



Review of Biometric Recognition Methods

¹S.Shanmugapriya, ²B.S.Sathishkumar

¹PG Scholar, Department of Applied Electronics, A.V.C College of Engineering, Mannampandal, India.

²Associate Professor, Department of ECE, A.V.C College of Engineering, Mannampandal, India.

Abstract: Biometrics is physical characteristic which is used in personal authentication for humans and it plays a vital role in authentication when compared to password, smart card etc., Biometric based recognitions are able to provide highly secure identification and personal verification and employed to identify the human identities. This paper gives a brief overview of field of biometrics several biometric identifiers which are used for biometric authentication. Then, it also summarize the possible use of biometrics and its' techniques that are used in human recognition..

Keywords: Biometric recognition, Identifiers, Human Identities

I. INTRODUCTION

The rapid growth of information technology needs high security in any field. Highly secure recognition must be needed, if the level of security breaches and transaction fraud increases. Biometric utilization in personal authentication is becoming convenient and more accurate than current methods such as password. Biometric authentication is used in several fields for enhanced security. It is an automated method of recognizing a person using their behavioural characteristics. Humans have several body characteristics such as face, iris, voice, gait etc., This recognition is used in military, commercial and civilian applications. In forensic department, biometric is the only evidence available to identify the suspects. When compared to others, biometrics are satisfied the requirements such as universality, distinctiveness and permanence. The Fig.1 shows the general block diagram of biometric recognition.

Biometric recognition consists of three phases. The first phase develops with image segmentation and pre-processing. The second phase extracts the biometric signature and the third phase addresses feature matching. Biometric recognition is best method to identify the human identities

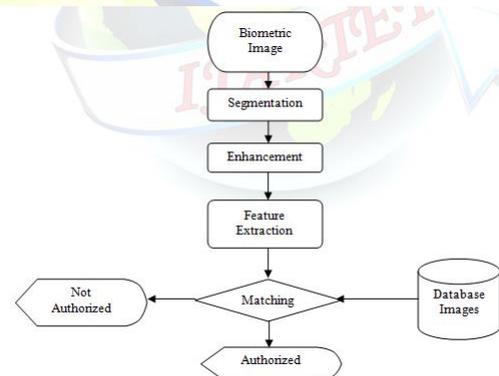


Fig 1.Flow diagram of biometric recognition

II. BIOMETRIC RECOGNITION

A. Fingerprint

In fingerprint recognition, the patterns formed on the fingertip are used in authentication. The pattern of ridges and furrows on an individual finger are used to identify the person. Binarization technique is used to segment the required part from the image. Minute pattern extraction technique is used for point matching. It is suitable method for in-house systems. In the case of dirty finger, fingerprint does not recognize. Due to age the pattern formed on the fingertip will be changed. Somebody misuse the stranger's fingerprint. The sample fingerprint image is shown in Fig.2.



Fig.2 Fingerprint image

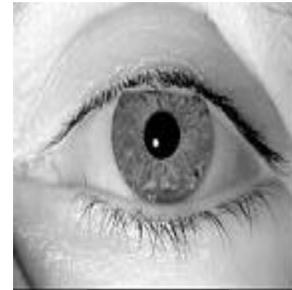


Fig.4 Iris image

B. RETINA

In this recognition, blood vessels are analysed. The blood vessels formed at the back of eye. In this technique, the low-intensity light source (near infrared light) is passed through an opto coupler to scan the unique patterns of retina. If any problem is present in the blood vessels, retinal scanning doesn't give perfect results. Though retinal scanning can be quite accurate, it does not accepted by all users. This is not convenient, if we wear the glasses. The retina of eye is affected by light source. The sample retinal image is shown in Fig.3.



Fig.3.Retinal image

C. IRIS

In this recognition, we analysing features found in the tissue which covers the pupil of the eye. The iris image is taken by high quality digital camera using infrared light. Iris scanning is less intrusive to eye related problems and lot of memory is required to store the data. Here, no close contact between the user and reader. Iris is stable biometric pattern. The iris patterns are described by iris codes. This method uses the polar image specification with pre-processing and segmentation for the image which contains only iris information. Fig.4 shows the iris image.

D. EAR

The shape of the ear is used to recognize the person. 2D and 3D images of the ear is required to identify the humans. ICP-based algorithm is used for verification. The variation in the image is minimized by using 2D and 3D image normalization. But the 3D image normalization technique is more complicated. Ear edge is a continuous curve so, seed growing method is used to extract the ear edge and eliminate the noise. The growth of ear is varied till certain age. The size of the ear is stable at after particular age. It requires careful image acquisition. Improper image and presence of earrings creates recognition problems. The Fig.5 shows the sample ear image.



