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Review and Analysis of Different Biometrics Techniques

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Abstract- In order to protect, monitor any organization, industry, country, etc. some of security protocols are applied. Many of them are human being detection, some are malicious programs. This paper has review techniques adopt by the researcher to get biometric information for human being identification or authorization. Classification of these techniques was done in the paper for the clear understanding of benefits and limitation of work. In this paper as per eye Iris detection a detail survey was performed. Different image features were also list in the work that may improve the technique accuracy of detection and reduces the false alarm.

Keywords: Image Processing, Iris Reorganization.

I. INTRODUCTION

Biometrics is a method for recognizing and identifying individuals based on distinct physiological or behavioural characteristics. A good biometric has two basic characteristics: Stability and uniqueness. A stable biometric doesn't vary over time. A distinctive biometric is unique to an individual.

Conventional methods for personal identification are based on what a person possesses (ID card) or what a person knows (a password, etc.).These methods have some problems. Keys may be lost, ID cards may be counterfeited, and passwords may be comprised.

In recent years, biometric personal identification has grown as an interesting field from industrial and academic point of view. So, biometric methods are security technologies which use human characteristics for personal identification. Iris recognition systems use iris textures as unique identifiers.

II. BIOMETRIC SYSTEMS

Biometric technologies can be divided into two major categories according to what they measure:

- Devices based on physiological characteristics of a person (such as the fingerprint or hand geometry).
- Systems based on behavioural characteristics of a person (such as signature dynamics).

III. BIOMETRIC CLASSIFICATION

1. Fingerprint Recognition:

Fig 1. Fingerprint

Fingerprint recognition technology is probably the most widely used and well known biometric. Fingerprint recognition relies on features found in the impressions made by distinct ridges on the fingertips. There are two types of fingerprints: flat or rolled. Flat prints are an impression of only the central area of the finger pad, while rolled prints capture ridge on the sides of the finger as well as the central portion between the tip and fist knuckle. Fingerprint images are scanned, enhanced and then converted into templates. These templates are saved in a database for future comparisons using optical, silicon, or ultrasound scanners.

2. Facial Recognition:

Face recognition technology identifies individuals by analyzing certain facial features such as the upper outlines of the eye sockets or sides of the mouth. Typically, facial recognition compares a living person with a stored template, but it has also been used for comparison between static images and templates. This technology is a biometric system that can routinely be used in a secure manner, for surveillance, since a person's face is easily captured by video technology.

Fig 2. Human Face

3. DNA:

The deoxyribonucleic acid (DNA) is represented through a one-dimensional code, unique for each person. The only exception is identical twins, which can represent a serious problem, regarding security and forensic applications. This method is considered to have some drawbacks, as the easy contamination and sensitivity, the impossibility to perform real-time recognition and severe privacy issues, due to the DNA can reveal susceptibility to some diseases.

Fig 3. DNA

4. Gait:

Although it was originally performed through the use of physical devices attached to the subject's legs, the vision-based gait biometrics has recently received a lot of attention, and the first known effort towards recognition was made in the early 1990s. The human gait is a periodic activity with each gait cycle covering two strides: the left foot forward and right foot forward strides.

Each stride spans the double-support stance to the legs-together stance as the legs swing past each other and back to the double-support stance. Gait vulnerability to changes in the walking surface, walking speed or in the carrying conditions were reported. Due to these, gait-based biometric systems tend to present high false rejection rates. Also, since video-sequence is used to capture the required data, it is considered as one of the most computationally expensive methods.

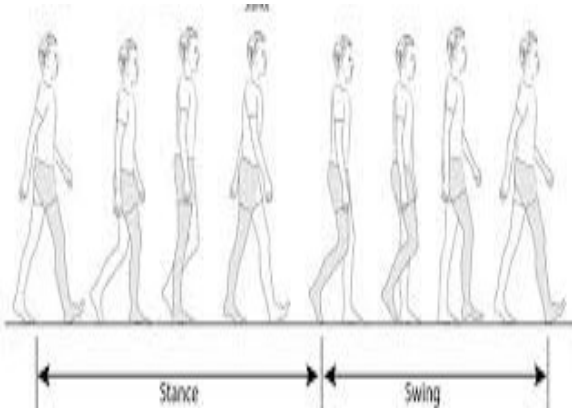

Fig 4. GAIT

5. Keystroke:

The behavioral biometric of Keystroke Dynamics uses the manner and rhythm in which an individual types

characters on a keyboard or keypad. The keystroke rhythms of a user are measured to develop a unique biometric template of the users typing pattern for future authentication.

Raw measurements available from most keyboards can be recorded to determine Dwell time (the time a key pressed) and Flight time (the time between —key up and the next —key down). The recorded keystroke timing data is then processed to determine a primary pattern for future comparison.

Similarly, vibration information may be used to create a pattern for future use in both identification and authentication tasks. Oppositely to other traits, the keystroke information can be continuously analyzed by the recognition system, decreasing the probability of active counterfeit measures.

