

A Review On Finger Print Detection Technique

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Abstract— Fingerprint analysis is the most essential part of human identification or human recognition. The biometric technique has been used to eye, facial, speech for recognition etc. In this paper we have discussion about the working of biometric system, pattern recognition. Review about the various technique used in finger print matching, image segmentation and its application. To mark the fingerprint from the image processing of Euclidean distance is required which will learn from the previous values and drive new values on the basis of current situations. In this paper, various techniques of image segmentation and fingerprint matching has been reviewed and discussed in terms of their outcomes.

Keywords— Correlation, Minutiae, Gabor Filters, Neural Network

I. INTRODUCTION

In a slight sense a fingerprint is the inscription left from the friction mount of a human finger. [1] The recovery of fingerprints from a crime scene is an important method of forensic science. Fingerprints are easily deposited on suitable surfaces (such as glass or metal or polished stone) by the natural secretions of sweat from the eccrine glands that are present in epidermal ridges. These are sometimes referred to as "Attempted Impressions". In a wider use of the term, fingerprints are the traces of an impression from the friction ridges of any part of a human or other primate hand. One print from the sole of the foot can leave an effect of friction roof. Deliberate impressions of fingerprints may be formed by ink or other substances transferred from the peaks of friction ridges on the skin to a relatively smooth surface such as a fingerprint card.

Fingerprint records usually have pads on the last pair of fingers and thumb, although fingerprint cards generally share under fingers. Human fingerprints are detailed, nearly unique, difficult to alter, and durable over the life of an individual, making them suitable as long-term markers of human identity. They can be employed by the police or other authorities to identify those who want to hide their identity, or to identify those who are incompetent or dead, and thus to identify themselves after the natural disaster are unable to. Fingerprint analysis, in use since the early 20th century, has led to many crimes being solved. [2]

Fingerprint biometrics is the cost effective and one of the most common methods for biometric system for different types of security system. Enhanced Fingerprint Identification Technique describes mathematical algorithms to overcome

the limitations faced while using the conventional fingerprint biometric systems.

For human being recognition or human identification the most essential part is finger print scanning. At present for fingerprint identification and recognition too many biometric techniques are used. We know that, a fingerprint contains a lot of key point like Y shape, delta, ridge ending, ridge starting, minutiae's pattern and etc.

Biometric techniques can be classified into three categories:

- Morphological analysis: fingerprints, iris of the eye, hand shape, facial features, venous network of the retina, and analysis of the veins.
- Analysis of biological traces: DNA, blood, saliva, urine, odor, thermographs.
- Behavioral analysis: speech recognition, keystroke dynamics, signature dynamics, how to walk. [3]

In present scenario, the various uses of fingerprint recognition are widespread like authentication to logon machine and others but still majorly for law enforcement applications. Expectations of increasing use of fingerprint credits are enhanced, which depends on small fingerprint capturing tools such as easy-to-use protection and awareness of some method. Fingerprint recognition is one of the techniques in biometrics which has a balance on all the properties. It is very convenient and reliable way to verify the person's Identity. Fingerprint is widely.

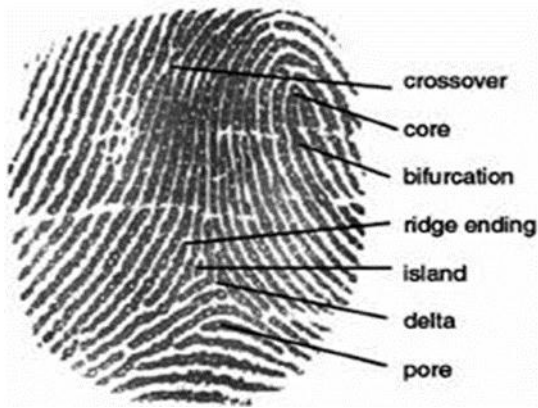


Fig 1 Fingerprint

II. HOW BIOMETRIC SYSTEM WORK

Block diagrams are two basic things of a biometric system. [4] First of all, the system in verification (or authentication) mode, in a biometric database, the museum compares one capture biometric one-to-one comparison with a specific template. Person it is done that is the person verification of a person involves three steps. [9] In the first phase, the reference model for all users is generated and stored in the model database In the second phase, some samples match the model to generate real and unholy scores and calculate the threshold. The third step is the testing phase

