Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X

IJCSMC, Vol. 2, Issue. 3, March 2013, pg.14 – 17

RESEARCH ARTICLE

Iris Recognition Using Fuzzy System

Prof.D.D.Patil[1], Prof.N.A.Nemade[2], K.M.Attarde[3]

[1]Lecturer, SSGBCOET, Bhusaval, India

dineshonly@gmail.com

[2]Lecturer, SSGBCOET, Bhusaval, India

neeta.nemade@gmail.com

[3]Student, SSGBCOET, Bhusaval, India

komal.attarde23@gmail.com

Abstract— By using biometric system automatic recognition of an individual is provided. Biometric systems include fingerprints, facial features, voice, hand geometry, handwriting, the retina and the one presented in this thesis, the iris. Working of this system is simple. It captures the image and compare with exiting image. If match is found then access is granted.

Key Terms: - Biometrics, Eye, Gabor filter, Iris recognition, Pattern, Possibilitic fuzzy matching (PFM).

I. INTRODUCTION

In today's world the identification of every human being is very important. Security is more important for all of us. Biometric Systems are automated methods of verifying or recognizing the identity of a living person on the basis of some physiological characteristics like a fingerprint or iris pattern This is one-to-one matching which means a person must first suggest their identity through a password, card or name and the system then seeks to determine whether or not there is a match between the suggested and true identities. Verification means testing if the user is really the person he/she claims to be. Biometric systems have been developed based on fingerprints, facial features, voice, hand geometry, handwriting, the retina and the one presented in this thesis, the iris. Biometric systems work by first capturing a sample of the feature, such as recording a digital sound signal for voice recognition, or taking a digital colour image for face recognition. The sample is then transformed using some sort of mathematical function into a biometric template. The biometric template will provide a normalized, efficient and highly discriminating representation of the feature, which can then be objectively compared with other templates in order to determine identity. Most biometric systems allow two modes of operation. An enrolment mode for adding templates to a database, and an identification mode, where a template is created for an individual and then a match is searched for in the database of pre-enrolled templates. This method of identification is preferred over traditional methods involving passwords and PIN numbers for various reasons:

i] The person to be identified is required to be physically present at the point-of-identification.

ii] Identification based on biometric techniques obviates the need to remember a password or carry a token.

There are three main ways of authenticating an identity –

Something you know → password
Something you have → token
Something you are → biometrics

Biometric Systems are automated methods of verifying or recognizing the identity of a living person on the basis of some physiological characteristics like a fingerprint or iris pattern, or some aspects of behavior, like handwriting or keystroke patterns. Biometric technology is a way to achieve fast, user-friendly authentication with a high level of accuracy. Biometrics provides a secure method of authentication and identification, as they are difficult to replicate and steal. Biometric techniques can potentially prevent unauthorized access to or

fraudulent use of ATMs, cellular phones, smart cards, desktop PCs, workstations, and computer networks. Iris recognition is based on the most mathematically unique biometric - the iris of the eye. The iris itself is stable throughout a person's life (approximately from the age of one). The physical characteristics of the iris do not change with age. None of the other biometric solutions, including fingerprint, facial recognition, retina scan, and voice recognition provide the level of accuracy, speed, or cost-effectiveness found with iris recognition technology.

II. LITERATURE SURVEY

a) Hand geometry:-

This involves analyzing and measuring the shape of the hand and the lengths of the fingers. It might be suitable where there are more users or where users access the system infrequently. Accuracy can be very high if desired and flexible performance tuning and configuration can accommodate a wide range of applications. Organizations use hand geometry readers in various scenarios, including time and attendance recording. It is a fairly simple procedure and is surprisingly accurate.