Moreover, since users are accustomed to authenticating themselves through usernames and password, most keystroke biometric methods are completely transparent and are well accepted by users. Among potential disadvantages, privacy concerns must be considered, as the way a subject strokes can be used to infer information about its potential rentability and work effectiveness.

Fig 5. Keystroke Recognition

6. Voice Recognition:

Voice recognition technology for identifying people is based on the differences in the voice resulting from learned speaking habits. When an individual is enrolled, the system captures samples of the person's speech as the individual says certain scripted information into a microphone or telephone multiple times. This information is known as a "pass phrase." (There are also some biometric systems available that can distinguish between people's voices without requiring a predefined phrase).

The pass phrase is then converted into a digital format and distinctive characteristics (e.g., pitch, cadence, tone) are extracted to create a template for the speaker. Voice recognition templates require the most data space of all the biometric templates.

However, voice recognition is a biometric technique based on behavioral characteristic which can be negatively affected by the current physical condition and the emotional state. The accuracy of the Voice recognition can also be affected by the background and system noise in the input signal. This increases the false rejection rate.

Fig 6. Voice Recognition

Voice sometimes can be a physiological trait because every person has a different vocal tract, but voice recognition is mainly based on the study of the way a person speaks, commonly classified as behavioural.

It is possible to understand if a human characteristics can be used for biometrics in terms of the following parameters :

- Universality – each person should have the characteristic.
- Uniqueness – is how well the biometric separates individuals one from another.
- Permanence – measures how well a biometric resists aging and other variance over time.
- Collectability – ease of acquisition for measurement.
- Performance – accuracy, speed, and robustness of technology used.

- Acceptability – degree of approval of a technology.
- Circumvention – ease of use of a substitute.

7. Retina

Retina scan is based on the blood vessel pattern in the retina of the eye. Retina scan technology is older than the iris scan technology that also uses a part of the eye. The first retinal scanning systems was launched by Eye Dentify in 1985.

The main drawback of the retina scan is its intrusiveness. The method of obtaining a retina scan is personally invasive. A laser light must be directed through the cornea of the eye. Also the operation of the retina scanner is not easy

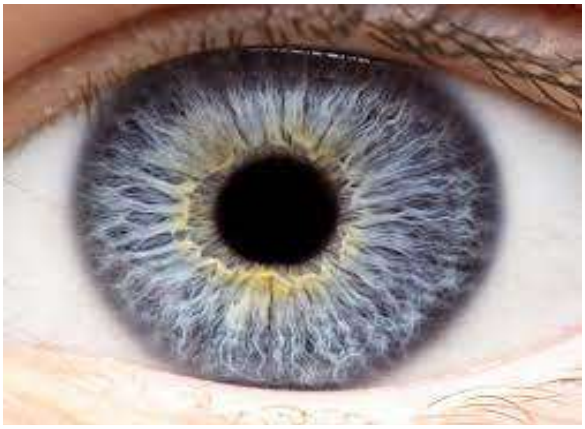

Fig 7. Retina.

8. Hand geometry:

Hand geometry is based on the fact that nearly every person's hand is shaped differently and that the shape of a person's hand does not change after a certain age. Hand geometry systems produce estimates of certain measurements of the hand such as the length and the width of fingers.

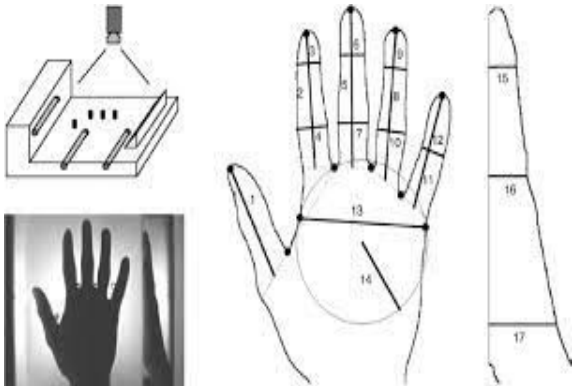

Fig 8. Hand Geometry.

Various methods are used to measure the hand. The optical method is much more common today. Optical hand geometry scanners capture the image of the hand and use the image edge detection algorithm compute the hand's characteristics.

9. Signature dynamics:

The signature dynamics recognition is based on the dynamics of making the signature, rather than a direct comparison of the signature itself afterwards. The dynamics is measured as a means of the pressure, direction, acceleration and the length of the strokes, number of strokes and their duration.

Pioneers of the signature verification first developed a reliable statistical method in 1970s. This involved the extraction of ten or more writing characteristics such as the number of times the pen was lifted, the total writing time and the timing of turning points.

Fig 9. Signature.

10. Iris Recognition:

Iris is a coloured circular muscle, which is beautifully pigmented giving human eye's colour (the central aperture of the iris is the pupil). This circular muscle controls the size of the pupil so that more or less light, depending on illumination conditions, is allowed to enter the eye. It consists of lines, dots, rings, rifts, pits, crypts, freckles, striations, contraction furrows, coronas and serpentine vasculature .

Scientists have identified 250 features unique to each person's iris – compared with about 40 for fingerprints – and it remains constant through a person's life, unlike a voice or a face, fingerprint and hand patterns which can be changed through alteration or injury. So, iris identification is more accurate than other high-techniques identification

systems available that scans voices, faces, and fingerprints.