Fig.5 Ear image

E. NAIL

Nail consists of nail matrix, nail plate and nail bed. Contour segmentation algorithm is used to extract the nail part from the finger. Then the nail is segmented by gray scale thresholding. Fuzzy feature match is used to analyse the similarities between two nails. Nail is stable only two months. After two months, the size of the nail is varied. Because of lifetime, it is not efficient in biometric recognition methods. The sample nail image is shown in Fig.6



Fig.6 Nail image

F. KNUCKLE

In this recognition, the segment (joint) of finger is used as biometric identifier. The finger dorsal image contains major and minor finger knuckle patterns. Major or minor finger knuckle is used in biometric authentication. Region of interest segmentation technique is used to segment the knuckle from finger dorsal image. The patterns formed on the knuckle are unique even though the physiological growth of the finger is increased. The finger surface is highly curved surface. So, uneven illuminations are present in the image. Adaptive histogram equalization technique is used to correct the illuminations and reflections. In forensic department, it is only evidence available to identify the suspects. The sample major finger knuckle image is shown in Fig.7



Fig.7 Knuckle image

G. VEIN

In vein recognition, region of interest is used for segmentation. Vein contains ridges and valley lines. Each finger vein image is subjected to binarization with the threshold value as 230 to localize the finger shape in the images. Enhancement technique is used to extract the stable vascular patterns. Translational and rotational alignment is needed for vein recognition. Median filter removes the noise from acquired image. Line tacking method gives accurate results in finger vein identification. In case of noisy finger image, vein is not viewed clearly. The vein image is shown in Fig.8

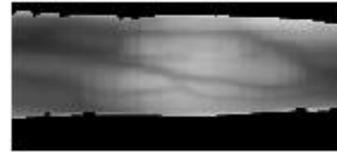


Fig.8 Vein image

H. FACE

In face recognition, the facial features of input face image are compared with the database images. For face images, eigenfaces representation technique is used for comparison. It consists of efficient indexing techniques for recognition and it is computationally inexpensive. Face location algorithm is locating the user's face properly. Here, the slight variation in the face movement causes the inefficient recognition. The sample face image is shown in Fig.9

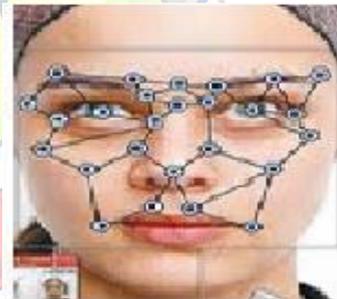


Fig.9 Face image

I. VOICE

In voice authentication, speech signal is converted to text which is used for verification. Usually the voice is recorded through the microphone which converts the voice into analog signal. The analog signal contains the binary form (0's and 1's) that is easy for computer processing. Else, sound recognition software converts the voice signal into speech elements and removes the noise and useless information that is occurred during authentication. Then the language is compared to the digital dictionary which is in computer memory. Because of cold and noise, voice authentication is disturbed.

The process of voice authentication is shown in Fig 10

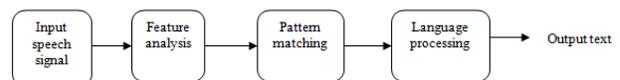


Fig.10. Block diagram of voice authentication



III. CONCLUSION

This paper has successfully investigated several possible biometric recognition methods are reviewed here. Because of user convenience, accuracy and enhanced security biometric is most preferable in authentication. Multimodal biometric recognition is introduced using two or more biometric identifier. Biometric recognition is applied in human surveillance, government (Aadhar card, voter ID and driving license), business transaction, Personal identification, commercial and civilian applications. The demerits of biometric authentication are overcome by evaluation of biometric technology and a careful system design. Multiple modalities are preferred for recognition based on score level or feature level to improve the performance of biometric recognition. From this review, we have to know that the Knuckle recognition has no interference.

REFERENCES

- [1]. Prabhakar, S. Pankanti, and A. K. Jain, "Biometric Recognition: Security and Privacy Concerns", *IEEE Security and Privacy Magazine*, Vol. 1, No. 2, pp. 33-42, 2003.
- [2]. altoni, D. Maio, A. K. Jain, and S. Prabhakar, *Handbook of Fingerprint Recognition*, Springer, NY, 2003.
- [3]. A. K. Jain and A. Ross, "Learning User-Specific Parameters in a Multibiometric System", *Proc. International Conference on Image Processing (ICIP)*, Rochester, New York, September, 2002.
- [4]. J. Clark and A. Yuille, *Data Fusion for Sensory Information Processing Systems*, Kluwer Academic Publishers, Boston, 1990.
- [5]. D. Zhang and W. Shu, "Two Novel Characteristic in Palmprint Verification: Datum Point Invariance and Line Feature Matching", *Pattern Recognition*, Vol. 32, No. 4, pp. 691-702, 1999.
- [6]. A. Kumar, D. C. Wong, H. C. Shen, and A. K. Jain, "Personal Verification using Palmprint and Hand Geometry Biometric", *4th International Conference on Audio- and Video-based Biometric Person Authentication*, Guildford, UK, June, 2003.