Scientific Journal Impact Factor (SJIF) : 1.711
International Journal of Modern Trends in Engineering and Research
ISSN (ONLINE) : 2349 - 9745
ISSN (PRINT) : 2393 - 8161

# PURIFICATION DETECTION AND RECTUS DISTORTED FINGERPRINT

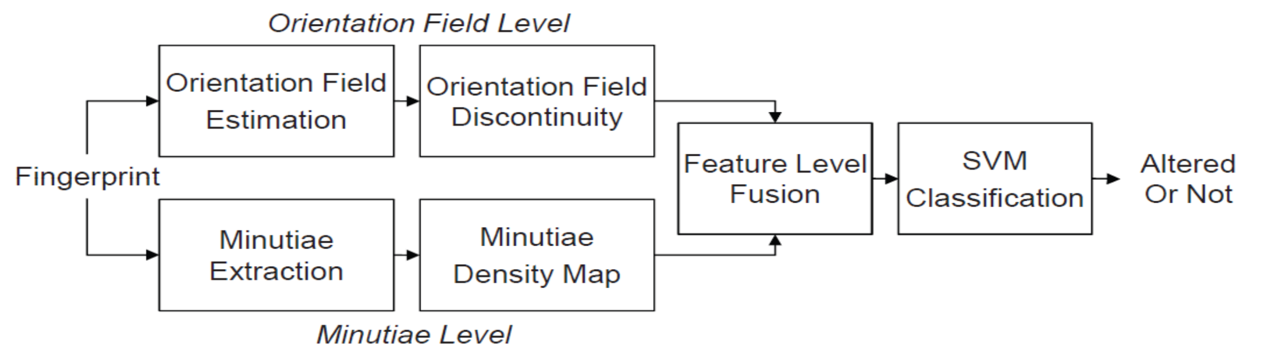
Avinash Konduri[1], N.Uma Rani[2], K.Jaya Shree[3]

[1,2,3] *Assistant Professor,Christu Jyothi Institute Of Technology and Science*

**Abstract**—Distortion flexibility of fingerprints is one of the main causes of false non-match. Although this problem applies to all fingerprint recognition applications, it is dangerous, especially for a negative recognition applications, such as your favorite DVD duplication and applications. In such applications, it can be malicious users to consciously distort their fingerprints to avoid identification. In this article, we have proposed new algorithms for detecting and correcting distortions in the skin fingerprint images at one. Disclosure of Distortion problem of classification as second-class, which are used Ridge Registered orientation map and the second map as feature vectors are seeded SVM training to perform the task of classification. And the perceived distortion correction (or an estimate of the distortion field equivalent) The problem with the gradient, where he became a distorted fingerprint output of the distortion field. To solve this problem, and a database (called the reference) fingerprints of different database distorted signal corresponding sectors distortion built stage now, and then point the Internet, the nearest neighbor fingerprint input reference database, and it distorts the field used is responsible for the conversion of the fingerprint input normal one. Promising results were obtained three databases which contain many fingerprints distorted, FVC2004 DB1, Tsinghua distorted fingerprint database, and the background fingerprint database NIST SD27.

## I. INTRODUCTION

Compiling case studies of incidents where individuals were found to have altered their fingerprints for circumventing AFIS, Investigating the impact of fingerprint alteration on the accuracy of a commercial fingerprint matcher, Classifying the alterations into three major categories and suggesting possible countermeasures, developing a technique to automatically detect altered fingerprints based on analyzing orientation field and minutiae distribution, and evaluating the proposed technique and the NFIQ algorithm on a large database of altered fingerprints provided by a law enforcement agency. Experimental results show the feasibility of the proposed approach in detecting altered fingerprints and highlight the need to further pursue this problem. The consequence of low quality fingerprints depends on the type of the fingerprint recognition system. A fingerprint




Flowchart of the proposed algorithm

recognition system can be classified as either a positive or negative system. In a positive recognition system, such as physical access control systems, the user is supposed to be cooperative and wishes to be identified. In a negative recognition system, such as identifying persons in watchlists and detecting multiple enrollment under different names, the user of interest (e.g., criminals) is supposed to be uncooperative and does not wish to be identified. In a positive recognition system, low quality will lead to false reject of legitimate users and thus bring inconvenience. Hence it is especially important for negative fingerprint recognition systems to detect low quality fingerprints and improve their quality so that the fingerprint system is not compromised by malicious users. Degradation of fingerprint quality can be photometric or geometrical. Photometric degradation can be caused by non-ideal skin conditions, dirty sensor surface, and complex image background (especially in latent fingerprints). Geometrical degradation is mainly caused by skin distortion.

## II. RELATED WORK

Since existing fingerprint quality assessment algorithms are designed to examine if an image contains sufficient information (say, minutiae) for matching, they have limited capability in determining if an image is a natural fingerprint or an altered fingerprint. Obliterated fingerprints can evade fingerprint quality control software, depending on the area of the damage. If the affected finger area is small, the existing fingerprint quality assessment software may fail to detect it as an altered fingerprint. 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.

The proposed algorithm based on the features extracted from the orientation field and minutiae satisfy the three essential requirements for alteration detection algorithm:

1) Fast operational time,
2) High true positive rate at low false positive rate, and
3) Ease of integration into AFIS.

## III. SYSTEM PREMELERIES

### 3. 1. DETECTION OF ALTERED FINGERPRINTS

#### 3.1.1. NORMALIZATION

An input fingerprint image is normalized by cropping a rectangular region of the fingerprint, which is located at the center of the fingerprint and aligned along the longitudinal direction of the finger, using the NIST Biometric Image Software (NBIS). This step ensures that the features extracted in the subsequent steps are invariant with respect to translation and rotation of finger.

