Identifying and Reforming of Contorted Fingerprints using SVM Classification Model

Vennila. V, Savitha. S
[1]Assistant Professor,
Department of Computer Science and Engineering,
K.S.R. College of Engineering,
Tiruchengode, India.

[2]P. Raj Sangavi, [3]P. Suguna,
[4]G. Sunandha,[5]M. Suresh,
2,3,4,5 U G Students
Department of Computer Science and Engineering,
K.S.R. College of Engineering,
Tiruchengode, India.

***Abstract*—Elastic distortion of fingerprints is the main causes for false mismatch. While this problem affects all fingerprint recognition applications, it is especially dangerous in false recognition applications, such as duplication applications. In such applications, hackers may purposely distort their fingerprints to mismatch their 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. Distortion rectification (or equivalently 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, 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 distorted fingerprints, namely FVC2002 DB1.**

KEYWORDS: Fingerprint, Distortion, registration, nearest neighbor regression.

I. INTRODUCTION

In recent years, the digital images were used almost in every part of the society. Many administrative, legal, and news organizations depended on these digital images to take the judgments or used it as photographable proof for particular event. This digital image shows some difficulties, as threat of the digital images has matched with prevalent accessibility of the image editing software. Therefore, It is necessary to provide the digital images with a good contrast and a digital is requisite in various major fields. For example, for vision, remote sensing, energetic scene analysis, and self-directed navigation, and biomedical image investigation.

The Delivering of visually normal images or transforming the image to enhance the display visual information enclosed in image is constraint for approximately all the vision and image processing strategies. Fingerprint detection is an automated procedure to detect the identity of person, based on the comparison of the stored fingerprint images with input fingerprint images. These are the conspicuous bio-metrics, which are utilized to check on the computer systems. Fingerprints are impressions or the patterns that are existing fingers of human with any age and over the time, this pattern never changes. Nowadays, the fingerprint identification technique has attracted interest of so many researchers, due to its several benefits. One of the best benefits is that it is very well acknowledged by legal community.

This detection technique is very fast, reliable, least cost and easiest way to recognition of an individual. Also, this detection technique has been broadly applauded for its accurateness in authentication as the probability of identical finger of two different individuals is exceptional. The Fingerprint never alters until any physical disorder such as accidents occurs or to those who work in the mechanical or the metal industries with burning or hot materials which can harm their fingerprints. Fingerprints are very beneficial, For instance, if parents get fingerprints of their child and placed it in file and if the child is lost, the childhood fingerprints are used to create match when these are acknowledged in the future stage of life.

The Object detection is an integral part of any vision based computer application. The Object detection algorithm decides that whether object of interest is present in scene or not. If it is present, it locates the position of the object in scene. An efficient object detection algorithm should be able to decide that whether object of interest is present in the arbitrary scene or not irrespective of the scaling and rotation of an object or change in camera views point and illumination variations. Working of object detection is carried out with the different objective such as detection of a known object and the detection of object which falls in specific class.

One of the approaches of object detection is the feature extraction and the matching of extracted features with object to be detected. The Objective of this survey is to detect the object which is distorted. Based on comparison object detection, the decision is taken. Image rectification is transformation method accustomed project 2 or additional pictures onto common image plane. This method has the many degrees of the liberty and there area unit several ways for reworking the pictures to a typical plane.

Hence it is of utmost importance to address the problem for negative fingerprint recognition system by detecting low quality fingerprints and improving their quality, to avoid false non-matches or false matches. Degradation in quality of fingerprint can geometric or photometric. Photometric degradation is caused by non-ideal skin conditions, dirty sensor surface, complex mage background etc. Whereas geometric degradation occurs due to skin distortion. Photometric degradation has been widely addressed along with evaluation

and enhancement algorithms. But the issue of geometric degradation has yet not received sufficient attention and so we aim to attend to this problem.

II. Related Work

In this paper we analyses the effect of intrusion detection and response on the reliability of a cyber-physical system (CPS) comprising sensors, actuators, control units, and physical objects for controlling and protecting a physical infrastructure. We develop a probability model based on stochastic Petri nets to describe the behavior of the CPS in the presence of both malicious nodes exhibiting a range of attacker behaviors, and an intrusion detection and response system (IDRS) for detecting and responding to malicious events at runtime. Our results indicate that adjusting detection and response strength in response to attacker strength and behavior detected can significantly improve the reliability of the CPS. We report numerical data for a CPS subject to persistent, random and insidious attacks with physical interpretations given.

To exploit stronger prior knowledge of fingerprints in order to further improve the performance. Realizing that ridge orientations at different locations of fingerprints have different characteristics, we propose a localized dictionaries-based orientation field estimation algorithm, in which noisy orientation patch at a location output by a local estimation approach is replaced by real orientation patch in the local dictionary at the same location. The precondition of applying localized dictionaries is that the pose of the latent fingerprint needs to be estimated. We propose a Hough transform-based fingerprint pose estimation algorithm, in which the predictions about fingerprint pose made by all orientation patches in the latent fingerprint are accumulated. Experimental results on challenging latent fingerprint datasets show the proposed method outperforms previous ones markedly.

