International Journal of Engineering Research and General Science Volume 3, Issue 2, Part 2, March-April, 2015
ISSN 2091-2730

AN ANALYTICAL STUDY ON IRIS RECOGNITION SYSTEM: A SURVEY

Gourav Sachdeva, Dr. Bikrampal Kaur

M.tech, Professor, Department of Information Technology

Chandigarh Engineering College, Landran (Mohali)

gouravsachdeva8@gmail.com, cecm.infotech.bpk@gmail.com

9914191588

ABSTRACT- The iris recognition is a kind of the biometrics technologies based on the physiological characteristics on the fingerprint, palm print, face and sound etc, the iris has some rewards such as individuality, stability, high recognition rate, and non infringing etc. Iris recognition is regarded as the most reliable and accurate biometric identification system available. In this paper, it is described the common methods of Iris Recognition along with some feature extraction techniques and matching methods. This paper will help in future in choosing the best optimal method for Iris Recognition.

***KEYWORDS*- Iris, Wavelets, Hamming, Gabor, SIFT, ACO, Feature Extraction**

I. INTRODUCTION

All these biometric identification technique, iris recognition is most prominent technique. Iris recognition systems are gaining interest because it is stable over time. Iris scan has been developing an identification/verification system capable of positively identifying and verifying the identity of individuals. The unique patterns of the human iris, used for overcoming previous shortcomings. The iris indicates the color part of the human eye. It is a circular membrane of the former face of the ocular sphere. It is pierced with a black hole called the pupil which allows the light penetration to the retina. The iris is used to adapt this light quantity by papillary dilation or constriction. The iris is a combination of several elements [1]. The visual appearance of the iris is directly related to its Multi-layered construction. The forward layer is divided into two essential regions, the central pupillary zone and the surrounding zone. The border between these areas is known as the collarette. The iris has been found to be incredibly unique individual to individual, in both color and structure. In fact, it has been discovered by both ophthalmologists and anatomists, investigating large numbers of eyes that even the left and right eye of an individual exhibit differences in

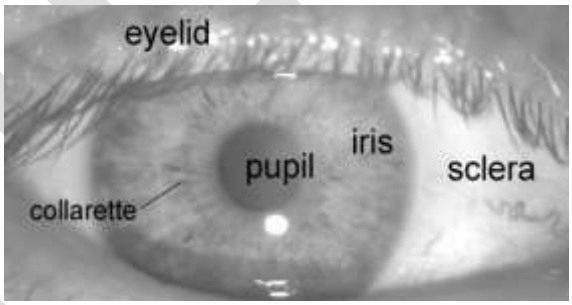

Figure 1 Biometric Iris

their iris pattern. Also, the pattern appears to very little after childhood. In various study it shows that the iris is most fully developed and also grows little after childhood. However, after teenage years a person's iris pattern to be expected remains same for rest of the life. Thus, the iris recognition pattern is deliberated to be the most reliable and accurate biometric identification system available and widely used in automated personal identification. And among many biometrics techniques, iris detection is one of the most hopeful approaches due to its high reliability for personal identification [2].

