Biometric System- A Review

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Abstract : Now a day the Biometric is becomes the most popular technique due to its liability. Because of need of high security systems we are also using the biometrics broadly. Another feature of biometric is its efficiency. It is very easy to use and handle. In this paper the review of Biometric System is provided. The main steps involve in biometrics is: Image Formation, Image Processing and Image Matching.

1. INTRODUCTION

The need for reliable user authentication techniques has increased in the wake of heightened concerns about security and rapid advancements in networking, communications and mobility. Biometrics, described as the science of recognizing an individual based on his or her legitimate method for determining an individual's identity [1]. Biometric authentication or simply biometrics refers to establishing identity based on the physiological and behavioral characteristics shown in Figure 1.1 (also known as traits or identifiers) of an individual such as face, fingerprints, hand geometry, iris, keystroke, signature, voice, etc. Biometrics systems offer several advantages over traditional authentications schemes. They are inherently more reliable than password – based authentication as biometric traits cannot be lost or forgotten; biometric traits are difficult to copy, share and distribute; and they require the person being authenticated to be present at the time and point of authentication. Thus, a biometrics – based authentication scheme is a powerful alternative to traditional authentication schemes. A number of biometric characteristics have been in use for different applications [1, 2].
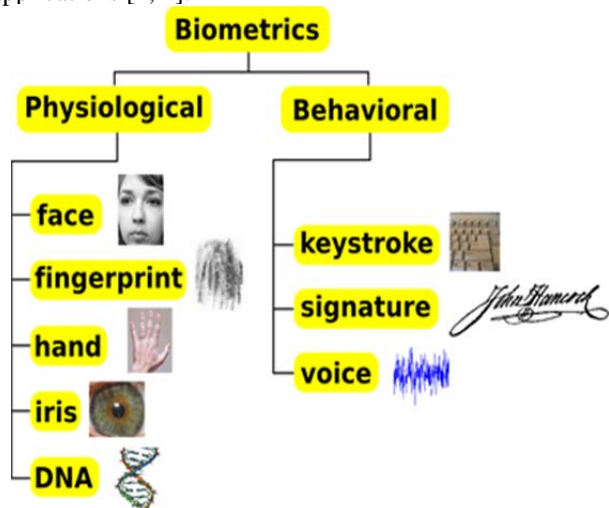

Figure 1. Classification of Biometric traits

BIOMETRICS SYSTEM:-

Biometrics is the automated use of physiological or behavioural characteristics to determine or verify identity. Several aspects of this definition require elaboration. All biometric identifier scan be divided into two big groups:
1) Physiological.
2) Behavior.
Physiological or behavioural characteristics: Biometrics is based on the measurement of distinctive physiological and behavioural characteristics. Finger-scan, facial-scan, iris-scan, hand-scan, and retina-scan are considered physiological biometrics, based on direct measurements of a part of the human body. Voice-scan and signature-scan are considered behavioural biometrics; they are based on measurements and data derived from an action and therefore indirectly measure characteristics of the human body. The element of time is essential to behavioural biometrics-the characteristic being measured is tied to an action, such as a spoken or signed series of words, with a beginning and an end. The physiological/behavioural classification is a useful way to view the types of biometric technologies, because certain performance- and privacy-related factors often differ between the two types of biometrics. However, the behavioural/physiological distinction is slightly artificial. Behavioural biometrics is based in part on physiology, such as the shape of the vocal cords in voice-scan or the dexterity of hands and fingers in signature-scan. Physiological biometric technologies are similarly informed by user behaviour, such as the manner in which a user presents a finger or looks at a camera [8, 9].
Fingerprints scanning: - Today fingerprints consider being one of the oldest and popular among other bio-metric technologies. Fingerprint identification is also known as dactyloskopy or also hand identification is the process of comparing two examples of friction ridge skin impression from human fingers, palm or toes [4].

