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Efficient Fingerprint Rectification System

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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 de duplication applications. In such applications, malicious users may purposely distort their fingerprints to evade identification. In this project, we proposed novel method 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 fingerprint feature vector is created and a SVM classifier is trained to perform the classification task. Here we use 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 different latent Fingerprints.*

Keywords: Fingerprints, Classification task

I. INTRODUCTION

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 watchlist and de duplication applications. In such applications, malicious users may purposely distort their fingerprints to evade identification. In this project, we proposed novel method to detect and rectify skin distortion based on a single fingerprint image[1][2][3]. Distortion detection is viewed as a two-class classification problem, for which the fingerprint feature vector is created and a SVM classifier is trained to perform the classification task. Here we use a database (called reference database) of various distorted reference fingerprints and corresponding distortion fields is built in the offline stage[6], 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 different latent fingerprints[4][5].

II. BACKGROUND

Technologies used in this project:

- **NetBeans** is an integrated development environment (IDE) for Java. NetBeans allows applications to be developed from a set of modular software components called modules. NetBeans runs on Windows, macOS, Linux and Solaris. In addition to Java development, it has extensions for other languages like PHP, C, C++, HTML5 and JavaScript. Applications based on NetBeans, including the NetBeans IDE, can be extended by third party developers.
- **GlassFish** is an open-source Jakarta EE platform application server project started by Sun Microsystems, then sponsored by Oracle Corporation, and now living at the Eclipse Foundation and supported by Payara, Oracle and Red Hat. Built on a modular kernel powered by OSGi, GlassFish runs straight on top of the Apache Felix implementation. It also runs with Equinox OSGi or Knopflerfish OSGi runtimes. HK2 abstracts the OSGi module system to provide components, which can also be viewed as services. Such services can be discovered and injected at runtime.

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III. EXISTING SYSTEM

A) How it Actually Works

In Existing System, 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.

B) Drawbacks of the Existing System

- Distorted finger treated as false fingerprint
- Late declaration of result
- Less awareness about current system.

IV. PROPOSED SYSTEM

A) How it Actually Works

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.

a) Advantages

- This system has high capacity
- Less time consuming
- New finger print obtained with normal and distorted feature
- User can do transaction process safely
- Filtering method are used to remove noice from image
- Local entropy thresholding and alternative sequential filter methodology is implemented to extract

B) Algorithm used

A Orientation Map Extraction: Orientation is an angle shaped by the ridge inclination and the horizontal line. The ridge has no direction, the term orientation is used instead and the angle varies from 0 to 180. The most simple method is used for orientation map extraction is based on gradient method. First, the horizontal and vertical gradients are computed at every picture element using sobel operator. Sobel operator is employed in image processing and computer vision, specifically among edge detection. Image are divided in tiny blocks of size k computed the angle by analysing the block. The operator uses 2 three kernels that are convolved with the initial image to seek out approximations of the derivatives- one for horizontal changes and one for vertical changes

$$\mathbf{G}_x = \begin{bmatrix} -1 & 0 & +1 \\ -2 & 0 & +2 \\ -1 & 0 & +1 \end{bmatrix} * \mathbf{A}$$

$$\mathbf{G}_y = \begin{bmatrix} +1 & +2 & +1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{bmatrix} * \mathbf{A}$$

$$\mathbf{G} = \sqrt{\mathbf{G}_x^2 + \mathbf{G}_y^2}$$

$$\mathbf{\Theta} = \operatorname{atan}\left(\frac{\mathbf{G}_y}{\mathbf{G}_x}\right)$$

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V. Results And Discussions

Figure 1: Login page

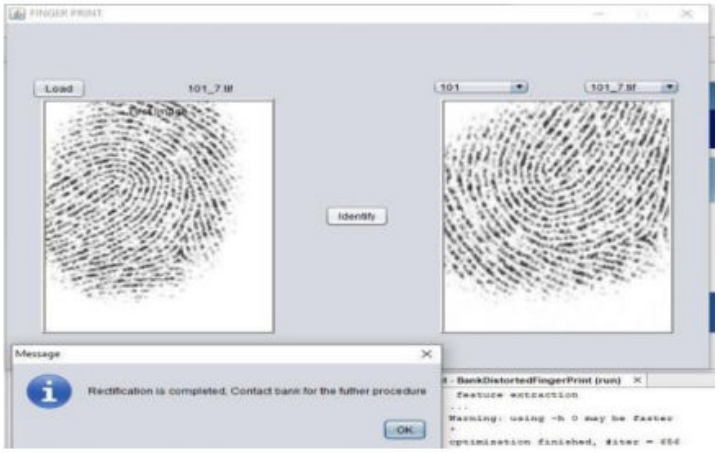

Figure 2: distorted rectified fingerprint

Figure 3: Normal rectified fingerprint

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V. CONCLUSION

The proposed system is not a conclusion it is a prediction 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 watchlist and de duplication applications. In such applications, malicious users may purposely distort their fingerprints to evade identification. In this project, we proposed novel method 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 fingerprint feature vector is created and a SVM classifier is trained to perform the classification task. Here we use 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 different latent fingerprints

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