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A Review on Biometrics Human Fingerprint Identification

R.Kala*,Dr.A.Thilaka*

*Assistant Professor, New Prince Shri Bhavani Arts and Science College, Chennai

Abstract - With the technology advantage of computer automated system the complexity for integration & recognition problem is growing step by step. This paper includes about a current research based on fingerprints recognition system. We will discuss about a review of security correct quality and recognition of fingerprints. Fingerprints recognition System generally used in identification tools and bio metrics applications. A few central factors likewise influencing the fingerprints like age and orientation. Some human body parts are utilized for recognition like retina, face identification, signature, DNA, iris etc.

Keywords - *Finger-Print minutiae, Recognition Rate, characteristic mining, Back Propagation, bio-metrics, impersonation.*

I. Introduction

Biometric identification process or fingerprint identification refers to the way of identifying a single based on his or her distinguishing identity. It divides method for uniquely identifying humans based on one or more physical or behavioral traits. Biometrics of human is splatted into two categories I) behavior of biometrics
ii) Physiological biometrics.

Each human has its own profile measurements attributes and can be distinguishing through these qualities. Fingerprints biometrics framework has four fundamental interaction or entry level positions that are: assortment, extraction, examination, choice or approval or distinguishing proof fingerprints acknowledgment framework (FRS) requires a correlation or match of his/her fingerprints with the fingerprints in the data set to demonstrate people in the capacity.

Identity verification becomes a provocation task when it has to be automated with good precision and hence with bad probability of break-ins and reliable non-renunciation. The user should not be able to deny having carried out the process and should be not-convenience as llittle as possible, which only makes the task more tough. In biometrics, there are two unique ways of authentication methods 1. Corroboration: based on a single identifier which unique out a particular person (e.g. an ID number) and his/her bio-metrics. It is based on a mixed of certification method. 2. Recognition: based only on biometric analysis.

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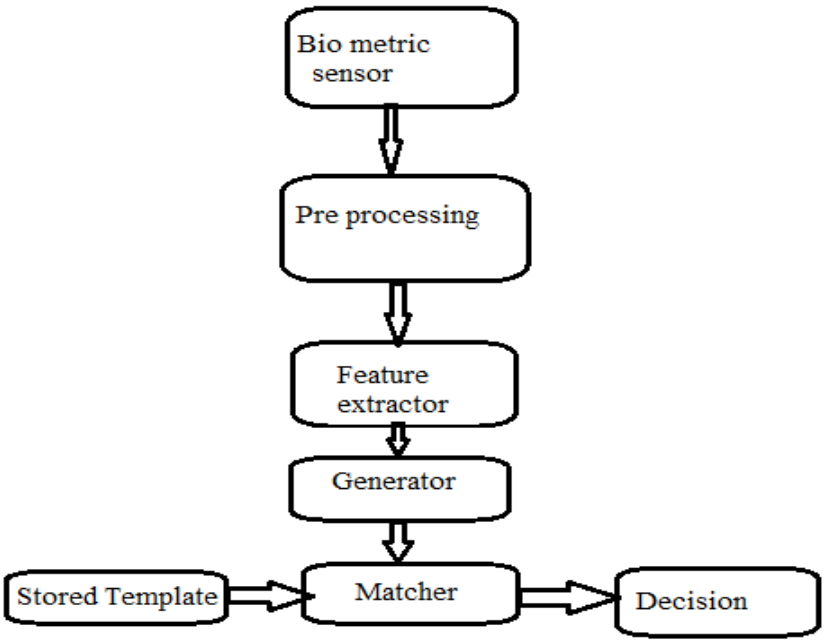

Figure 1:Block Diagram of Finger print Recognition.

This paper achieves to discover biometric technologies like fingerprint recognition their advantages and disadvantages.

