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Efficient Rectification of Malformation Fingerprints



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ABSTRACT:

Elastic distortion of fingerprints is one of the major causes for false non-match. While this problem affects all fingerprint recognition applications, it is especially dangerous in negative recognition applications, such as watch list and reduplication applications. In such applications, malicious users may purposely distort their fingerprints to evade identification. In this paper, we proposed novel algorithms to detect and rectify skin distortion based on a single fingerprint image. Distortion detection is viewed as a two-class classification problem, for which the registered ridge orientation map and period map of a fingerprint are used as the feature vector and a SVM classifier is trained to perform the classification task. Distortion rectification equivalently (or distortion field estimation) is viewed as a regression problem, where the input is a distorted fingerprint and the output is the distortion field. To solve this problem, a database (called reference database) of various distorted reference fingerprints and corresponding distortion fields is built in the offline stage, and then in the online stage, the nearest neighbor of the input fingerprint is found in the reference database and the corresponding distortion field is used to transform the input fingerprint into a normal one. Promising results have been obtained on three databases containing many fingerprints, namely FVC2004 DB1, distorted Tsinghua Distorted Fingerprint database, and the NIST SD27 latent fingerprint database.



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INTRODUCTION: Fingerprint recognition application is rapidly advanced

security application to recognizing the duplicate object from the original one. The consequence of low quality fingerprints depends on the type of the fingerprint recognition system. A fingerprint recognition system can be classified as either a positive or negative system. Degradation of fingerprint quality can be photometric or geometrical. Photometric degradation can be caused by non-ideal skin conditions, dirty sensor surface, and complex age background. Geometrical degradation is mainly caused by skin distortion. Photometric degradation has been widely studied and a number of quality evaluation and enhancement algorithms. An Elastic distortion is introduced due to the inherent flexibility of fingertips, contact-based fingerprint acquisition procedure, and a purposely lateral force or torque, and etc. Skin distortion increases the intra-class variations that is the difference among fingerprints from the same finger and thus leads to false non-matches due to limited capability of existing fingerprint matchers in recognizing severely distorted fingerprints. Our proposed system implements a novel algorithm should be proposed to deal with the fingerprint distortion problem. Distortion detection is viewed as a two class classification problem, for which the registered ridge orientation map and period map of a fingerprint are used as the feature vector and a SVM classifier is trained to perform the classification task. Distortion rectification equivalently distortion (or field estimation) is viewed as a regression problem, where



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the input is a distorted fingerprint and the output is the distortion field. To solve this problem, a database of various distorted reference fingerprints and corresponding distortion fields is built in the offline stage, and then in the online stage, the nearest neighbor of the input fingerprint is found in the database of distorted reference fingerprints and the corresponding distortion field is used to rectify the input fingerprint.

EXISTING SYSTEM:

Finger print recognition system still exists several challenging research problems, for example, recognizing low quality fingerprints. Fingerprint matcher is very sensitive to image quality, where the matching accuracy of the same algorithm varies significantly among different datasets due to variation in image quality. The difference between the accuracies of plain, rolled and latent fingerprint matching is even larger as observed in technology evaluations. Fingerprint degradation due to skin distortion has not yet received sufficient attention, despite of the importance of this problem. This is the problem this paper attempts to address. Note that, for a negative fingerprint recognition system, its security level is as weak as the weakest point. Thus it is urgent to develop distorted fingerprint (DF) detection and rectification algorithms to fill the hole.

Disadvantages:

System result is Dangerous in negative recognition system. System was producing false non-matches. Duplication of data exists. Fingerprints are distorted easily by malicious users. System cannot detect distorted fingerprint images in existing fingerprint images.

PROPOSED SYSTEM:

The implementation of the fingerprint recognition system using novel algorithms for recognizing distorted fingerprints. Fingerprint distortion detection can be viewed as a two class classification problem. We used the registered ridge orientation map and period map as the feature vector, which is classified by a SVM classifier.

Volume No: 3 (2016), Issue No: 6 (June) www.ijmetmr.com In order to extract meaningful feature vector, fingerprints have to be registered in a fixed coordinate system. For this task, propose a multi-reference based fingerprint registration approach. In the following, we describe how the reference fingerprints are prepared in the offline stage, and how to register an input fingerprint in the online stage. Distortion detection as a twoclass classification problem. Distorted fingerprints are viewed as positive samples and normal fingerprints as negative samples. If a distorted fingerprint is classified as a positive sample, a true positive occurs. If a normal fingerprint is classified as a positive sample, a false positive occurs. By changing the decision threshold, we can obtain the receiver operating characteristic (ROC) curve. the genuine match scores of most distorted fingerprints are improved after rectification, there are some examples whose matching scores dropped after rectification. Unsuccessful rectification can be classified into two categories such as a normal fingerprint is incorrectly detected as a distorted one and then undergoes the rectification process, and the rectification for a distorted fingerprint is incorrect.

Advantages:

System should extract the distorted fingerprint images without affect the original image. Fingerprint recognition is fast and secure.

SYSTEM ARCHITECTURE:



IMPLEMENTATION MODULES:

Fingerprint distortion detection:

Fingerprint distortion detection can be viewed as a two class classification problem. We used the registered



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ridge orientation map and period map as the feature vector, which is classified by a SVM classifier.

