

Fingerprint Recognition Using Bozorth3 Algorithm For The Traffic Police

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ABSTRACT

Fingerprints are rich in details which are in the form of discontinuities in ridges known as minutiae and are unique for each person. One of the most important tasks considering an automatic fingerprint recognition system is the minutiae biometric pattern extraction from the captured image of the fingerprint. The fingerprint matcher compares features by using Digital Image processing from input search point against all appropriate driving licences in the database to determine if a probable match exists. With this implementation, there'll be no need to carry documents along. A single fingerprint and an image will be enough to recognise and verify the individual and the vehicle. Mobile platforms such as smart-phones and tablet computers have attained the technological capacity to perform tasks beyond their intended purposes. The steady increase of processing power has enticed researches to attempt increasingly challenging tasks on mobile devices with appropriate modifications over their stationary counterparts. In this work we describe main features of software modules developed for Android smartphones that are used by RTO officers for licence and vehicle documents verification. In this project we use biometric approach

Like fingerprints and vehicle number plates for verification.

Keyword - Biometric systems, Fingerprints, Standardized fingerprint model, synthesize fingerprint.

1. INTRODUCTION

fingerprint recognition is one of the most important biometric technologies based on fingerprint distinctiveness, persistence and ease of acquisition. Although there are many real applications using this technology, its problems are still not fully solved, especially in poor quality fingerprint images and when low-cost acquisition devices with a small area are adopted. In fingerprint recognition process, the important step which affects on system accuracy is matching between template and query fingerprint.

1.1 A model of standardized fingerprint –

A fingerprint is the reproduction of a fingertip epidermis, produced when a finger is pressed against a smooth surface. The most evident structural characteristic of a fingerprint is its pattern of interleaved ridges and valleys. Ridges and valleys often run parallel but they can bifurcate or terminate abruptly sometimes. The minutia, which is created when ridges and valleys bifurcate or terminate, is important feature for matching algorithms.

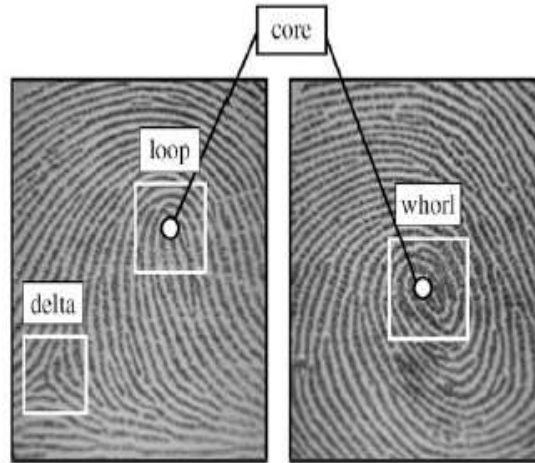


Fig 1: Special regions (white boxes) and core points (small circles) in fingerprint images

1.2 Standardized fingerprint model -

From the given images of fingerprint, which are low quality or scaled or rotated together, we propose a model to create a new fingerprint image, which contains features (ridge line and minutia) of the original ones.

The model includes the following steps:

Pre-processing fingerprint image: for each image, we recognize fingerprint area, thinned ridge lines and extract minutiae.

Finding and adjusting parameter sets: at first, choose a fingerprint which has largest fingerprint area as mean image. Then, we use Genetic Algorithms in to find the transformation between mean image and others.

Synthesizing fingerprint: with the transformations in previous step, we re-calculate parameters' value (to get exact value for parameters), add supplement ridge lines and minutiae to mean fingerprint.

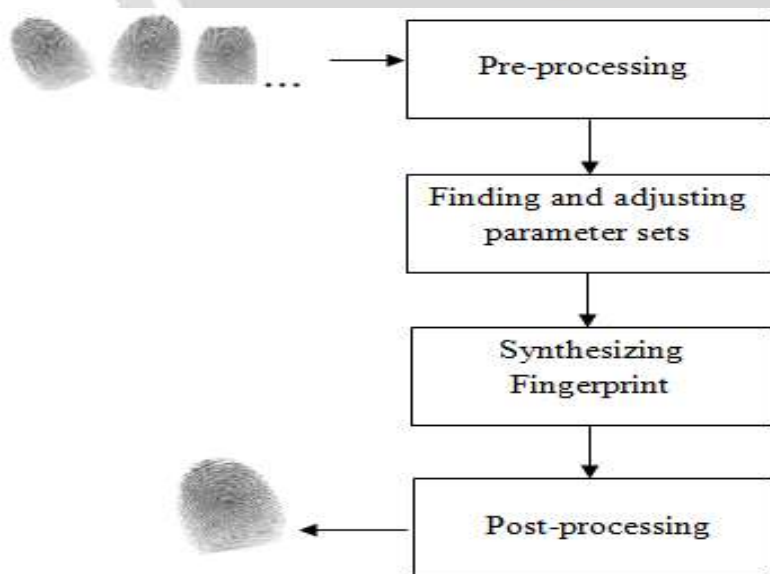


Fig.2 Synthesizing Fingerprint Model

1.3 Mathematical Background -

$$S = \{\{I\},\{P\},\{O\}\}$$

Where,

I = Input Set

P = Processing Set

O = Output Set

➤ Input

- Input I = { Login, ThumbScanImage }
- Login = { Username, Password }
- ThumbScanImage = {Thumb Scan Image1, Thumb Scan Image2.....Thumb Scan Imagen }s
- Username={Username1,Username2.....Usernamen }
- Password={Password1,Password2.....Passwordn }

