

A Review on “Personal Identification by using Biometric Traits”

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Abstract: In today's world automation is takes place in every field of human life which causes replacement of human control functions in to automated equipments. This results in need of hugely reliable personal identification system for authentication of person. Personal identification traits which are traditionally used such as password or signature are highly sensitive to spoofing attacks or being hacked. So, to fulfill the need of highly reliable personal identification and authentication biometric systems comes in to light. Biometric system which uses biological traits for identification are unique for every single personal as well as need not remember or carry token for it. During past few years, there are number of biometric traits are used for personal identification .This paper provides short review on different biometrics used for personal identification and related study which investigates their comparative performance.

Keywords: Biometric traits, Personal identification.

I. INTRODUCTION

Biometric authentication is nothing but determining who you are that he or she claims to be on the basis of unique characteristics of that person. Authentication can be done by two ways. First one is by verifying or by identifying that person. Identification is process of comparison among x no. of persons to determine its authentication whereas in verification process comparison is done to determine this is the person that she or he claims to be. Biometric system uses biometric traits in the form of images as its input. These biometric traits may be physiological or behavioral. Physiological biometric includes iris, finger prints, DNA, veins pattern etc. And behavioral biometric includes signature, thumb pressure, voice recognition.

All these biometric traits are unique for individual. But each has its advantages and limitations. According to application or security levels biometric system uses these biometric traits.

II. BIOMETRIC SYSTEM

Automatic identification of person by using its behavioral or physical characteristics is referring as biometric system. Biometric system measures and doing analysis on unique characteristics of individual identify the person.

Typical block diagram of biometric system is shown in following figure1.

A. Acquisition Unit:

First step of any system is take input and after that do further process on it. The input of most biometric system is in the form of image. According to form of biometric traits this acquisition unit is differ. Quality of image must be important for further processing so obviously this step plays very important part in biometric system.

B. Preprocessing Unit:

In preprocessing stage acquired image is processed in many ways, the process may be enhancement or removal of noise or unwanted frequencies, normalization of image etc. For this purpose according to requirement various technologies are used.

C. Feature extraction Unit:

Feature extraction is process of extracting relevant data from original set of information further it can be used for classification process. In feature extraction phase relevant data is extracted in such way that it characterizes the class. Extracted features are stored in the form of vectors .For that purpose various extraction algorithms are used. Vectors which represent extracted features further used in matching process.

D. Matching Unit

Obtained vectors in feature extraction process are used in classification phase .These are compared with templates. After obtaining result identification is done. In classification process if matching is done successfully then identification becomes successful.

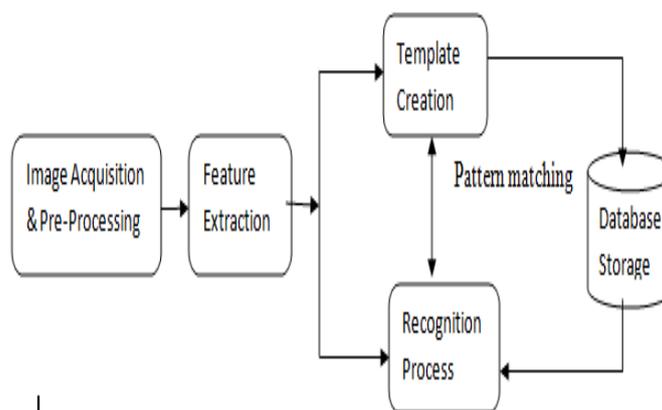


Figure 1: Block Diagram of biometric System

III. LITERATURE REVIEW

A. Finger Print :

Impression of friction ridges of human finger is nothing but fingerprint. Dark lines in image of fingerprint are called as finger ridges where as white lines are valleys. Among many biometric traits this trait is highly acceptable by people. It is the oldest of all biometric traits. In fingerprint image which include ridges, minutiae points and these minutiae point is point where ridges are suddenly combined [1]. Summation of ridges and minutiae point forms unique characteristics of individual's finger characteristic. When 25-80 minutiae points are presented in image then that image is said to be good one. In matching phase different techniques are used on the basis of ridge, valleys, such as correlation and minutiae based techniques [1, 2].

B. Pam Print:

Palmprint of person is used as input for biometric system which is used for identification and verification purpose. When comparison is takes place between Palm print and finger print then results comes as palm print are more distinctive and which obviously gives more information than fingerprints [3]. Principal lines, ridges and wrinkles are important features of palm. These features of palm are dependent genetically but it is not true about attributes. It is seen that especially biometric about identical twins dominantly that palmprints are different. With the help of different techniques different features of pal are extracted. Stored templates are compared with extracted features. Various techniques for feature extraction purpose such as wavelets and Gabor filter are edge detection techniques are used.

