate significant improvement in the performance, i.e., both from the authentication and recognition experiments.

B. A Threshold Selection Method From Graylevel Histogram

A nonparametric and unsupervised method of automatic threshold selection for picture segmentation is presented. An optimal threshold is selected by the discriminant criterion, so as to maximize the separability of the resultant classes in gray levels. The procedure is very simple, utilizing only the zeroth- and the first-order cumulative moments of the gray-level histogram. It is straightforward to extend the method to multi threshold problems. Several experimental results are also presented to support the validity of the method.

C. Effect of anemia on pulse oximeter accuracy at low saturation

A retrospective evaluation of simultaneous tests of oximeters of various manufacturers in volunteer subjects dis-closed greater errors at low saturations in subjects with low hemoglobin (Hb) concentrations. Forty-three pulse oximeters of 12 manufacturers studied over a period of 10 months showed that, at a mean arterial oxygen saturation (SaO2) level of 54.5%, as Hb concentration fell, average pulse oximeter (SpOz) bias increased approximately linearly from 0 at Hb >14 g/dl to about -14% at 8 < Hb < 9 g/dl. At SaOz =53.6%, the mean bias (SaO2 - SpO2) of 13 oximeters of 5 manufacturers averaged -15.0% (n = 43) in a subject with Hb = 8 g/dl, but -6.4% (n = 390) in non-anemic subjects. The additional bias in the anemic subject increased with desaturation. It was 0.13% at SaO2 = 98.5% (n = 13), -1.31% at 87.5% (n = 38), -2.71% at 75.1% (n = 38), -5.18% at 61.3% (n = 26), and -9.95% at 53.6% (n = 41); n is the product of the number of oximeters and number of tests in each saturation range.

The instruments that showed the greatest errors at low saturations in non-anemic subjects also showed the greatest additional errors associated with anemia (the range between manufacturers of anemic incremental error at about 53% being from -3.2 to -14.5%) and conformed well to the relationship bias (anemic) = 1.35 • bias (normal) - 8.18% (r = 0.94; Srx = 3.3%). The error due to anemia was zero at 97% SaO2 and became evident when SaOz fell below 75%. 10,200 full palmprints to test the proposed system. Despite the inherent difficulty of latent-to-full palmprint matching, rank-1 recognition rates of 78.7 and 69 percent, respectively, were achieved in searching live-scan partial palmprints and latent palmprints against the background database.

D. Spatial Frequemcy Domain Image Processing For Biometric Recogntion

Biometric recognition refers to the process of matching an input biometric to stored biometric information. In particular, biometric verification refers to matching the live biometric input from an individual to the stored biometric template about that individual. Examples of biometrics include face images, fingerprint images, iris images, retinal scans, etc. Thus, image processing techniques prove useful in the biometric recognition. In this paper, we discuss spatial frequency domain image processing methods useful for biometric recognition.

E. Likelihood Ratio Based Biometric Score Fusion

Multibiometric systems fuse information from different sources to compensate for the limitations in performance of individual matchers. We propose a framework for optimal combination of match scores that is based on the likelihood ratio test. The distributions of genuine and impostor match scores are modeled as finite Gaussian mixture model. The proposed fusion approach is general in its ability to handle (i) discrete values in biometric match score distributions, (ii) arbitrary scales and distributions of match scores, (iii) correlation between the scores of multiple matchers and (iv) sample quality of multiple biometric sources. Experiments on three multibiometric databases indicate that the proposed fusion framework achieves consistently high performance compared to commonly used score fusion techniques based on score transformation and classification.

F. Latent Palmprint Matching

The evidential value of palmprints in forensic applications is clear as about 30 percent of the latents recovered from crime scenes are from palms. While biometric systems for palmprint-based personal authentication in access control type of applications have been developed, they mostly deal with low-resolution (about 100 ppi) palmprints and only perform full-to-full palmprint matching. We propose a latent-to-full palmprint matching system that is needed in forensic applications. Our system deals with palmprints captured at 500 ppi (the current standard in forensic applications) or higher resolution and uses minutiae as features to be compatible with the methodology used by latent experts.

Latent palmprint matching is a challenging problem because latent prints lifted at crime scenes are of poor image quality, cover only a small area of the palm, and have a complex background. Other difficulties include a large number of minutiae in full prints (about 10 times as many as fingerprints), and the presence of many creases in latents and full prints. A robust algorithm to

reliably estimate the local ridge direction and frequency in palmprints is developed. This facilitates the extraction of ridge and minutiae features even in poor quality palmprints. A fixed-length minutia descriptor, Minutia Code, is utilized to capture distinctive information around each minutia and an alignment-based minutiae matching algorithm is used to match two palmprints. Two sets of partial palmprints (150 live-scan partial palmprints and 100 latent palmprints) are matched to a background database of Hand Vein Recognition Using Mat lab.

Identification based on hand vein pattern is an interesting branch of biometric recognition that is enjoying increasingly attention among the researchers in the recent decade. However, despite the fact the most of the developed commercial systems for this purpose are expensive; their false acceptance ratios are not zero. Therefore, using them for identification purposes can be crucial if they mistakenly accept an imposter (even with a very low probability). The current work proposes a very low-cost hand vein pattern recognition system using a simple modified webcam. The system introduces a blob removal algorithm for enhancing the results of the segmentation and uses a modified version of Hausdorff distance for feature matching for the recognition purposes. Experimental results show that the system can achieve a zero false acceptance ratio while keeping the true acceptance rate in an acceptable level.

