

Review on Fingerprint Recognition

Aditya Soni¹, Saurabh Anand²

¹Department of Information Technology, Poornima College of Engineering, Jaipur, India

Email Id: 2014pceitaditya@poornima.org

²Asst. Professor, Department of Information Technology, Poornima College of Engineering, Jaipur, India

Email id: saurabhanand@poornima.org

Abstract—Biometric system works on behavioral and physiological biometric parameters to spot a person. Every fingerprint contains distinctive options and its recognizing system primarily works on native ridge feature local ridge endings, minutiae, core point, delta, etc. However, fingerprint pictures have poor quality thanks to variations in skin and impression conditions. In personal identification, fingerprint recognition is taken into account the foremost outstanding and reliable technique for matching with keep fingerprints within the information. Minutiae extraction is additional essential step in fingerprint matching. This paper provides plan regarding numerous feature extraction and matching algorithms for fingerprint recognition systems and to seek out that technique is additional reliable and secure.

Keywords— *fingerprint images, minutiae extraction, ridge endings, ridge bifurcation, fingerprint recognition.*

I. INTRODUCTION

Biometric identification of someone is quick, easy-to-use, precise, trustworthy and economical over ancient knowledge-based and token-based ways. A biometric system contains in the main a picture capturing module, a feature extraction module and a pattern matching module as shown in Fig. 1. a picture capturing module acquires the raw biometric knowledge of someone employing a detector. Utilizing appropriate algorithm/s feature extraction module improves the standard of the captured image. Information module stores the biometric example info of registered Persons.



Fig.1.1: Fingerprint image from a Sensors

Pattern matching module compares the extracted options with the keep templates, that in-turn generates match score [1].The verification method either accepts or rejects the user's identity by matching against an existing fingerprint info. In identification, the identity of the user is established victimization fingerprints. Since correct matching of fingerprints depends for the most part on ridge structures, the standard of the fingerprint image is of essential importance. However, in a fingerprint image might not continually be outlined because of components of noise that corrupt the clarity of the ridge structures. This corruption might occur because of variations in skin and impression conditions adore scars, humidity, dirt, and non-uniform contact with the fingerprint capture device. The results of all such techniques rely upon the standard of the input image. Thus, image enhancement techniques are usually utilized to cut back the noise and to boost the definition of ridges against valleys in order that no spurious trivialities are known.

II. WHAT IS FINGERPRINT?

A fingerprint is that the feature pattern of a finger[3]. it's an effect of the friction ridges and furrows on all elements of a finger. These ridges and furrows gift smart similarities in every tiny native window, like similarity and average dimension. [5]However, shown by intensive analysis on fingerprint recognition, fingerprints aren't distinguished by their ridges and furrows, however by options referred to as item. Among the range of item varieties according in literature, 2 area unit largely important and in significant usage: Ridge finishing - the abrupt end of a ridge and Ridge bifurcation- one ridge that divides into 2 ridges [6].



Fig.1.2: (a) various minutia features

III. FINGERPRINT MATCHING TECHNIQUES

The large number of approaches to finger print matching can be coarsely classified into three families.

- **Correlation-based matching:** Two fingerprint images are superimposed and the correlation between corresponding pixels is computed for different alignments (e.g. Various displacements and rotations).

- **Minutiae-based matching:** This is the most popular and widely used technique, being the basis of the fingerprint comparison made by fingerprint examiners. Minutiae are extracted from the two fingerprints and stored as sets of points in the two-dimensional plane. Minutiae-based matching essentially consists of finding the alignment between the template and the input minutiae sets that results in the maximum number of minutiae pairings.

- **Pattern-based (or image-based) matching:** Pattern based algorithms compare the basic fingerprint patterns (arch, whorl, and loop) between a previously stored template and a candidate fingerprint. This requires that the images be aligned in the same orientation [10]. To do this, the algorithm finds a central point in the fingerprint image and centers on that. In a pattern-based algorithm, the template contains the type, size, and orientation of patterns within the aligned fingerprint image. The candidate fingerprint image is graphically compared with the template to determine the degree to which they match. [7]

Method Implementation

The implementation is done on Minutiae based method. In particular this technique uses only in two of the most important minutia features i.e. Ridge Ending and Ridge bifurcation. (Figure 2.1)

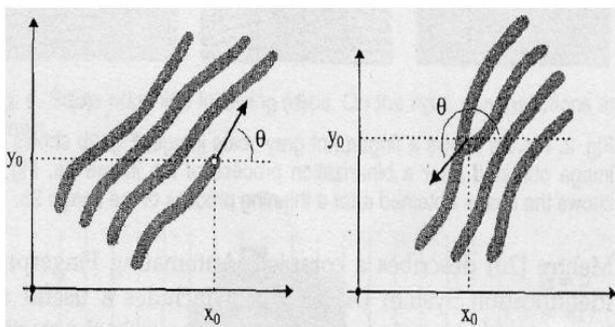


Fig.2.1:(a)Ridge Ending(b)Ridge Bifurcation

IV. DESIGN DESCRIPTION

Minutia extraction includes Image Enhancement, Image Segmentation and Final Extraction processes while Minutiae matching include Minutiae Alignment and Match processes

