Crime Investigation System using Biometrics

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Abstract: *A fingerprint is the feature pattern on the finger. It is proved through strong evidences that each fingerprint is almost unique in nature. Each individual retains his own fingerprints with the permanent and durable uniqueness. Hence fingerprints are being adapted for identification and forensic investigation. The fingerprint recognition problem can be grouped into two sub-categories: one is termed as fingerprint verification and while the other is termed as fingerprint identification. Additionally, apart from the manual approach of fingerprint recognition by the experts, fingerprint recognition here is usually referred as AFRS (Automatic Fingerprint Recognition System), which is drastically program-based. The proposed system presents the variation of Fast Fourier Transform on finger print recognition by fast fingerprint minutiae extraction and recognition algorithm that improves the clarity between the ridge and valley structures of the supposed to be provided finger print images in accordance with the frequency as well as the orientation of the local ridges and extracting correct minutiae.*

Key Words: Binarization, Segmentation, Minutae Extraction, Minutae marking.

1. Introduction

With the introduction of biometrics technology which is an advanced computer techniques now widely adopted as a front line security measure for both identity verification and crime detection, and also others an effective crime deterrent. In an increasingly digital world, reliable personal authentication has become an important human computer interface activity. Fingerprint recognition could be very complex pattern recognition problem. It is difficult to design accurate algorithms that are capable of extracting prolific features and comparing them in a robust way, especially in poor quality fingerprint images and when low-cost acquisition devices with small area are adopted. There is a greatest misconception that the fingerprint recognition is a fully solved problem considering it was one of the first applications of all amongst machine pattern recognition.

1.1 Biometrics

Biometrics is an automated method that recognizes people based on their physical and action characteristics, and is a field that used to authenticate a certain individuals characteristics, recognize a person's character, or study a person's measurable characteristics. Among the different biometrics, like face, hand, iris, voice and many others, fingerprints is the most dominant biometric technology in commercial applications due to their distinctiveness, persistence, accuracy, throughput, size and cost of readers.

1.2 Exigency

The time taken for detecting fingerprints is minimum .The Proposed system is useful to investigate the current techniques for fingerprint recognition. The Proposed system is divided into image-preprocessing, feature extraction and feature match. Some optimization at coding level and algorithm level are proposed to improve the performance of fingerprint recognition system with the variation of FFT on stored images. The Proposed system is useful for the low quality fingerprint images. Variation of FFT value on samples produces more accurate results.

2. Literature Survey

We have reviewed the study of the Fingerprint recognition using level 3 extraction method by Chandra Prakash Singh, Susheel Jain, Anurag Jain, International Journal Of Engineering And Computer Science [ISSN:2319-7242 Volume 3 Issue 1 January, 2014].
Their work primarily concentrates on the extraction of patterns from pore extraction and matching.

3. Notion

The image feed is thus far the pioneer process for the further image processing stages. The Proposed system identifies the fingerprints of a certain person from the

criminal database by matching the fingerprints with all the fingerprints stored in the database .And the output of the fingerprint matching will be in the form of percentage .Suppose in the case of low quality fingerprint images if certain fingerprint obtain from crime scene is not blur or not detected completely then with the help of percentage detection we can detect that particular criminal.

3.1 Preprocessing Steps

3.1.1 Binarization

After the filtering process Binarization takes place on the filtered fingerprint image. Binarization means converting gray scale image into binary format. Binarization is a process where each pixel in an image is converted into one bit and you assign the value as '1' or '0'.

3.1.2 Segmentation

Segmentation means dividing the raw fingerprint image into segments. The goal of segmentation is simplification and changes the respective representation of an image into much more meaningful and easier to analyze. Segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics.

3.2 Minutae Extraction

3.2.1 Thinning

After the binarization, thinning process takes place thinning means the width of the pixel is reduced to one pixel. After the thinning process the raw fingerprint image is in binary format only.

3.2.2 Minutae Marking

After the thinning process the process of minutiae marking takes place in minutiae marking the false minutiae points are marked which are ridge ending and bifurcation points the points are marked on the basis of the points which are ending abruptly and which contain blur points are marked.

3.3 Post processing Steps

3.3.1 False Minutae Removal

After the Minutiae marking process minutiae removal takes place in which the false minutiae which we have

marked in previous steps are removed after the removal the accuracy of the fingerprint images is increased.