➤ Processing

Processing P = { matchscore, sendDetails }

➤ Output

Output O = {Document }

2. GOALS AND OBJECTIVE -

- To identify a person's information through his/her finger prints and to make the person document free.
- The fingerprint recognition technique will help to identify whether the person is authorized to drive the vehicle or not.
- In the central database using Bozorth3 algorithm the image is matched with the images in the database with the match score.
- If a match is found then details of the respective image are sent to the mobile as a response.
- The details are then displayed on the screen.
- The system will automatically deduct fine from the person's bank account.

3. RELATED WORK –

Deciding the project topic was a herculean task in itself. We wanted to do an innovative project, such that the work done can actually solve real world problems. That's when we came up with the idea of designing a system for the traffic police. A system which can automate and speed up the process of checking the documents of a person driving a vehicle. After reviewing the present Number plate recognition system, we decided to come up with a better idea that to secure and make the present system easy to use and less complex. The system proposes an Android application to verify a person's documents using his/her thumb impression. After reading some research papers we decided to implement the idea.

Currently the traffic police use a manual process for identifying and verifying authority of a person. However, people have to face many problems with the current procedure used by the traffic police. According to public point of view there is no facility provided by the RTO which will make the person document free. The main problem with the existing system is that either people have to carry their documents or smart card, but there is possibility that the

information might get lost. Today android devices play an important role in our day to day life since most of the tasks can be done on android device. Since the people have to carry documents regarding the information of the vehicle, the police as well as people have to face many problems. Thus the traffic police app not only reduces the task of the police but also makes the person document free.

Application

- Reduce Vehicle Crime.
- To identify a persons information through his finger print.
- Reduce motorcycle / traffic related nuisance
- To make the person document free.

4. PROPOSED WORK

The NIST reference system uses a minutiae based matcher to authenticate a person's identity. Firstly, the minutiae detection algorithm relies of each gray scale input image in order to locate all minutia points (ridge ending and bifurcation). Then, the matching algorithm computes a match score between the minutia pairs from any two fingerprints using the location and orientation of the minutiae points. The matching algorithm is rotation and translation invariant. Finally, we consider that two fingerprints are from the same finger when the match score is higher than a threshold. The approach mainly involves extraction of minutiae points from the sample fingerprint images and then performing fingerprint matching based on the number of minutiae pairings among two fingerprints in question. It finally generates a percent score which tells whether two fingerprints match or not.

Biometric Fingerprint Device :

Through which fingerprint of a person will be accepted.

Android Mobile/Tablet:

Android Mobile/Tablet is used for various purposes such as the diagrammatic representation of the system architecture is given below :

User Modules:

- System activation after the user logs into the system
- The thumb impression of the driver will be captured and sent to the server.
- After getting details from the system, fine will be applied by the user

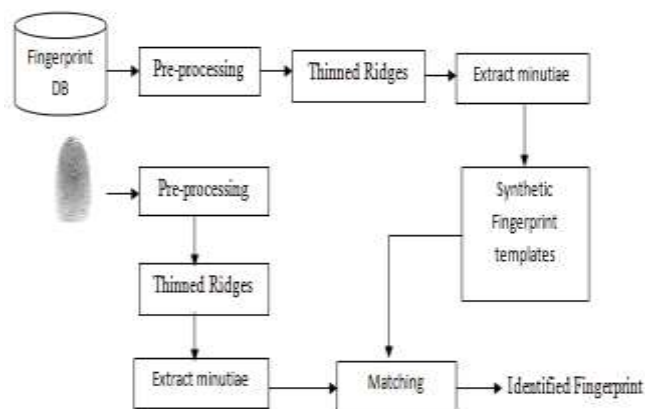


Fig.3 Fingerprint recognition using Standardized fingerprint model

System Module:

- Calculation of Matchscore for the input image
- Details to be sent to the user
- Automatic Fine deduction from the driver's account.

5. CONCLUSION

Fingerprint Recognition is used as a form of biometric to recognize identities of human beings. It includes all the stages from minutiae extraction from fingerprints to minutiae matching which generates a match score. Various standard techniques are used in the intermediate stages of processing. The traditional fingerprint recognition system takes more time for recognition because of pre processing and post processing steps of images and hence become impractical. We perform matching between mean fingerprint and other templates (FVC 2004 DB4 database, which has poor-quality fingerprints) to show the capability of the system

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BIOGRAPHIES

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