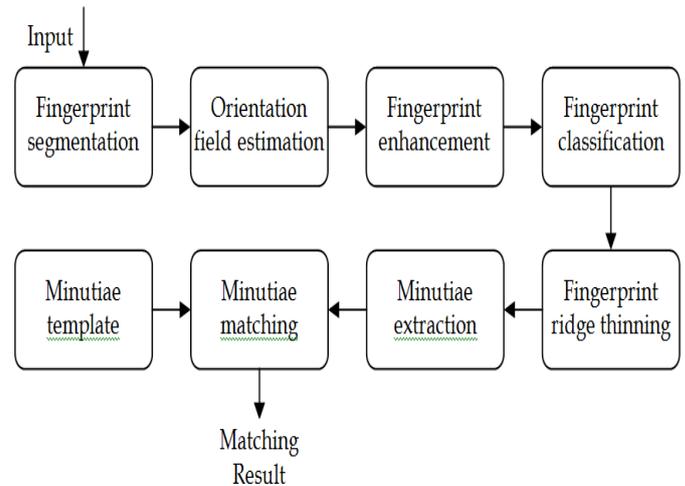


Fig.2.2: Detailed Design Description

Under image enhancement step Histogram Equalization, Fast Fourier Transformation increases the quality of the input image and Image Binarization converts the grey scale image to a binary image.

Then image segmentation is performed which extracts Region of Interest using Ridge Flow Estimation and MATLAB's morphological functions.

Thereafter the minutia points are extracted in the Final Extraction step by Ridge Thinning, Minutia Marking and Removal of False Minutiae processes

Minutiae detection can also be done directly from gray level fingerprint images. A number of techniques exist, but it is still a topic of research. Extracting features directly from a gray scale image without binarization and thinning is of great relevance because of the following reasons:

- A lot of information may be lost during binarization process.
- Binarization and thinning are time consuming.

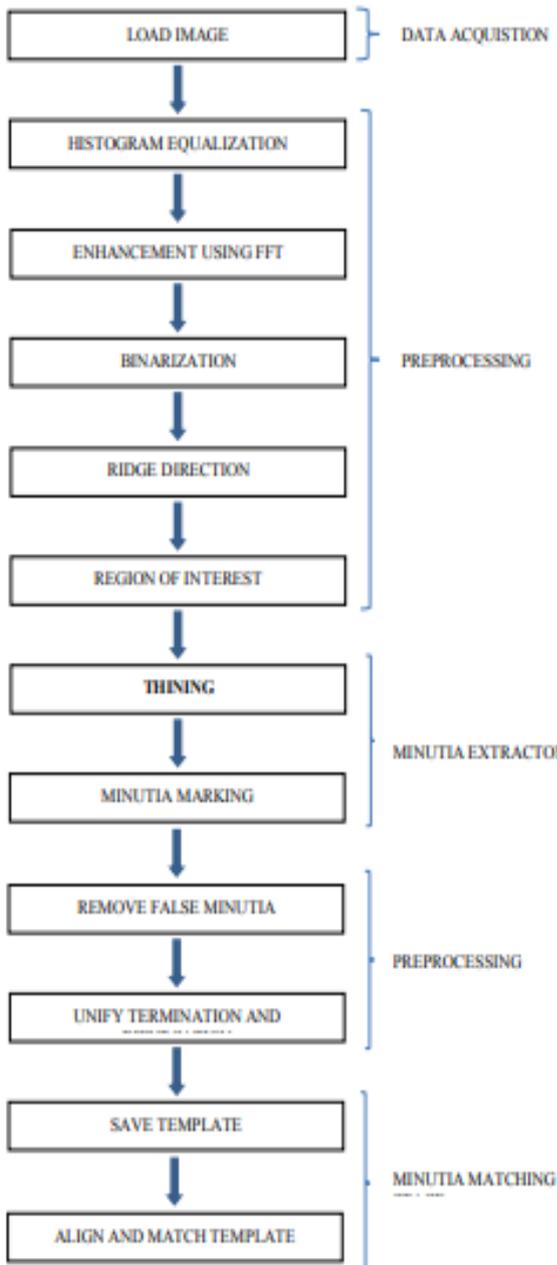


Fig.2.3: Flowchart of the Minutia Based Approach

V. CONCLUSION

The on top of implementation was a shot to grasp however Fingerprint Recognition is employed as a variety of biometric to recognize identities of mortals. It includes all the stages from trivia extraction from fingerprints to trivia matching that generates a match score. Varied customary techniques area unit employed in the intermediate stages of process. The comparatively low share of verification rate as compared to alternative kinds of life science indicates that the algorithm used isn't terribly strong and is prone to effects like scaling and elastic deformations. Varied new techniques and rule are got wind that offer higher results. Also a significant challenge in Fingerprint recognition lies within the pre-

processing of the unhealthy quality of fingerprint pictures which conjointly augment the low verification rate.

REFERENCES

- [1] Vishakha Bhadane, Manojkumar Deshpande, Prashant Mishra,"Fingerprint Recognition System",Volume-2, Issue-2, Feb.2014,ISSN: 2320-2106
- [2] Priyanka Rani, Pinki Sharma,"Fingerprint Identification System",Vol. 2, Issue-3,Sept. 2014,ISSN : 2347 - 9817
- [3] Ritu , Matish Garg,"Fingerprint Based Identification System"Vol. 3, Issue 3, March 2014,ISSN : 2319-5940
- [4] ManishaRedhu,Dr.Balkishan,"Fingerprint Recognition Using Minutiae Extractar",Vol. 3, Issue 4,Aug 2013,ISSN: 2248-9622
- [5] Gurpreet Singh and Vinod Kumar,"Minutiae Extraction and Matching Technique",Vol. 10 Issue 1, Oct. 2014,ISSN 2351-80