

# A REVIEW ON FINGER PRINT RECOGNITION USING FAST FOURIOR TRANSFORM IN DIGITAL IMAGE PROCESSING

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## ABSTRACT

*Fingerprints have always been considered as basic element for personal recognition. from raw fingerprint images. We create pattern of ridges and furrows as well as the minutiae points to get unique fingerprint. Fingerprint based identification has been one of the most successful biometric techniques used for personal identifications an efficient scheme for fingerprint recognition was proposed. Initially, In this work a novel method for Fingerprint recognition is considered using a combination of **Fast Fourier Transform (FFT)** and Gabor Filters to enhancement techniques used for minutiae personal identification. Afingerprintisthusdefinedbytheuniquenessofthe local ridgecharacteristics and their relationships. Minutiae points are these localridgecharacteristics thatoccur eitherata ridge ending ora ridge bifurcation.*

**KEYWORDS:** Finger print, FFT, Enhancement, minutiae

## INTRODUCTION

Personal identification is to associate a particular individual with an identity. It plays a critical role in our society, thousands of organizations in financial services, health care, electronic commerce, telecommunication, government, etc. With the rapid evolution of information technology, people are becoming even more and more electronically connected. As a result, the ability to achieve highly accurate automatic personal identification is becoming more critical. A wide variety of systems require reliable personal authentication schemes to either confirm or determine the identity of individuals requesting their services. The purpose of such schemes is to ensure that the rendered services are accessed by a legitimate user, and not anyone else. Examples of these systems include secure access to buildings, computer systems, laptops, cellular phones and ATMs.

In the absence of robust authentication schemes, these systems are vulnerable to the wiles of an impostor. Traditionally, passwords (knowledge-based security) and ID cards (token-based security) have been used to restrict access to systems. The major advantages of this traditional personal identification are that

- They are very simple
- They can be easily integrated into different systems with a low cost.

## OVERVIEW

### FINGER PRINT TECHNOLOGIES

A growing number of biometric technologies have been proposed over the past several years, but only in the past 5 years have the leading ones become more widely deployed. Some technologies are better suited to specific applications than others, and some are more acceptable to users. We describe some leading biometric technologies:

Facial Recognition

Fingerprint Recognition

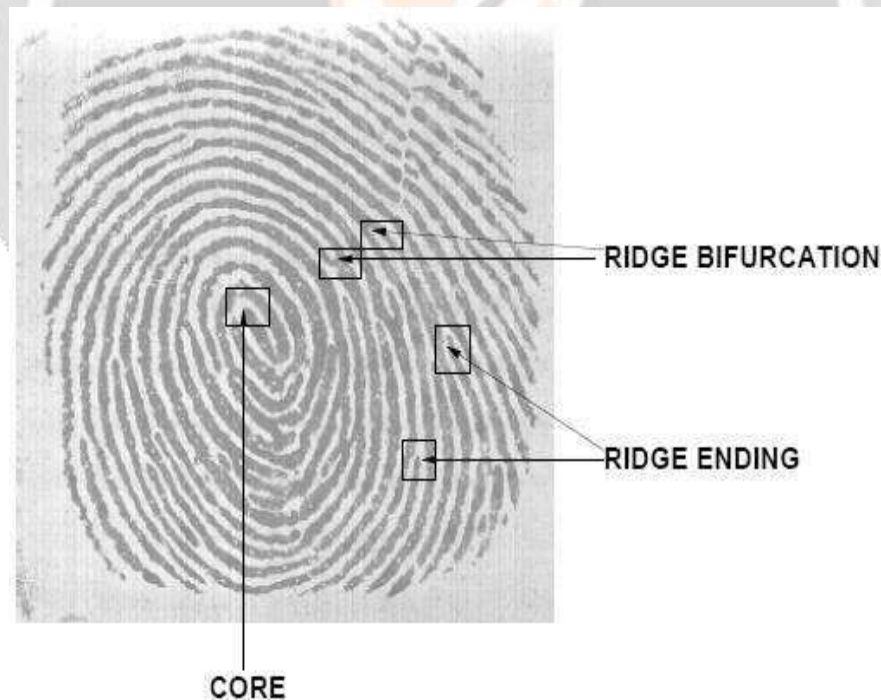
Hand Geometry

Iris Recognition

Signature Recognition








#### Fingerprint Recognition

Fingerprint recognition is one of the best known and most widely used biometric technologies. Automated systems have been commercially available since the early 1970s, and at the time of our study, we found there were more than 75 fingerprint recognition technology companies. Until recently, fingerprint recognition was used primarily in law enforcement applications



#### MINUTIAE

Minutiae, in fingerprinting terms, are the points of interest in a fingerprint, such as bifurcations (a ridge splitting into two) and ridge endings.

RIDGE TERMINATION	
BIFURCATION	
INDEPENDENT RIDGE	
DOT OR ISLAND	
LAKE	
SPUR	
CROSSOVER	

**FINGER PRINT ENHANCEMENT BY FOURIER TRANSFORM**

We divide the image into small processing blocks (32 by 32 pixels) and perform the Fourier transform according to:

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

For  $u = 0, 1, 2, \dots, 31$  and  $v = 0, 1, 2, \dots, 31$ .