IV. IRIS DETECTION TECHNIQUES

Chen et al. [10] converse Sensor-level and Feature-level methods of Iris Liveness Detection. Sensor-level methods have a reasonable detection rate but are comparatively expensive and inflexible, while feature-level methods are accepted as cost-effective and flexible. Furthermore, the authors claim that the approach based on analyzing variations in texture patterns has an extraordinary presentation.

Nguyen et al. [11] conducted a widespread study of long-range Iris Recognition. The study converses the prevailing systems and their restrictions and three easily accessible general population datasets, "UBIRIS V2.0, CASIA-Iris-Distance", and MBGC. The authors also converse the limits of the recognition methods.

Dronky et al. [19] claim that the maximum of the ILD was planned to identified certain sorts of "fake iris patterns or used private datasets. This is not appropriate in real-world situations", where the system should detect diverse varieties of spoofing attacks. Thus, the author claims a scope for up-gradation in ILD techniques to guard the iris recognition systems contrary to spoofing attacks.

Rattani and Derakhshani [12] offered an overview of visible-spectrum optical recognition methods. The authors depict the seven datasets acquired in the visible spectrum. However, several of the datasets referenced by the researchers are no more accessible despite the assertions of the unique researchers of the datasets.

In their future work, the authors described that the researchers might emphasize the data upgrading techniques. Our SLR converses the few data upgrading techniques, in that way escalating the performance of the model.

V. IMAGE FEATURES

1. Colour Feature:
Image could be a matrix of light strength values; these intensity values represent completely different type of colour. Thus to spot an object colure is a very important feature, one vital property of this feature is low computation price. Different Image files available in different color formats like images have different colure format ranging from RGB that indicate red, green, and blue. This can be a three dimensional illustration of one image during which two dimensional matrix represent single color and assortment of these matrix tends to third dimension.

So as to form intensity calculation for every element grey format is use that could be a two dimension values vary from zero to 255. If in case of binary format that could be a black and white colour matrix whose values area unit solely zero or one. With the assistance of this colour feature face has been detected expeditiously in [9].

2. Edge Feature:
As image could be an assortment of intensity values, and with the fast modification within the values of a picture one vital feature arises because the Edge as shown in figure 4. This feature is use for various kind of image object detection like building on a scene, roads, etc [14].

There are several rule has been developed to effectively illustrate all the pictures of the image or frames that are Sobel, perwitt, canny, etc. out of those algorithm canny edge detection is one amongst the most effective algorithm to search out all potential boundaries of a pictures.

2. Texture Feature:
Texture could be a degree of intensity distinction of a surface that enumerates properties like regularity and smoothness [13]. Compared to paint house model, texture needs a process step. The feel options on the premise of color are less sensitive to illumination changes as same on edge options.

3. Corner Feature:
So as to stabilize the video frames in case of moving camera it need the distinction between the two frames that are illustrated by the corner feature within the image or frame. Thus by finding the corner position of the two frames one can notice resize the window in original read.

This feature is additionally use to search out the angles still because the distance between the item of the two completely different frames. As they represent purpose within the image thus its use to trace the target objects

VII. BIO METRIC COMPARISON

Biometrics consists of methods for uniquely recognizing humans based upon one or more intrinsic physical or behavioural traits. Another definition defines biometrics as the science and technology of measuring and analyzing biological data.

In information technology, biometrics refers to technologies that measure and analyze human body characteristics, such as fingerprints, eye retinas and irises, voice patterns, facial patterns and hand measurements, for authentication purposes. Biometrics can be divided to two main classes.

1. Physiological:
Are related to the shape of the body. Examples include, but are not limited to fingerprint, face recognition, DNA, palm print, hand geometry, iris recognition, which has largely replaced retina, and scent.

2. Behavioral:
Are related to the behaviour of a person. Examples include, but are not limited to typing rhythm, gait, and voice. Some researchers have coined the term behaviour metrics for this class of biometrics.

Table 1. Comparison of Different Bio Metrics.

Characteristic	Fingerprints	Hand Geometry	Retina	Iris	Face	Signature	Voice
Ease of Use	High	High	Low	Medium	Medium	High	High
Error incidence	Dryness, dirt, age	Hand injury, age	Glasses	Poor Lighting	Lighting, age, glasses, hair	Changing signatures	Noise, colds, weather
Accuracy	High	High	Very High	Very High	High	High	High
User acceptance	Medium	Medium	Medium	Medium	Medium	Medium	High
Required security level	High	Medium	High	Very High	Medium	Medium	Medium
Long-term stable	High	Medium	High	High	Medium	Medium	Medium

VIII. CONCLUSION

In this paper a detail study of various biometric techniques were done. As per input data type biometric techniques were classified in paper. Most of input I the models were image hence image features were also in the paper that can influence the detection rate of model. Paper has further elaborate iris detection methods proposed by different researchers. Comparison of different biometric methods was also done for understanding the importance and application of techniques. In future it is desired to increase the Iris detection accuracy for applying contactless screening, authentication.

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