Figure 2. Example of fingerprint

Face Recognition:- During the whole history of humanity, people used face to distinguish one person from the other. Facial (face) recognition is a computer application that automatically identifies or verifies a person with the help of a digital image or a video frame from a video source. One of the ways to do this is to compare the given example with the examples in the database [4].
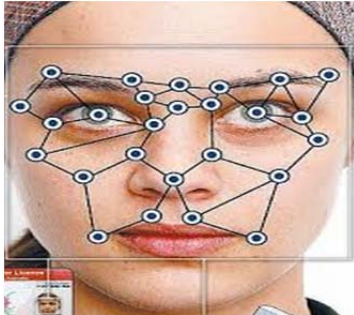

Figure 3. Example of face scanning

DNA: - Not long ago Russian show business was full of rumours that one of the popular Russian singers has two fathers and each father tried his best to influence on the son. Special programmes were created and the situation was discussed but only one thing was interested to public: who was the real father of the singer. The singer himself was confused. In one of the programs the singer and both of his father's decide to take DNA test [4].

Figure 4. Example of DNA scanning

Hand Geometry: - Hand geometry is the use of geometric shape of the hand for recognition purposes. This method was rather popular 10 years ago but nowadays it is seldom used. The method is based on the fact that the shape of the hand of one person differs from the shape of the hand of another person and does not change after certain age. But it is not unique [4].
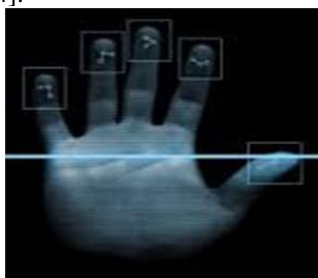

Figure 5. Example of hand scanning

Iris Recognition: - The iris is a thin circular diaphragm, which lies between the cornea and the lens of the human eye. The iris is perforated close to its centre by a circular aperture known as the pupil. The function of the iris is to control the amount of light entering through the pupil, and this is done by the sphincter and the dilator muscles, which adjust the size of the pupil [5]. Iris is the elastic, pigmented, connective tissue that surrounds the pupil of the eye. Iris biometric is more reliable and accurate as compared to other biometric trait such as finger print. Iris texture is stable throughout life and is highly secure. Iris is less prone to attacks. Iris of the eye has different pattern for left and right eye.

They are even unique for the identical twins. Iris is used for various authentication and security applications that include identity cards and passports, prison security, database access and computer login, border control and Government programmes [6]. Iris surface is divided into two in cooperative datasets, whereas in non-cooperative major layers: papillary zones and the ciliary zone. Papillary dataset iris region is normally close to the corner of left zone is the inner part that forms boundary of the pupil. and right eye. To recognize the image, iris is divided in to An outer ciliary zone is the remaining part of the iris, and multiple regions and detection of single region can these are separated by the collarets – shows a pattern recognize a person. Color information is another important flower or zigzag [7].

Not to be confused with another, less prevalent, ocular-based technology, retina scanning and iris recognition uses camera technology with subtle infrared illumination to acquire images of the detail-rich, intricate structures of the iris. Digital templates encoded from these patterns by mathematical and statistical algorithms allow the identification of an individual or someone pretending to be that individual. Databases of enrolled templates are searched by matcher engines at speeds measured in the millions of templates per second per (single core) CPU, and with infinitesimally small False Match rates [13].

Iris Normalization is a Process in image processing that changes the range of pixel intensity values. Applications include photographs with poor contrast due to glare, for example. Normalization is sometimes called contrast stretching. In more general fields of data processing, such as digital signal processing, it is referred to as dynamic range expansion [13]. The purpose of dynamic range expansion in the various applications is usually to bring the image, or other type of signal, into a range that is more familiar or normal to the senses, hence the term normalization. Often, the motivation is to achieve consistency in dynamic range for a set of data, signals, or images to avoid mental distraction or fatigue.
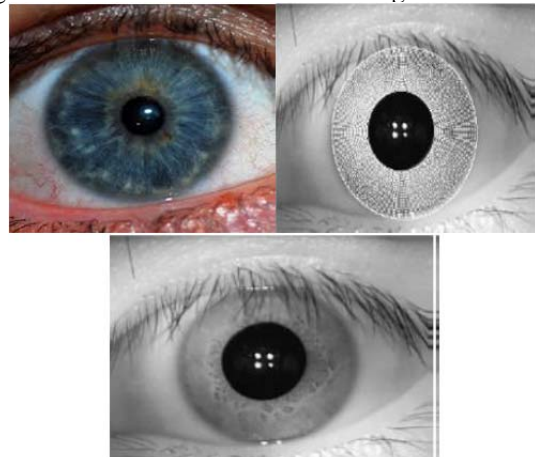