To compare this process, you can use a smart card, user name, or ID number (for example, pin) to indicate which template should be used. [Note 3] A common use of 'positive recognition' verification mode is "where many people are using the same identification to stop the goal". [4]

Second, in an attempt to establish an identity of an unknown person in identification mode, biometrics compares more than one against the database. The system will be able to identify the person if the comparison of biometric specimen in the template in the database is within the first set threshold Identity mode can be used either for 'positive policy' (there is no information about the template used for user use) or for the 'negative act' of the person "where the system is installed Is that person who refuses to be (clearly or explicitly)?" [4] The latter work can only be achieved through biometrics, because other people of personal identification like passwords, pins, or keys are ineffective.

From individual biometric information is captured and stored, during the enrolment. In later use, biometric information is detected at the time of enrolment and it is compared. The first time someone uses biometric systems is called enrolment

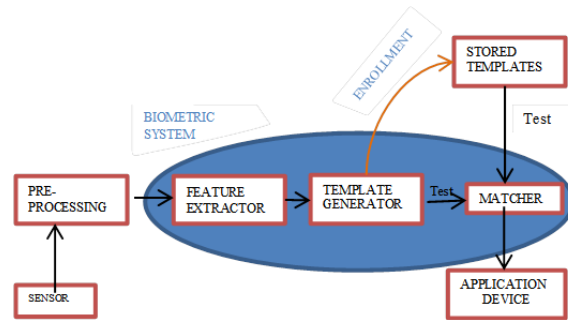


Fig 2 Block Diagram Biometric System

Note that it is important that such systems should be protected from the storage and generator of the biometric system.

The first block (sensor) is the interface between the real world and the system; It must get all the necessary data. Most of the time it is an image acquisition system, but it can modification according to the preferred characteristics. The second block performs all the necessary pre-processing: it is to remove artifacts from the sensor (for example, to remove background noise) to increase the input to use some sort of generalization etc. The necessary features are extract in the third block This step is an important step as the correct features need to be extracted in the optimal way. To create a template, an image of a vector or special multiplier is used. A template is a synthesis of the relevant characteristics extracted from the source. Measurement of biometric elements not used in comparative algorithms is left to reduce file size in template and protect Enrol i's identity [citation needed].

During the enrolment phase, the template is stored anywhere (on the card or in a database or inside). During the matching phase, the obtained template is passed to a matcher that compares it with other existing templates, estimating the distance between them using any algorithm (e.g. Hamming distance). Address the analysis of the template with matching program input. It will still be the output for any use or purpose (for example entering the nearby area) [citation needed].

III. METHODOLOGY

Signature verification system which verifies the authenticity of given signature of a person. The design of a system is divided into two stages:

1. Training stage
2. Testing stages

A training stage consists of four major steps: -

- a) Retrieval of a signature image from a database
- b) Image pre-processing

- c) Feature extraction
- d) Retrieval of a signature to be tested from a database
- e) Image pre-processing
- f) Feature extraction
- g) Map Features and Generate Results

IV. PATTERNS OF FINGERPRINT

There are three main fingerprint patterns:

- Arch
- Loops
- Whorls [7]



Fig 3 Patterns of Fingerprint

Now have a description and further sub type details of fingerprint patterns.

Table 1 Fingerprint Classes

Classes	Description	Figure
<p>LOOPS There is only one delta in a loop pattern, the recurve (loop around) passes through a hypothetical line drawn from the touch or delta to the core, and on the same side, the pattern exits as the exit.</p> <ul style="list-style-type: none"> 1. Ulnar loop 2. Radial loop 		
<p>WHORL A whorl pattern has two deltas. There are four types of whorl patterns:</p> <ul style="list-style-type: none"> 1. Plain whorl, 2. Central Pocket Loop whorl, 3. Double Loop whorl, 	<p>A whorl pattern consists of a series of almost concentric circles.</p>	

4.Accidental whorl		
<p>ARCH There are two types of arch patterns:</p> <ul style="list-style-type: none"> 1. Plain arch, 2. Tented arch 	<p>In an arch pattern, ridges flow in one side and flow out the opposite side. There are no deltas in an arch pattern</p>	

V. TECHNIQUES FOR FINGERPRINT MATCHING

There are three different techniques used for fingerprint matching are as follows.