1. The paper proposes a novel fingerprint orientation field estimation algorithm based on prior knowledge of fingerprint structure. We represent prior knowledge of fingerprints using a dictionary of reference orientation patches. which is constructed using a set of true orientation fields, and the compatibility constraint between neighboring orientation patches. Orientation field estimation for lattens is posed as an energy minimization problem, which is solved by loopy belief propagation. Experimental results on the challenging NIST SD27 latent fingerprint database and an overlapped latent fingerprint database demonstrate the advantages of the proposed orientation field estimation algorithm over conventional algorithms. Rectification requires too much time for calculation.

2. The paper proposes a new fingerprint enhancement algorithm that selectively applies contextual filtering starting from automatically-detected high-quality regions and then iteratively expands toward low-quality ones. The proposed algorithm does not require any prior information like local orientations or frequencies. Experimental results over both real (FVC2004 and FVC2006) and synthetic (generated by the SFinGe software) fingerprints demonstrate the effectiveness of the proposed method. Image of fingerprint is binaries and then applying thinning process for further process of Identification.

As During the past decade, many efforts have been made to use palm prints as a biometric modality. However, most of the existing palm prints recognition systems are based on encoding and matching creases, which are not as reliable as ridges. This affects the use of palm prints in large-scale person identification applications where the biometric modality needs to be distinctive as well as insensitive to changes in age and skin conditions. It uses rely on text-lines. Recently, several ridge-based palm print matching algorithms have been proposed to fill the gap.

Major contributions of these systems include reliable orientation field estimation in the presence of creases and the use of multiple features in matching, while the matching algorithms adopted in these systems simply follow the matching algorithms for fingerprints. However, palm prints differ from fingerprints in several aspects: 1) Palm prints are much larger and thus contain a large number of minutiae, 2) palms are more deformable than fingertips, and 3) the quality and discrimination power of different regions in palm prints vary significantly. As a result, these matchers are unable to appropriately handle the distortion and noise, despite heavy computational cost. Motivated by the matching strategies of human palm print experts, we developed a novel palm print recognition system.

III. Proposed System

In Proposed System was evaluated at two levels: finger level and subject level. At the finger level, we evaluate the performance of distinguishing between natural and altered fingerprints. At the subject level, we evaluate the performance of distinguishing between subjects with natural fingerprints and those with altered fingerprints. This paper described 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 classifier is trained to classify the input fingerprint as distorted or normal.

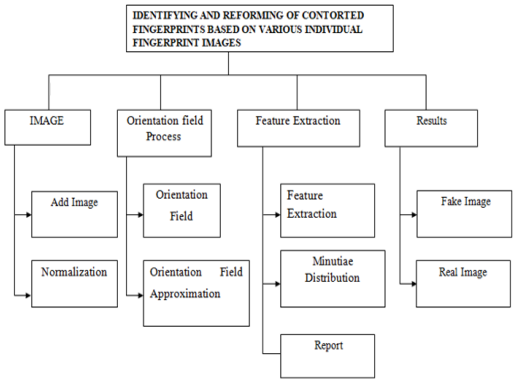

Fig. 1 System Interface Diagram

A nearest neighbor regression approach is used to predict the distortion field from the input distorted fingerprint and then the inverse of the distortion field is used to transform the distorted fingerprint into a normal one.

METHODOLOGY

Detection of Altered Fingerprints

Normalization

An input fingerprint image which is supplied is normalized by cutting a rectangular region of the input image fingerprint, which is situated at the center of the fingerprint and associated along with the longitudinal direction of the fingerprints, using the NIST Biometric Image Software (NBIS). This step assures that the features take out in the following steps are invariant with respect to conversion and rotation of finger.

Orientation Field Estimation

The orientation field of the fingerprint is analyzed using the gradient-based method. The starting orientation field is smoothed moderating filter, pursue by modest the orientations in pixel blocks. A foreground mask is produced by measuring the dynamic range of gray values of the fingerprint image in local blocks and morphological method for filling holes and eliminating isolated blocks is achieved.

Orientation Field Approximation

The orientation field is near by a polynomial model to obtain.

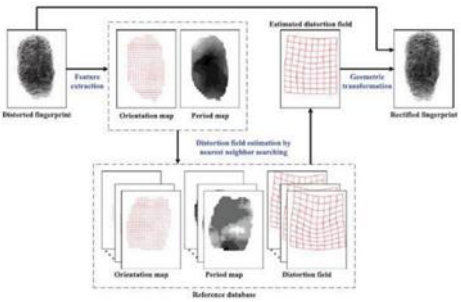

Fig. 2 Flowchart of distorted fingerprint rectification

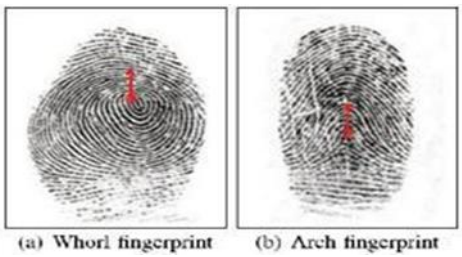

Fig. 3 The center (indicated by red circle) and direction (indicated by red arrows) of two fingerprints

Feature Extraction

The error map is calculated as the absolute difference between and used to build the feature vector.