Figure 6. Example of Iris scanning

Researchers have proposed different algorithm for iris detection. Processing iris image is a challenging task and that's for the iris region can be occluded by eye-lids or eye-lashes. This will cause a difference between intra and inter class comparisons. Therefore we decided to isolate the effects of the eye-lid and the effects of the eye-lashes by using only the left and right part of the iris area for the iris recognition. Most of the method extracts the complete iris image, but we extract part of the iris image for the recognition [14].

Extraction is done by trimming the iris area above the upper boundary of the pupil and the area below the lower boundary of the pupil. Then we apply histogram equalization for enhance normalized iris image in order to compensate for the effect of image contrast and illumination. Usually good features must satisfy the following requirement. First, intra-class variance must be small, that means features derived from different samples of the same class should be closed. Second, the inter-class separation should be large [14].

Voice recognition: - Voice, like many other characteristics that are used for biometric methods, is unique. Like style of gait, it takes quite little time to analyze the voice and to identify the person. Voice in biometrics or "voice print" is presented as a numerical model of the sound [4].

Figure 7. Example of voice recognition

Key stroke :- The keystroke is the behave of the human mean to say that the different humans have the different techniques of pressing keys on such basis the identification takes place.
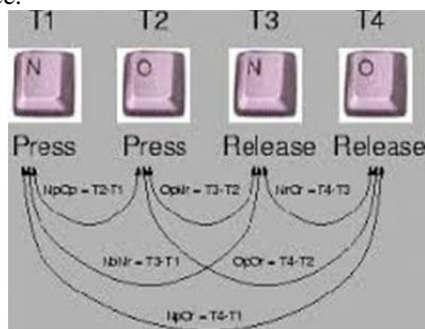

Figure 8. Example of voice recognition

Signature scanning: - Another behavioral biometric is signature by which the data can be extract by the signature of that particular person.

Figure 9. Example of signature recognition

Working of Biometric System:-
Because most of us are accustomed to recognizing our friends and family through their faces and voices, as well as having to prove who we are with passwords and keys in our day-to-day lives, you should have no problem grasping the concepts we have addressed. However, the way in which biometric technology works—the actual biometric matching functions—is more complex. In this section, we address the way biometric technologies work and the process of biometric matching [3].
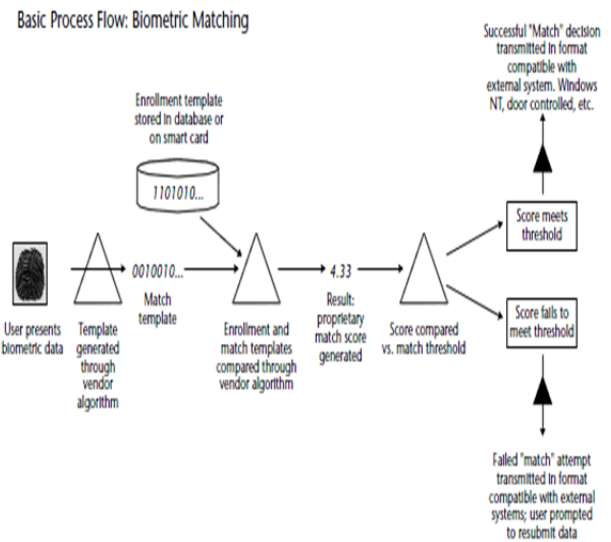

Figure 10. Working of Biometric systems

2. WORK ALREADY DONE

Asima Akber Abbasi, M.N.A. Khan and Sajid Ali Khan [7] In their work they have shown that the eye iris detection method of this implemented system of eye A biometric system is an automatic identification system based on a unique template or feature matching. Biometric system is one of the methods that is used now a days as an useful authentication system. Iris recognition system is among the most reliable and unique biometric identification system. The approach in this paper is to create an authentication biometric system using iris recognition with parallel approach.