II.LITERATURE REVIEW ON FINGERPRINT PROTECTION TECHNIQUES:

Jay Kant Pratap Singh Yadav(2020) discussed on four major machine learning techniques which are Support Vector Machines, Deep Learning, Artificial Neural Networks, and Genetic Algorithms and their implementation at various sub stages like pre-processing, features extraction, classification or matching. They revealed that machine learning algorithms show superiority over traditional fingerprint recognition algorithms to face fingerprint recognition challenges. In a fingerprint recognition system, processing time reduction and accuracy enhancement are still pending challenges.

Cavoukian, and Ann, (2012). while biometric technology provides various advantages, there exist some major problems like changeability and privacy. Biometric data reflect the user‟s physiological or behavioral characteristics. If the storage of the biometric pattern is obtained by an adversary, the user‟s privacy may be compromised. The biometric templates should be stored in a format such that the user‟s privacy is preserved.

Sadhya et al (2016) discussed the number of research works have been showed in recent years. These techniques can be divided into two main classes such as Biometric crypto-systems and Template transformation.

J.O.Jooda (2021) Artificial Bee Colony (ABC) is an optimizing algorithm that has been frequently used in solving FS problems. ABC algorithm for feature selection of

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texture features extracted from multiple instances of fingerprint was used to raise the performance of fingerprint intramural biometric system (FIBS).

Alex C. Kot et al. (2013), discussed the finger print multiple of privacy protection in which two different fingerprints were combined to produce a new virtual identity and finally stored in database. A fake fingerprint image is reconstructed from a stolen combined fingerprint pattern; There are possibilities that the hacker can break the older systems. Minutiae points are found based on waves and frequency and the re-framed fingerprint is used by the attacker to restructured.The spirals from the partial fingerprint image and the fingerprint can be re-framed apprehend by reconstructing a fingerprint it might be false, which causes tremendous problems to the security systems.

Dr. E. Chandra et al. [2014], (6) proposed a shift based estimation for fingerprint enhancement. It is a technique that retrieves the preliminary orientations from the fingerprint. After obtaining the clustered candidates, final direction is determined. The proposed algorithm is poor and inefficient in terms of latency and speed.

Syed Farooq Ali examined with regards to Fingerprint coordinating, parody moderation and live ness discovery are the trendiest biometric strategies, for the most part due to their security through life, uniqueness and their least gamble of attack. This study gives a thorough audit on the unique finger impression calculations and methods which have been distributed over the most recent couple of many years. It separates the exploration on unique mark into nine distinct methodologies including highlight based, fluffy rationale, comprehensive, picture improvement, idle, customary AI, profound learning, layout coordinating and incidental strategies.

III. PREVIOUS TECHNIQUES

Fingerprint Recognition System: The Block diagram of Fingerprint recognition system can be divided into four phases: (1).fingerprint image acquisition (2) Image enhancement process (3) Feature extraction from the enhanced image and (4) Pattern matching process.

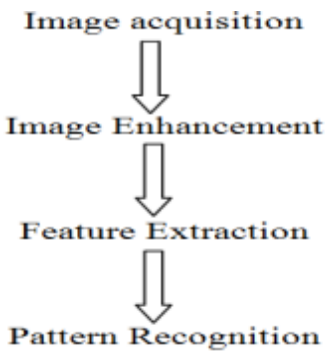

Figure 2: Steps to identification Fingerprint Image

Image acquisition: With reference to problem domain, image sensor acquires digital images.Step First is a Physical device ie) sensitive to the energy radiated by the object. Next step, called a Digitizer, is a device for changing the output of the physical sensing device into digits form. Specialized image processing hardware comprises of the digitizer and hardware that performs other primitive operations. The Computer is

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an image processing system which ranges starts from Personal Computer to Supercomputer. Software for image processing comprises of specialized modules that perform specific works. Mass storage capability is a must in image processing applications. An image of size 1024x1024 pixels, in which the intensity of each pixel is an 8-bit quantity, requires one megabyte (MB) of storage space, if the image is not compressed. Image displays in use are mainly color TV monitors. Monitors are driven by the outputs of image and graphics display cards that are an integral part of the Computer System.