Fingerprint Registration:

In order to extract meaningful feature vector, fingerprints have to be registered in a fixed coordinate system. For this task, we propose a multi-reference based fingerprint registration approach. In the following, we describe how the reference fingerprints are prepared in the offline stage, and how to register an input fingerprint in the online stage

Reference Fingerprints:

In order to learn statistics of realist fingerprint distortion, we collected a distorted fingerprint database called Tsinghua distorted fingerprint database. A FTIR fingerprint scanner with video capture functionality was used for data collection. Each participant is asked to press a finger on the scanner in a normal way, and then distort the finger by applying a lateral force or a torque and gradually increase the force. Online Fingerprint Registration In the online stage, given an input fingerprint, we perform the registration w.r.t. registered reference fingerprints. Finally, register the ridge orientation map and period map of the input fingerprint to the fixed coordinate system by using the obtained pose information.

Statistical Modeling of Distortion Fields:

In order to learn statistical fingerprint distortion model, we need to know the distortion fields (or deformation fields) between paired fingerprints (the first frame and the last frame of each video) in the training set. The distortion field between a pair of fingerprints can be estimated based on the corresponding minutiae of the two fingerprints. Unfortunately, due to the severe distortion between paired fingerprints, existing minutiae matchers cannot find corresponding minutiae reliably. Thus, we extract minutiae in the first frame using VeriFinger and perform minutiae tracking in each video. Since the relative motion between adjacent frames is small, reliable minutiae correspondences between the first frame and the last frame can be found by this method. Given the matching minutiae of a pair of fingerprints, we estimate the transformation using thin plate spline model we define a regular sampling grid on the normal fingerprint and compute the corresponding grid (called distortion grid) on the distorted fingerprint using the TPS model.

Distorted fingerprint rectification:

A distorted fingerprint can be thought of being generated by applying an unknown distortion field d to the normal fingerprint, which is also unknown. If we can estimate the distortion field d from the given distorted fingerprint, we can easily rectify it into the normal fingerprint by applying the inverse of d. So we need to address a regression problem, which is quite difficult because of the high dimensionality of the distortion field (even if we use a block-wise distortion field). A nearest neighbor regression approach is used for this task. The proposed distorted fingerprint rectification algorithm consists of an offline stage and an online stage. In the offline stage, a database of distorted reference fingerprints is generated by transforming several normal reference fingerprints with various distortion fields sampled from the statistical model of distortion fields. In the online stage, given a distorted input fingerprint retrieval its nearest neighbor in the distorted reference fingerprint database and then use the inverse of the corresponding distortion field to rectify the distorted input fingerprint.

Distorted Reference Fingerprint Database:

To generate the database of distorted reference fingerprints, we use nref ¹/₄ 100 normal fingerprints from FVC2002 DB1. The distortion fields are generated by uniformly sampling the subspace spanned by the first two principle components. For each basis, 11 points are uniformly sampled in the interval For visualization purpose, only one reference fingerprint is used to generate the database of distorted reference fingerprints, and for each basis, five points are sampled. In practice, multiple reference fingerprints are used to achieve better performance. Also note that instead of storing the fingerprint image,



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we store the ridge orientation map and period map of each fingerprint in the reference database.

Distortion Field Estimation by Nearest Neighbor Search:

Distortion field estimation is equal to finding the nearest neighbor among all distorted reference fingerprints. The similarity is measured based on level 1 features of fingerprint, namely ridge orientation map and period map. We conjecture that distortion detection and rectification of human experts also relies on these features instead of minutiae. The similarity computation method is different depending on whether the upper core point can be detected in the input fingerprint. If the upper core point is detected, we translate the input fingerprint by aligning the upper core point to center point.

SCREENSHOTS:

ATM LOGIN: Elastic distortion of fingerprints is one of the major causes for false non-match. While this problem affects all fingerprint recognition applications, it is especially dangerous in negative recognition applications, such as watch list and reduplication applications.

new ATM System	A		
	Detection a	and Rectification of Distorted Fingerpri	nts
	Bank	AIM	

Bank login: Administrator can login with user id and password.

🖁 bank_login		
Bank Login		
	User Name	admin
	Password	LOGIN

Bank Home Page: Administrator can create user account, manages customer details and also view transactions.

🚽 bank_home_page	
Bank Home Page	
Create New Account	
Mange Customer Details	< 272 >
View Transactions	6
Logout	

Create New Account:

Name	1	Bank Name State Bank + Indian Bank ICICI Bank +	
Gender	SELECT •	Branch	
Date of Birth	Tuesday , January 19,2016	Account Number	
Address		ATM Card Number	
		ATM PIN Number	
Ocuupation			
Annual Income		Finger Print Upload Finger Print	
Mobile Number			

After login user get few options like withdrawel, money transfer, check balance etc.



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ATM	Home Page	
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Mew Transactions	EB-Bill Payment	
	Logout	

CONCLUSION:

Fingerprint recognition system for recognizing distorted finger prints is implemented successfully. False non-match rates of fingerprint matchers are very high in the case of severely distorted finger prints. our proposed system with a novel distorted fingerprint detection and rectification algorithm. For distortion detection, the registered ridge orientation map and period map of a fingerprint are used as the feature vector and a SVM classifier is trained to classify the input fingerprint as distorted or normal.

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