b) Fingerprint matching: - Fingerprint is the pattern of ridges and valleys on the tip of a finger and is used for personal verification of people. Fingerprint based recognition method because of its relatively outstanding features of universality, permanence, uniqueness, accuracy and low cost has made it most popular and a reliable technique and is currently the leading biometric technology. There is archaeological evidence that Assyrians and Chinese ancient civilizations have used fingerprints as a form of identification since 7000 to 6000 BC.Henry Fauld in 1880 laid the scientific foundation of the modern fingerprint recognition by introducing minutiae feature for fingerprint matching. Current fingerprint recognition techniques can be broadly classified as Minutiae-based, Ridge feature-based, Correlation-based and gradient base. Most automatic fingerprint identification systems employ techniques based on minutiae points. Although the minutiae pattern of each finger is quite unique, noise and distortion during the acquisition of the fingerprint and errors in the minutiae extraction process result in a number of missing and spurious minutiae. To overcome the difficulty of reliably obtaining minutiae points from a poor quality fingerprint image, ridge feature-based method is used. A ridge is a pattern of lines on a fingertip. This method uses ridge features like the orientation and the frequency of ridges, ridge shape and texture information for fingerprint matching. However, the ridge feature-based methods suffer from their low discrimination capability. The correlation-based techniques make two fingerprint images superimposed and do correlation (at the intensity level) between the corresponding pixels for different alignments. These techniques are highly sensitive to non-linear distortion, skin condition, different finger pressure and alignment. Most of these techniques use minutiae for alignment first. Among all the biometric techniques, fingerprint-based identification is the oldest method which has been successfully used in numerous applications. Everyone is known to have unique, immutable fingerprints. A fingerprint is made of a series of ridges and furrows on the surface of the finger. It is used in a wide range of applications including forensics, access control, and driver license registration. An automatic recognition of people based on fingerprints requires that the input fingerprint be matched with a large number of fingerprints in a database.

c) Retina:-

A retina-based biometric system involves analyzing the layer of capillary vessels located at the back of the eye. This technique involves using a low intensity ray light source through an optical coupler to scan the unique patterns of the retina. Retinal scanning can be quite accurate but does require the user to look into a receptacle and focus on a given point. In general the user has to take off his or her glasses. The equal error-rate is quite low.

d) Voice recognition:-

Voice authentication captures the characteristics such as cadence, frequency, pitch and tone of an individual's voice. Voice verification works with a microphone or with a regular telephone handset, although performance increases with higher quality capture devices. Voice recognition has got its problems with persons who are husky or mimic another voice. Additionally the likelihood of recognition decreases with poor-quality microphones and if there is background noise.

e) Face: - Face recognition for its easy use and non-intrusion has made it one of the popular biometric. A summary of the existing techniques for human face recognition can be found in. Further, a survey of existing face recognition technologies and challenges is given. A number of algorithms have been proposed for face recognition. Such algorithms can be divided into two categories: geometric feature-based and appearance-based.

An inherent drawback of appearance-based methods is that the recognition of a face under a particular lighting and pose can be performed reliably when the face has been previously seen under similar circumstances. Further, in appearance-based methods the captured features are global features of the face images and facial occlusion is often difficult to handle in these approaches. Geometric feature-based methods are robust against variations in illumination and viewpoints but very sensitive to feature extraction process. The geometry feature-based methods analyze explicit local facial features, and their geometric relationships. The geometry feature-based methods include: Active Shape Elastic Bunch Graph matching and Local Feature Analysis (LFA). Recognition of faces from still images or 2D images is a difficult problem, because the illumination, pose and expression changes in the images create great statistical differences and the identity of the face itself becomes shadowed by these factors. To overcome this problem 3D face recognition has been proposed which has the potential to overcome feature localization, pose and illumination problems, and it can be used in conjunction with 2D systems. Research using 3D face data to identify humans was first published by. The 3D face data encodes the structure of the face and so is inherently robust to pose and illumination variations. Applying HMMs to 3D face verification was first attempted. A recent advance for 3D face verification has been to show the applicability of the Gaussian Mixture Model (GMM) parts-based approach. The drawbacks of 3D face recognition include high cost and decreased ease-of-use for laser sensors, low accuracy for other acquisition types, and the lack of sufficiently powerful algorithms.