Analysis of Minutiae Distribution

In this method, a minutia in the fingerprint involves the ridge personality such as ridge ending or ridge junction. Almost all the fingerprint detection systems use minutiae for matching. The irregularity observed in orientation field also celebrated that minutiae distribution of altered fingerprints frequently change from that of natural fingerprints. On the beginning of minutiae take out from a fingerprint by the open source minutiae extractor in NBIS.

The overall criterion for edge detection includes:

1) Detection of edge with low error rate, which suggests that the detection ought to accurately catch as several edges shown within the image as potential

2) The edge purpose detected from the operator ought to accurately localize on the middle of the sting

3) A given approach the image ought to solely be marked once, and wherever potential, image noise mustn't produce false edge.

IV. RESULT

We view distortion detection as a two-class 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.

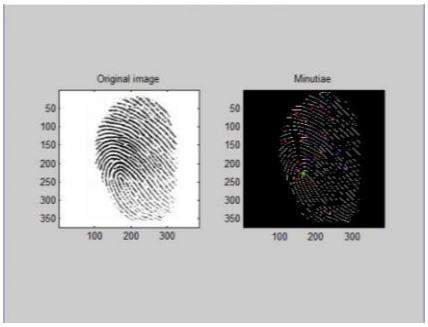

Fig. 4 Shows the Minutiae and Bifurcation points

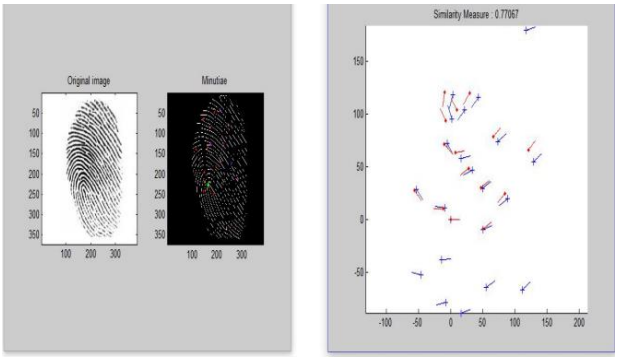

Fig. 5 The red points denotes the changes

CONCLUSION

A major limitation of the current approach is efficiency. Both detection and rectification steps can be significantly speeded up if a robust and accurate fingerprint registration algorithm can be developed. Another limitation is that the current approach does not support rolled fingerprints. It is difficult to collect many rolled fingerprints with various distortion types and meanwhile obtain accurate distortion fields for learning statistical distortion model. It is our ongoing work to address the above limitations. False non-match rates of fingerprint matchers are terribly high within the case of severely distorted fingerprints. This generates a security hole in automatic fingerprint recognition systems which might be used by criminals and terrorists. For this reason, it's necessary to develop a fingerprint distortion detection and rectification algorithms to fill the outlet. This paper successfully identifies the distortion field and the distorted points and displays a matching score list.

REFERENCES

[1] X. Si, J. Feng, and J. Zhou, "Detecting fingerprint distortion from a single image," in Proc. IEEE Int. Workshop Inf. Forensics Security,pp.1– 6,2012.

[2] V. N. Dvornychenko, and M. D. Garris, "Summary of NIST latent fingerprint testing workshop," Nat. Inst. Standards Technol., Gaithersburg, MD, USA, Tech. Rep. NISTIR 7377, Nov. 2006.

[3] L. M. Wein and M. Baveja, "Using fingerprint image quality to improve the identification performance of the U.S. visitor and immigrant status indicator technology program," Proc. Nat. Acad. Sci. USA, vol. 102, no. 21, pp. 7772–7775, 2005

[4] .[4] S. Yoon, J. Feng, and A. K. Jain, "Altered fingerprints: Analysis and detection," IEEE Trans. Pattern Anal. Mach. Intell., vol. 34, no. 3, pp. 451– 464, Mar. 2012.

[5]

[6] E. Tabassi, C. Wilson, and C. Watson, "Fingerprint image quality," Nat. Inst. Standards Technol., Gaithersburg, MD, USA, Tech. Rep. NISTIR 7151, Aug. 2004.

[7] F. Alonso-Fernandez, J. Fi_errez-Aguilar, J. Ortega-Garcia, J. Gonzalez-Rodriguez, H. Fronthaler, K. Kollreider, and J. Big€un, "A comparative study of fingerprint image-quality estimation methods," IEEE Trans. Inf. Forensics Security, vol. 2, no. 4, pp. 734–743, Dec. 2007.

[8]

[9] [7]L. Hong, Y. Wan, and A. K. Jain, "Fingerprint image enhancement: Algorithm and performance evaluation," IEEE Trans. Pattern Anal. Mach. Intell., vol. 20, no. 8, pp. 777–789, Aug. 1998.

[10] J. Feng, J. Zhou, and A. K. Jain, "Orientation field estimation for latent fingerprint enhancement," IEEE Trans. Pattern Anal. Mach. Intell., vol. 35, no. 4, pp. 925–940, Apr. 2013.