#### 3.1.2. ORIENTATION FIELD ESTIMATION

The orientation field of the fingerprint is computed using the gradient-based method. The initial orientation field is smoothed averaging filter, followed by averaging the orientations in pixel blocks. A foreground mask is obtained by measuring the dynamic range of gray values of the fingerprint image in local blocks and morphological process for filling holes and removing isolated blocks is performed.

#### 3.1.3. ORIENTATION FIELD APPROXIMATION

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

#### 3.1.4. FEATURE EXTRACTION

Volume 02, Issue 12, [December – 2015] ISSN (Online):2349–9745 ; ISSN (Print):2393-8161

The error map is computed as the absolute difference between and used to construct the feature vector.

### 3.2 ANALYSIS OF MINUTIAE DISTRIBUTION

A minutia in the fingerprint indicates ridge characteristics such as ridge ending or ridge bifurcation. Almost all fingerprint recognition systems use minutiae for matching. In addition to the abnormality observed in orientation field, we also noted that minutiae distribution of altered fingerprints often differs from that of natural fingerprints.

Based on the minutiae extracted from a fingerprint by the open source minutiae extractor in NBIS, a minutiae density map is constructed by using the Parzen window method with uniform kernel function.

## IV. CONCLUSIONS

False non-match rates of fingerprint matchers are very high in the case of severely distorted fingerprints. This generates a security hole in automatic fingerprint recognition systems which can be utilized by criminals and terrorists. For this reason, it is necessary to develop a fingerprint distortion detection and rectification algorithms to fill the hole. 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 SVM classifier is trained to classify the input fingerprint as distorted or normal. For distortion rectification (or equivalently distortion field estimation), 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. The experimental results on FVC2004 DB1, Tsinghua DF database, and NIST SD27 database showed that the proposed algorithm can improve recognition rate of distorted fingerprints evidently. The proposed algorithm based on the features extracted from the orientation field and minutiae satisfies the three essential requirements for alteration detection algorithm:

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.

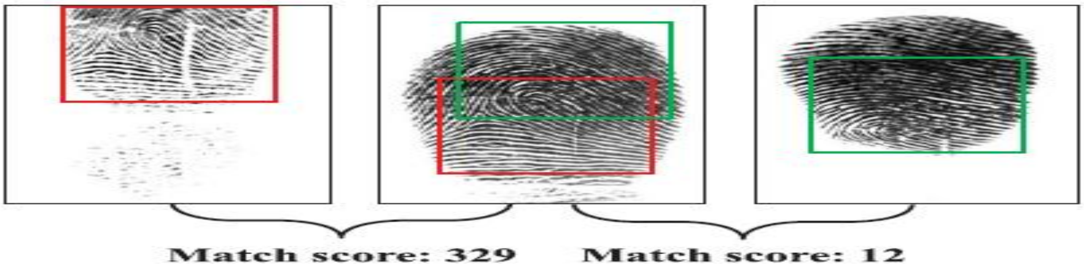



*FIG: DETECTION MECHANISM*

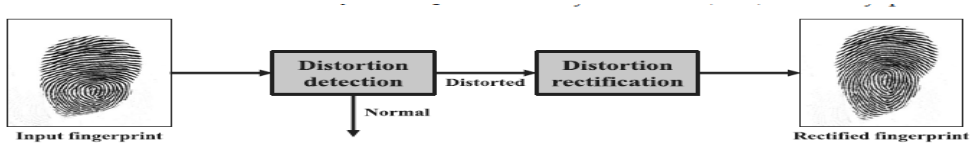



*FIG: DETECTION SYSTEM*

## REFERENCES

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

[2] D. Maltoni, D. Maio, A. K. Jain, and S. Prabhakar, Handbook of Fingerprint Recognition, 2nd ed. Berlin, Germany: Springer-Verlag, 2009.

[3] FVC2006: The fourth international fingerprint verification competition. (2006). [Online]. Available: http://bias.csr.unibo.it/fvc2006/

[4] 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.

[5] Neurotechnology Inc., VeriFinger. (2009). [Online]. Available: http://www.neurotechnology.com

[6] 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.

[7] 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.

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

[9] 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.

[10] J. Fi_errez-Aguilar, Y. Chen, J. Ortega-Garcia, and A. K. Jain, "Incorporating image quality in multi-algorithm fingerprint verification," in Proc. Int. Conf. Biometrics, 2006, pp. 213–220.

[11] 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.

[12] S. Chikkerur, A. N. Cartwright, and V. Govindaraju, "Fingerprint enhancement using STFT analysis," Pattern Recognit., vol. 40, no. 1, pp. 198–211, 2007.

[13] F. Turroni, R. Cappelli, and D. Maltoni, "Fingerprint enhancement using contextual iterative filtering," in Proc. Int. Conf. Biometrics, 2012, pp. 152–157.

[14] 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.

[15] X. Yang, J. Feng, and J. Zhou, "Localized dictionaries based orientation field estimation for latent fingerprints," IEEE Trans. Pattern Anal. Mach. Intell., vol. 36, no. 5, pp. 955–969, May 2014.

[16] R. M. Bolle, R. S. Germain, R. L. Garwin, J. L. Levine, S. U. Pankanti, N. K. Ratha, and M. A. Schappert, "System and method for distortion control in live-scan inkless fingerprint images," U.S. Patent No. 6 064 753, May 16, 2000.