III. WORKING OF SYSTEM

a) Acquiring the Picture: Image is captured with the help of Web Camera. Image is captured at a distance of few inches from camera. To acquire more clear images through a web camera and minimize the effect of the reflected lights caused by the surrounding illumination, we arrange two halogen lamps as the surrounding lights.

b) Find the Pupil Region: The pupil is considered as blackest region in an eye. So to find center of Iris, pupil region has to be found. Using the box method pupil region is detected. Kong and Zhang present a method for eyelash detection, where eyelashes are treated as belonging to two types, separable eyelashes, which are isolated in the image, and multiple eyelashes, which are bunched together and overlap in the eye image. Separable eyelashes are detected using 1D Gabor filters, since the convolution of a separable eyelash with the Gaussian smoothing function results in a low output value. Thus, if a resultant point is smaller than a threshold, it is noted that this point belongs to an eyelash. Multiple eyelashes are detected using the variance of intensity. If the variance of intensity values in a small window is lower than a threshold, the center of the window is considered as a point in an eyelash.

c) Find the Edge points & center: Once pupil region is found, detect edge points. At a distance above pupil region, scanning starts in horizontal direction. RGB values of each point are calculated & there is dramatic change in it, that point is considered as edge point. In similar manner three points are detected forming a right-angled triangle. Mid-point of hypotenuse is considered as center of Iris.

d) Clipping the image: Radius of Iris is calculated applying distance Formula between center & edge points. Iris portion of radius found has to be clipped & stored. Average filter is used to minimize the noise in captured image.

e) Compare & Verify: Clipped image of newly acquired image is compared with already stored image. RGB values of points in both images are compared. Percentage of matching is calculated. If per (%) > 60, Access is granted else access is denied.

IV. CONCLUSION

Iris recognition provides the accurate recognition as compared to another methods .This system is reliable and easy to use. In future it is trying to remove the drawbacks if any found in this system.

V. ACKNOWLEDGEMENT

It gives me immense pleasure in project on the topic "**Iris Recognition using Fuzzy Matching System**". I acknowledge the enormous assistance and excellent co-operation extended to by my respected guide Prof.N.A.Nemade.

I would also like to thanks the staff members for their valuable support. Lastly I would like to express my heartfelt indebtedness towards to all those who have help me directly or indirectly for the success of the project.

.

REFERENCES

[1] S. Shah and A. Ross, "Iris segmentation using geodesic active contours,"IEEE Trans. Inf. Forensics Security, vol. 4, no. 4, pp. 824–836, Dec. 2009.

[2] C. C. Tsai, J. S. Taur, and C. W. Tao, "Iris recognition using Gabor filters optimized by the particle swarm algorithm," J. Electron. Imaging, vol. 18, no. 2, p. 023 009, May 2009.

[3] L. Masek and P. Kovesi, MATLAB Source Code for a Biometric Identification System Based on Iris Patterns. Perth, Australia: School Comput.Sci. Softw. Eng., Univ. Western Australia, 2003.

[4] J. S. Marques, "A fuzzy algorithm for curve and surface alignment," Pattern Recognit. Lett., vol. 19, no. 9, pp. 797–803, Apr. 1998.

[5] N. R. Pal, K. Pal, J. M. Keller, and J. C. Bezdek, "A possibilistic fuzzy c-means clustering algorithm," IEEE Trans. Fuzzy Syst., vol. 13, no. 4, pp. 517–530, Aug. 2005

[6] K. W. Bowyer, K. Hollingsworth, and P. J. Flynn, "Image understanding for iris biometrics: A survey," Comput. Vis. Image Understand., vol. 110,no. 2, pp. 281–307, May 2008.

[7] L. Birgale and M. Kokare, "Iris recognition without iris normalization,"J. Comput. Sci., vol. 6, no. 9, pp. 1042–1047, 2010.

[8] R. P.Wildes, "Iris recognition: An emerging biometric technology," Proc IEEE, vol. 85, no. 9, pp. 1348–1363, Sep. 1997.