C. Iris Recognition :

Iris of human eye is biometric trait used as input in iris recognition system. Iris of human eye is unique characteristic of individual one [4]. Iris of human becomes important biometric trait because it is protected by cornea and eyelid from external environment [2]. Iris is a flat, colored, ring-shaped membrane behind the cornea of the eye, with an adjustable circular opening (pupil) in the centre. The gray level intensities of two different people are differing from each other. This is also found between identical twins, as well as in left and right eye of same person [5]. In iris recognition system image quality of iris must be better for reliable result, so arrangement of proper illumination is necessary. In preprocessing stage of iris image pupil, iris, eyelid detection and removal procedure is carried out.[5]. In feature extraction stage with the help of techniques such as phase based method Zero crossing and texture based methods are used [6]. The extracted features compared with stored one.

D. Face Recognition :

Face recognition system use face images as input. This system can get facial image from any static camera or any video system which can generate images with sufficient quality. It can use existing hardware for image acquisition purpose it becomes easy to use but for higher accuracy purpose well controlled acquisition environment is required. Some algorithms for facial recognition identify facial features, then by extracts features from image. In identification process they analyze shape of eye, relative distance of nose jaws etc [7] .

The extracted features are compared with previously saved templates. If matching is done accurately then recognition becomes successful.

E. EAR :

Like other biometric traits every other person has its unique ear shape and its outer structure [8]. Ear becomes important biometric trait because of its important characteristics as it is least affected with changing facial expressions, aging.



Surya prakash et al [9] implemented such system which automatically locates ear region which computes non-skin and skin region. From the binary image of ear with help of Euclidean distance technique a distance transform is calculated. And in feature extraction stage for verification a shape analyzer is used.

F. Veins Recognition:

Biometric traits such as veins which may be head veins or finger veins, heart veins are used as system's input. Veins based system are said to be more secured because these techniques cannot be modified or falsified. The important feature of vein is that it is exist only in living body. First infrared penetrates skin of hand in hand vein recognition system and generates a image. This is result of absorbance of blood vessels. By digitalizing this image different templates are created which stored for further matching purpose. Various features such as vessel branching points, thickness of veins and angles of branching are used for feature matching stage [10].

G. Voice Recognition:

For communication purpose voice is very basic medium among the people [11]. Voice recognition system is actually uses speech and converts it into words which are in special format so one can say it as some type of signal processing. So, it is also called as speech recognition system [4]. On the basis of our vocal sound any speech recognition system divides into following categories as isolated word, connected word, continuous speech, and spontaneous. For feature extraction purpose technique which is used in speech recognition system is as excitation source feature as pitch and variation in pitch.

H. DNA Recognition:

Unique pattern of DNA of individual become important characteristic in identification of person. DNA does not change during life span of person; it can be easily obtained from variety of sources. This biometric is specially used to prove the blood relation between parents and child; also it becomes important evidence in forensic investigation. Instead of having great accuracy it is not widely used because of its costly implementation [4].

I. Finger Knuckles :

Fingers are bend forward that is in palm direction but opposes in backward direction, this is possible for fingers because of anatomy of fingers which gives fingers flexibility and due to which there is formation special pattern. It is found that different person's dorsum surface of hand has unique pattern which is result of anatomy of finger; patterns found on fingers are nothing but finger knuckles and can be used for person authentication purpose. Investigation done by Ajay Kumar et al proposed new approach for person identification traits [12].

Also some other approach presents such system in which biometric traits are combined which gives better accuracy [13]. Such type of system is called as multimodal biometric system.

This combination of traits enhances the performance of single biometric trait. The advantage of such approach is that one can get both biometric traits from single image.

The ideal biometrics is one which gives low false rejection rate; false acceptance rate. Table 1 shows comparison of major biometrics based on accuracy, reliability, and long term stability [14].

Table 1: Biometrics comparison chart

Biometric Type	Accuracy	Reliability	Long Term Stability	Ease of Use	User Acceptance	Errors Due to
Finger Print	High	High	High	High	Medium	Dryness, age, dirt.
Face	Medium	Medium	Medium	Medium	Medium	Age, glasses, hairs.
Speech/voice	Low	Low	Medium	High	High	Noise, weather, cold.
IRIS	Very high	High	High	Medium	Medium	Poor light, eye diseases.
Veins patterns	High	High	High	Medium	Medium	None.
DNA	High	High	High	Low	Low	None.
Finger Knuckles	High	High	High	High	Low	Dryness, age, dirt.
Palm Print	Medium	Medium	Medium	High	High	Dryness, age, dirt.

IV. CONCLUSION

This paper discussed about different biometric traits for personal identification purpose. While doing comparative study of above biometrics it is found that each biometric has its own advantages, limitations, area of applications. On basis of parameters such as accuracy of iris for biometric purpose is very high but at same time it is not ease of use so in result its user acceptance is poor. Similarly, DNA is such biometric which gives high accuracy but poor in terms of its practical use. Finger vein is promising biometric traits as well as more challenging field for identification purpose. Instead of using unimodal biometric system, multimodal biometric system gives better performance.

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