G. 3D Palm print Classification Using Global Features

Three dimensional palm print has proved to be significant biometric for personal authentication. Personal authentication plays a key role in application of public security, access control, forensics and e-banking etc. 2-D palm print has been recognized as an effective biometric identifier in past decade. 3-D palm print system develops to capture the depth information of palm print. The previous work of 3-D palm print recognition done using local features such as line, texture, wrinkles, point but, in this we are using the global features such as width, length and area of the palm. This paper provides an overview of current palmprint research, describing in particular capture devices, preprocessing, verification algorithms, palmprint-related fusion, algorithms especially designed for real-time palmprint identification in large databases. Most of the previous studies are based on two dimensional (2D) image of the palmprint.2D images are easily affected by noise, such as scrabbling and dirty in the palm. To overcome these shortcomings, we develop a three dimensional (3D) palm print identification system.

H. A Manifold Approach To Face Rcognition From Low Quality Video Across Illumination and Pose Using Super-Implicit Resolution

We consider the problem of matching a face in a low resolution query video sequence against a set of higher quality gallery sequences. This problem is of interest in many applications, such as law enforcement. Our main contribution is an extension of the recently proposed Generic Shape-Illumination Manifold (gSIM) framework. Specifically, (i) we show how super-resolution across pose and scale can be achieved implicitly, by off-line learning of sub sampling artifacts; (ii) we use this result to propose an extension to the statistical model of the gSIM by compounding it with a hierarchy of sub sampling models at multiple scales; and (iii) we describe an extensive empirical evaluation of the method on over 1300 video sequences – we first measure the degradation in performance of the original gSIM algorithm as query sequence resolution is decreased and then show that the proposed extension produces an error reduction in the mean recognition rate of over 50%.

I. Finger Knuckleprint Based Recognition System Using Feature Tracking

This paper makes use of finger knuckleprints to propose an efficient biometrics system. Edge based local binary pattern (ELBP) is used to enhance the knuckleprint images. Highly distinctive texture patterns from the enhanced knuckleprint images are extracted for better classification. It has proposed a distance measure between two knuckleprint images. This system has been tested on the largest publicly available Hong Kong Polytechnic University (PolyU) finger knuckleprint database consisting 7920 knuckleprint images of 165 distinct subjects. It has achieved CRR of more than 99.1% for the top best match, in case of identification and ERR of 3.6%, in case of verification.

S.N	Name Of The Paper	Year	Algorithm	Merits	Demerits
1.	Human Identification using Finger-vein Images	Ajay Kumar and Yingbo Zhou VOL. 21, NO. 4, April 2017	Score level combination - Holistic and non-linear fusion.	Provides exact result.	Lack of symmetric study No publicly available finger-vein database
2.	A Threshold Selection Method from Gray-Level Histogram	Nobuyuki Otsu VOL. NO. 1, January 1979	Gaussian distributions. Statistical decision procedures	The procedure is very simple	The rigorous proof of the unimodality has not yet been obtained.
3.	Effect of anemia on pulse oximeter accuracy at low saturation	*John* W. Severinghaus Vol 6 No 2 April 1990	Pulse oximetry measurement technique.	Limitless Measures O2 saturation level accurately	Change in accuracy level when device goes beyond 70%.
4.	Spatial Frequency Domain Image Processing For Biometric Recognition	B.V.K. Vijaya Kumar VOL. 15, NO. 8, September 2002	Spatial frequency domain image processing.	Closed form expressions Distortion-tolerance.	Lack of shift invariance
5.	Likelihood Ratio Based Biometric Score Fusion	Karthik Nandakumar,Yi Chen, and Anil K. Jain vol. 17, no. 10, November 2007	GMM	Use for classification of static posture	Fails if dimensionality is too high.
6.	Latent Palmprint Matching	Anil K. Jain and Jianjiang Feng VOL. 31, NO. 6, June 2009	Region Growing algorithm	Stable & Unique	High cost.

7.	Hand Vein Recognition Using Mat lab	Rakesh Pandey, Volume 5, Issue 2 April 2013	Blob removal algorithm	Fast, simple and secure.	If the veins are not properly detected, the Risk of errors increases.
8.	3D Palm Print Classification using Global Features	Priyanka A. Mane, Volume 2, Issue 7, July 2014	SVM	Powerful, Not linearly separable	Several key parameters need to be set
9.	A Manifold Approach to Face Recognition from Low Quality Video Across Illumination and Pose using Implicit Super-Resolution	Ognjen Arandjelovic´, Roberto Cipolla Volume 20, Issue 9, October 2014	gSIM	Easy to use Inexpensive	Can't tell difference between identical twins.
10.	Finger Knuckleprint based Recognition System using Feature Tracking	Aditya Nigam, Vol 28, Issue 11, December 2015	Lucas Kanade Tracking algorithm	Tolerant to slight variation	Low resolution. Labor intensive.

III. CONCLUSION

In this paper, we have presented a complete and fully automated finger image matching framework by simultaneously utilizing the finger surface and finger subsurface features, i.e., from finger texture and finger-vein images.

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