- ✓ Ridge Feature Based Technique or Pattern Matching
- ✓ Correlation Based Technique
- ✓ Minutiae Based Technique
- ✓ Edge detection techniques

VI. IMAGE SEGMENTATION TECHNIQUE

- ✓ Region based techniques
- ✓ Clustering technique
- ✓ Split and merge technique
- ✓ Thresholding
- ✓ Image acquisition

VII. APPLICATIONS OF FINGER PRINT

The application of finger print is as followed:

- ✓ Image matching
- ✓ Machine learning
- ✓ Spatial representation
- ✓ Coastline boundaries
- ✓ Medical Imaging
- ✓ Locate tumors and other pathologies
- ✓ Measure tissue volumes
- ✓ Computer-guided surgery
- ✓ Diagnosis
- ✓ Treatment planning
- ✓ Study of anatomical structure
- ✓ Locate objects in satellite images (roads, forests, etc.)
- ✓ Face recognition [10]

- ✓ Fingerprint recognition
- ✓ Traffic control systems
- ✓ Brake light detection

VIII. LITERATURE REVIEW

In the fingerprint identification area, so far various types of work have been done. We had gone through various research papers, the work done till today and the methods used in each work are shown under this section:

In 2017 Umesh Singh Tomar, Abhinav Vidwans Have defines the various refined method of fingerprint like segmentation, FFT and Gabor Filters. The Gabor filter method is a very useful method because it is easy to implement for feature extraction. This technique can be used to recognize a person by its fingerprint image which conclude that the fingerprint is very fast and more accurate for more trusty and safety system. [1]

In 2016 A. T. Gaikwad, Pravin Yannawar, Vivek H. Mahale, Mouad.M.H. Ali [13] This paper is a brief review in the conceptual and structure of fingerprint recognition. There are four steps in the original fingerprint method system:

- 1) The sensor which is used for enrolment & recognition to capture the biometric data.
- 2) Pre-process phase, which is used to remove unwanted data and increase the clarity of the ridge structure using enhancement techniques.
- 3) Feature extraction stage which take the input
- 4) From the output of the preprocessing phase to remove fingerprint features.
- 5) Comparing comparison of acquire features with a template in the matching phase database.

Ritu Bhargava, Anchal Kumawat Neeraj Bhargava, in 2015 has normalized the fingerprint matching based on [6] Euclidean distance. It is a distance matching technique, which is widely known overview computational websites, image processing, computer graphics and patterns. According to the Euclidean distance formula, simply in the plane the distance between two points is map, and the resulting distance is match with the resulting distance of reference fingerprint for matching.

IX. LITERATURE GAP

1. In Future research work can be carried out to improve the recognition rate by neural network with fuzzy system.
This machine learning based algorithm holds humongous future scope and can be widely used and implemented in variety of applications. It can be combined with mobile phones to improve the Fingerprint scanner technology and make the use of it more efficient.
2. The development system is still a prototype version and needs to be reduced for reducing the time spent during fingerprint processing and for the number of false acceptance and the number of remedies made by algorithms. There is currently some work on some movement in the matching system, which is improving the problem of system
3. As a future direction, our intention is to improve the application so it is able to implement the palm detection in order to add new capabilities to the existing architecture.

X. CONCLUSIONS

As a challenging field in the field of biometrics, fingerprint analysis is one of the emerging techniques used for verification and identification of a person. Automatic minutiae extraction is an awfully decisive process. Due to the enormous potential of fingerprints as an effective method of identification, an effort has been made in the present work to analyses their correlation with features of fingerprints, gender and age of an individual. In this paper, various techniques of image segmentation, edge detection and fingerprint matching technique are reviewed and discussed.

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