Sukhwinder Singh, Ajay Jatav [10] In their work they have shown eye iris Is Used In High Security Areas. Some Of The Applications Of Iris Recognition System Are Border Control In Airports And Harbours', Access Control In Laboratories And Factories, Identification For Automatic Teller Machines (Atms) And Restricted Access To Police Evidence Rooms. This Paper Provides A Review Of Major Iris Recognition Researches. Iris identification was considered one of the most robust ways to identify humans. It provides enough Degrees-of-Freedom for accurate and safe recognition. Iris is considered the most unique, data rich physical structure on the human body. It works even when people were sunglasses or contact lenses.

Essam-Eldean F. Elfakhrany, Ben Bella S. Tawfik [5] In their work they have shown eye iris Reliable and unique identification of people is a difficult problem; people typically use identification cards, usernames, or passwords

to prove their identities, however passwords can be forgotten, and identification cards can be lost or stolen. Biometric methods, which identify people based on physical or behavioural characteristics, are of interest because people cannot forget or lose their physical characteristics in the way that they can lose passwords or identity cards. Biometric systems have been developed based on fingerprints, facial features, voice, hand geometry, handwriting, the retina, and the one presented in this work, the iris. Iris is difficult issue because of pre-processing and segmentation phases.

Senbhaga S [11] In their work they have shown eye iris presents a new iris segmentation framework which can robustly segment the iris images acquired using near infrared or visible illumination. The proposed approach exploits multiple higher order local pixel dependencies to robustly classify the eye region pixels into iris or non iris regions. Face and eye detection modules have been incorporated in the unified framework to automatically provide the localized eye region from facial image for iris segmentation.

Mojtaba Najafi ,Sedigheh Ghofrani [12] In their work they have shown eye new feature extraction method according to ridge let transform for identifying the iris images is provided. At first, after segmentation and normalization the collarets area of iris images has been extracted. Then we improve the quality of image by using median filter, histogram equalization, and the two-dimensional (2-D) Wiener filter as well. Finally, ridge let transform is employed for extracting features and then, the binary bit stream vector is generated.

D R Prithvi, R Madhu [13] In their work they have shown methods are more reliable and capable than single knowledge-based techniques which are a uni-modal system. Due to its applications as well as features the theoretical challenges of multimodal biometric has drawn more and more attention in recent years. They show that integration of iris and palm print biometrics with secure key can achieve higher performance that which may not be possible using a single biometric indicator alone.

Savita Borole, Prof. S. D. Sapkal [14] A novel descriptor for iris recognition is proposed by using dual-tree complex wavelet feature and Support Vector Machine (SVM). SVM is used as a classifier and some kernel functions are tested in the experiment. In this they compared with the k-NN and Naïve Bayes classifier to demonstrate the efficiency of the proposed technique. The 2D DT-CWT is extracted from the iris images and train the support vector machine (SVM) as iris classifier.

3. PROPOSED WORK

The eye iris recognition in biometrics we are going to identify the person from the mob by just only on the basis of them's eye iris by remote human identification. My proposed work can be understood by the following flow chart very easily.
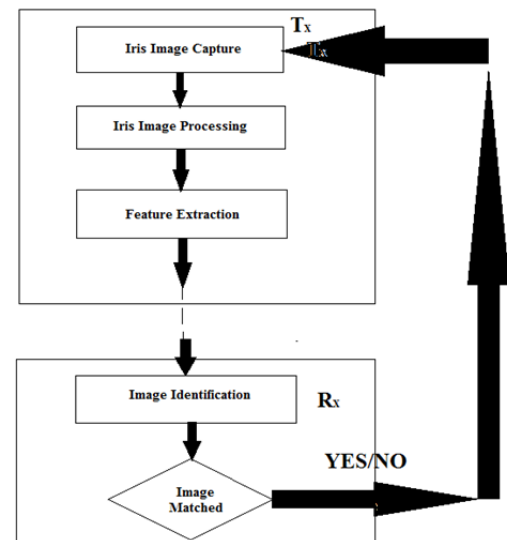

Figure 11. Flow chart of proposed work

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