In order to enhance a specific block by its dominant frequencies, we multiply the FFT of the block by its magnitude a set of times. Where the magnitude of the original FFT =  $abs(F(u,v)) = |F(u,v)|$

We get the enhanced block according to

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

where  $F^{-1}(F(u,v))$  is done by:

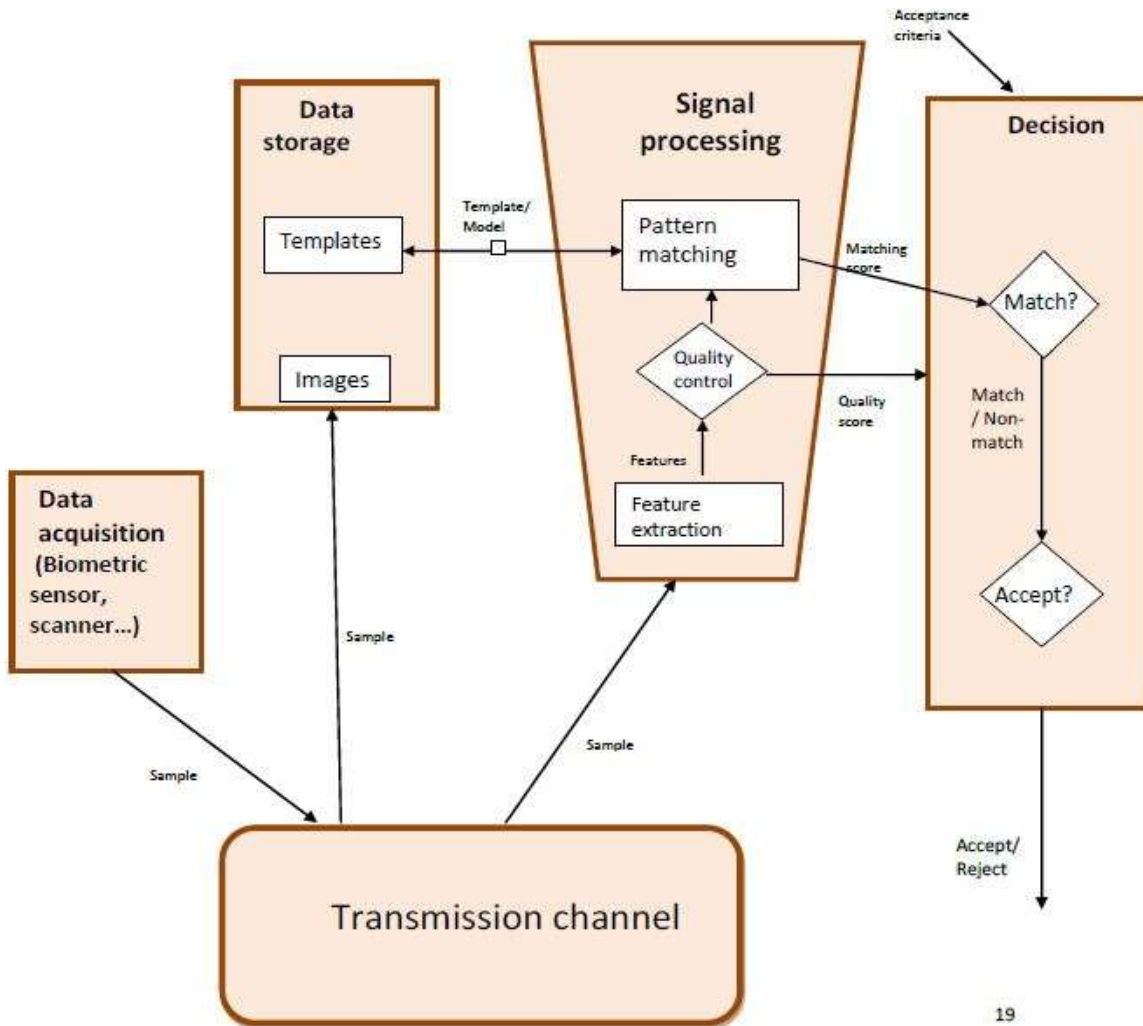
$$f(x, y) = \frac{1}{MN} \sum_{x=0}^{M-1} \sum_{y=0}^{N-1} F(u, v) \times \exp \left\{ j2\pi \times \left( \frac{ux}{M} + \frac{vy}{N} \right) \right\}$$

The k in formula is an experimentally determined constant, which we choose  $k=0.45$  to calculate. While having a higher "k" improves the appearance of the ridges, filling up small holes in ridges, having too high "k" can result in false joining.

**METHODOLOGY**

A complete minutiae extraction scheme for automatic fingerprint recognition systems is presented. The proposed method uses improving alternatives for the image enhancement process, leading consequently to an increase of the reliability in the minutiae extraction task.