3.3.2 Fast Fourier Transform

A fast Fourier transform (FFT) is an algorithm that computes the Fourier transforms (DFT) and its respective inverse. Fourier analysis is designed converts time (or space) to relative frequency and vice versa; an FFT is meant for rapid computations such as transformations using factorization of the DFT matrix into the product of sparse factors. Since there is presence of such diversification, Fast Fourier transforms render a brief use in many applications of engineering, science, and mathematics fields .FFT at different levels can be applied for 0.1 to 0.9.and percentage for fingerprint matching will be calculated for each finger .Different tables are maintained for each finger with three images and applied FFT

From 0.1 to 0.9 levels. We divide the provided image into small processing blocks (32 by 32pixels) and execute the Fourier transform according to for u = 0, 1, 2, ..., 31

and v= 0, 1, 2, ..., 31. For the purpose of image enhancement a specific block by its dominant frequencies, we simply multiply the FFT of the block by the magnitude a set of times. Where the assets magnitude doesn't change.

$$F(u,v) = \sum_{x=0}^{M-1} \sum_{y=0}^{N-1} f(x,y) \times exp\left\{-j2\pi \times \left(\frac{ux}{M} + \frac{vy}{N}\right)\right\}$$

$$g(x,y) = F^{-1}\{F(u,v) \times |F(u,v)|k\}$$

$$f(x,y) = \frac{1}{MN} \sum_{x=0}^{M-1} \sum_{y=0}^{N-1} F(u,v) \times exp\left\{j2\pi \times \left(\frac{ux}{M} + \frac{vy}{N}\right)\right\}$$

4. Essentialities

The output of the fingerprint matching will be in the form of percentage .Suppose in the case of low quality fingerprint images if certain fingerprint obtain from crime scene is not blur or not detected completely then

with the help of percentage detection we can detect that particular criminal.

4.1 Functional Requirements

4.1.1 Data Source

Data source used for storing data of system. Also it compares the coherence bound provided by client and according to this bound it responses to central node.

4.1.2 Minutae Extractor

The scaling of patterns with the scaling of another image is minutia. Each image consists of a pattern that will resemble with the pattern in similar image only. So the extraction process of such recognizable patterns could be harnessed as a tool to support the data comparison scheme.

4.1.3 Fourier transformation

There are several ways to define the Fourier transform of a function f: R C. We define it using an integral representation and state some basic uniqueness and inversion properties, without proof.

4.1.4 Minutia Matcher

It plays an important role in process of Fingerprint matching .In this process the provided minutia is checked with available minutia points on a finger.

4.2 Non Functional Requirement

4.2.1 Response Time

The system shall give response in minimum time after query is figured by user.

4.2.2 User Interface

The user interface should be simple to use by user, also it should give response in minimum time span.

4.2.3 Design Constraints

Database: - MySql database an open source and free.

Operating System: - Development environment needed is windows 2000.

Domain: - Image Processing.

Software: - Windows 7 and above, Visual studio.

5. Figures and Tables

In this table criminal details gets inserted in the table, it has given particular id no and its description .Name of the criminal and the particular fingerprint image its descriptions will be taken in this table.
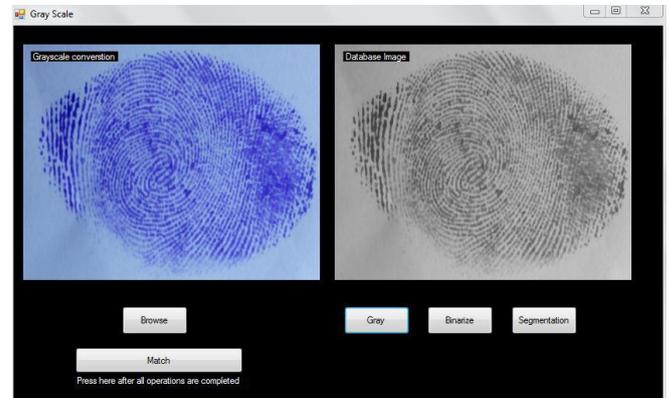

Fig -1: Conversion of image into grey scale.

Table -1: Name of the Table

ID	C1	C2	C3	C4
Name	Jon	Roy	Adler	Raul
Percentage	50%	80%	70%	30%

6. CONCLUSIONS

The proposed system is helpful to both user and federals. The system is developed considering all issues related to all users included. Variety of customers can use this system if they know how to operate the proposed system. The product is user friendly, low-cost and does not need any special training. Our scheme would prove time saving and ease for fingerprint recognition to many people using the system. The advantages of the system make it more robust.

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REFERENCES

[1]. Rossmin Texture Algorithm Proc. of Intl Conference on Processing of Image (ICIP), pp.282-285, Thessaloniki, Greece, Oct 7 - 10, 2001.

[2]. Wei L. Fingerprint classification using singularities detection. International Journal of Science and Research (IJSR). 2008;2(1).

[3]. International Journal on Computer Architecture and its Applications (IJN-CAA) Society of Digital Information and Wireless Communications, 2012 (ISSN2220-9085)

[4]. Feature extraction algorithm International Journal of Advanced Research in Computer Science and Software Engineering 2 (10), October- 2012, pp.292-2

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