Image Enhancement: The point of this stage is to give a great picture. A decent quality unique mark picture has high differentiation among edges and valleys. A low quality unique mark picture is low conversely, uproarious, broken, or smugy, causing misleading and missing particulars. Procedures, for example, Gray-level smoothing, contrast extending, histogram balance, and Wiener separating can be utilized as pre-handling ventures before a modern finger impression improvement calculation is applied.

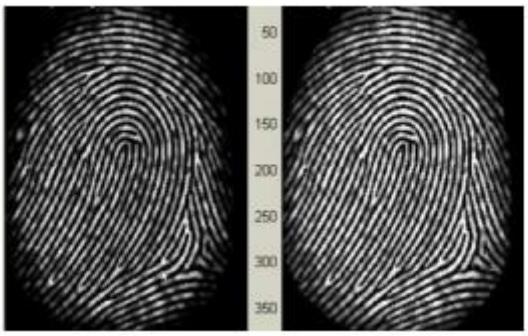

Figure 3: Histogram Enhancement: Original Image (Left). Enhanced image (Right)

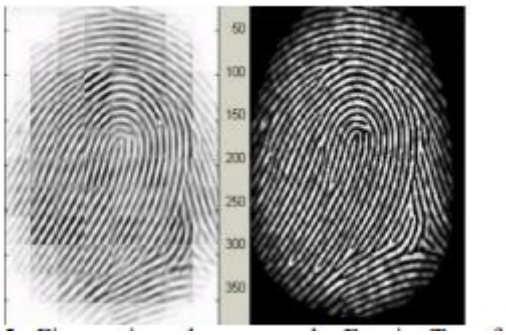

Figure 4 : Fingerprint enhancement by Fourier Transform Enhanced image (left), Original image (right)

The goal of an enhancement algorithm is to improve the clarity of the ridge structures in a fingerprint. The image is analyzed in local neighbourhoods to estimate attributes of the ridge patterns, such as ridge width, orientation and the amount of noise & image quality. A set of contextual filters is built, based on the local information, with the aim of enhancing the underlying ridge structure while removing the noise.

The complete sequence of steps for image enhancement is: (i) normalization; (ii) calculation of orientation field; (iii) region of interest extraction; (iv)Ridge extraction; and (v) ridge profiling. (iii) Feature Extraction: Once a clean image is acquired, the minutiae features can be extracted from the image as well as their attributes and relationships. The whole process is divided into three steps: (i) thinning of reconstructed binary ridge structure achieved after image enhancement; (ii)

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removal of all structure imperfections from the thinned image, and (iii) minutiae extraction.

Pattern Recognition: A pattern is structural arrangement of descriptors. It is distinguished by the order of the elements of which it is made, rather than by the intrinsic nature of these elements. Pattern recognition is divided into two types. They are Decision theoretic and Structural. Decision theoretic discuss with patterns using quantitative descriptors, such as length, area, and texture. Structural category discuss with patterns best described by qualitative descriptors, such as the relational descriptors. Three common pattern arrangements are vectors, strings and trees. A. Fingerprint Recognition It is the most extensively second-hand biometric vigilance.

Advantages of finger print recognition

- Subjects have multiple fingers
- Easy to use.
- Systems require less space

Disadvantage of finger print

- Admiration
- Public Perceptions
- Seclusion concern of criminal implications

Methods involved in Finger Print analysis

- Fingerprint Matching
- Correlation-Based Matching
- Minutiae Matching
- Ridge Feature-Based Matching
- Pattern-Based Matching
- Image Enhancement Image Binarization Image Segmentation Thinning

IV. CONCLUSION AND FUTURE SCOPE

Fingerprint recognition methods for human authentication are fast and accurate for more reliable and secure system. This paper showed to provide a detail survey on finger print recognition and to deliver some progress to this title and it is difficult and fascinating problem in and itself. Fingerprint method has concerned scientist as an important regulation and has created a technological tactics on society. It is hoped that this paper brings out encouragement among the research group of fusion of Bio-metrics. Future research work can be carried out to improve the quality of the images by improving the image enhancement techniques and to develop a better matching technique for partial and rotated fingerprint images.

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