**FLOW CHART**



19

A fingerprint recognition system constitutes of fingerprint acquiring device, minutia extractor and minutia matcher

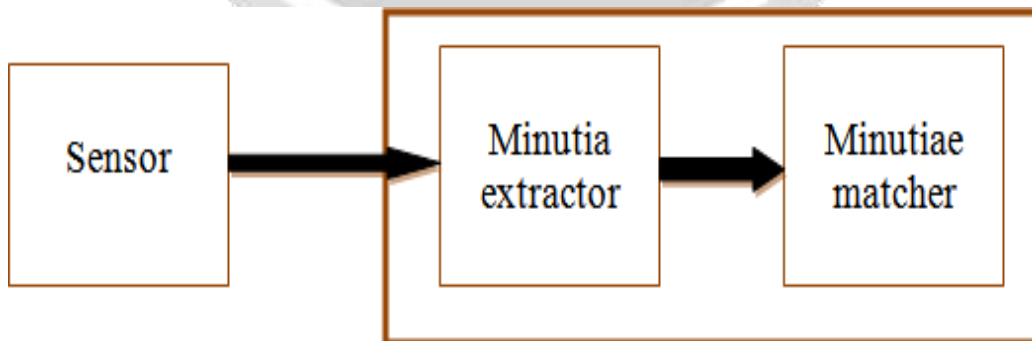


Figure 1s: Simplified Fingerprint Recognition System

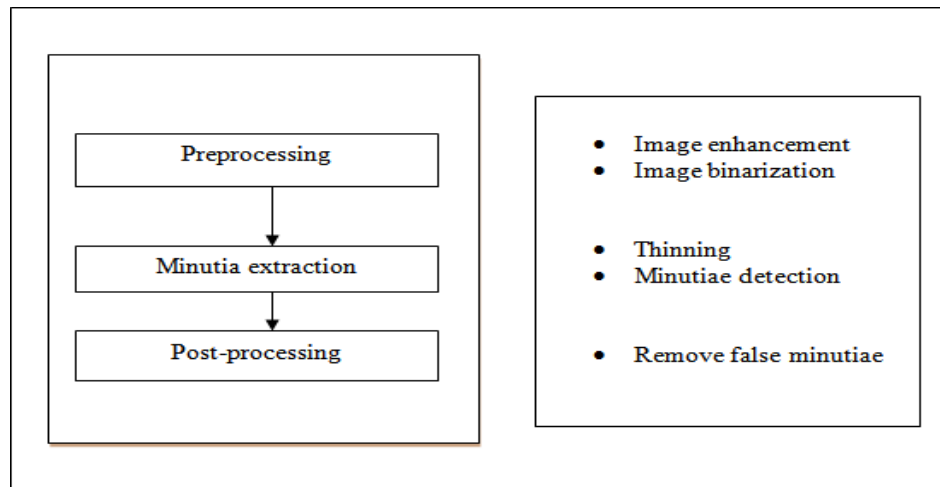


Figure 2 Minutia Extractor

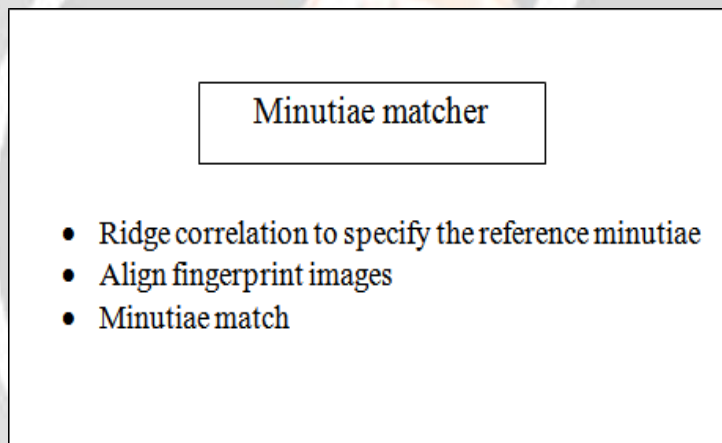


Figure3. Minutia Matcher

**Finger print image enhancement**

Fingerprint Image enhancement is used to make the image clearer easy further operations. Since the fingerprint images acquired from scanner or any other media are not assured with perfect quality, those enhancement methods, for increasing the contrast between ridges and valleys and for connecting the false broken points of ridges due to insufficient amount of ink, are very useful for keep a higher accuracy to fingerprint recognition.



## CONCLUSION

The reliability of any automatic fingerprint system strongly relies on the precision obtained in the minutiae extraction process. A number of factors damage the correct location of minutiae. Among them, poor image quality is the one with most influence. The proposed alignment-based elastic matching algorithm is capable of finding the correspondences between minutiae without resorting to exhaustive search. There is a scope of further improvement in terms of efficiency and accuracy which can be achieved by improving the hardware to capture the image or by improving the image enhancement techniques. So that the input image to the thinning stage could be made better, this could improve the future stages and the final outcome.

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