II. IRIS RECOGNITION SYSTEM

A major approach for iris recognition today is to generate feature vectors corresponding to individual iris images and to perform iris matching based on some distance metrics [3–6]. Most of the commercial iris recognition systems implement a famous algorithm using iris codes proposed by Daugman [3]. One of the difficult problems in feature-based iris recognition is that the matching performance is significantly influenced by many parameters in feature extraction process (e.g., spatial location, direction, center frequencies and size parameters for 2D Gabor filter essential part), which may vary depending on environmental factors of iris image acquisition. Iris recognition is an automated method of biometric identification than uses mathematical pattern-recognition techniques on images of the irides of a persons eyes, whose composite random patterns are single and can be seen from some space. Not to be puzzled with another, less common, ocular-based technology, retina scanning, and iris recognition uses camera technology with subtle infrared illumination to acquire images of the detail rich, complicated structures of the iris. Digital templates prearranged from these patterns by mathematical and statistical algorithms allow the identification of a person or someone pretending to be that person. To enhance the presentation of recognition, the iris recognition process is useful to left and right irises separately and the corresponding distance scores are generated for each iris of a person. These scores are joint using the weighted sum fusion rule which further increases their cognition rate. Iris recognition system is composed of segmentation, normalization, characteristic encoding and matching [7]. Iris recognition is an attractive technology for identity authentication for several reasons. Few people can't use the technology as most individuals have at least one eye. In a few instances even blind people have used iris recognition successfully, as the skill is iris recognition pattern-dependent, not vision dependent. Once an individual is enrolled, re-enrollment requirements are uncommon. With other biometric technology, change in voice timbre, weight, hairstyle, finger and hand size, cuts or even the effect of manual work can trigger the need for re-enrollment.Iris recognition is ideal for handling applications requiring management of large user groups, such as a National Documentation function might require. Iris Access platforms integrate well with large database back ends like Microsoft SQL and Oracle 9i. In a UK Government-commissioned study, Iris ID's Iris Access platform searched records nearly 20 times faster than the next fastest technology. Iris ID has developed a high speed matching engine, Iris Accelerator, designed to deliver 10 million+ matches per second.Iris recognition involves nothing more than taking a digital picture of the iris pattern (from video), and recreating an encrypted digital pattern of that pattern. 512 byte iris template are encrypted and cannot be re-engineered or reconstituted to produce any sort of visual image. Iris recognition then affords high level defense against identity robbed, a rapidly growing offense. The imaging process involves no lasers or bright lights and authentication is essentially non-contact. Iris recognition has a good, convenient and intuitive user interface.

Iris recognition is the most excellent authentication process accessible nowadays. While many fault it for scanning of retina, iris detection basically involves taking a representation of the iris; this depiction is used exclusively for verification. But what makes iris recognition the authentication system of choice?

1. **Stable** - The distinctive pattern in the individual iris is formed by 10 months of age, and remains unaffected all through one's lifetime.
2. **Uniqueness** - The possibility of two irises producing the similar system is nearly impossible.
3. **Flexibility** - Iris detection skill simply integrates into obtainable security systems or operates as an impartial.
4. **Reliability** - A characteristic iris pattern is not disposed to theft, loss or negotiation.

III Previous Techniques

S. No.	Author	Method
1	Padma Polash, Maruf Monwar et.al [8]	The paper deal with the High Transform and Gabor filters. This paper presented an iris recognition system in order to verify both the uniqueness of the human iris and also its performance as a biometric identification. A biometric system provides automatic identification of an individual based on a unique feature or characteristic possessed by the individual.
2	Miyazawa, Kazuyuki, Koichi Ito, Takafumi Aoki, Koji Kobayashi, and Hiroshi Nakajima et.al [9]	The paper based on phase-based image matching. This paper presents use of phase components in two-dimensional discrete Fourier transforms of iris images makes possible to achieve highly robust iris recognition with a simple matching algorithm. Trial evaluation using the CASIA iris image database (ver. 1.0 and ver. 2.0) clearly demonstrates an efficient performance of the proposed algorithm.
3	Himanshu Srivastava [10]	The paper deals with the Canny Edge Detector & Circular Hough Transformation technique. This paper presents a personal identification using iris recognition system with the help of six main steps i.e. image achievement, localization, separation, normalization, feature extraction and matching and also these six steps consists numbers of minor steps to complete each step.
4	M. Vatsa, R. Singh, A. Noore et. al [11]	The paper deals with the 1D log polar Gabor wavelet and Euler numbers. They presents the 1D log polar Gabor wavelet which is used to remove the textural features, and Euler numbers which are used to take out topological features of the iris. The proposed choice strategy uses those features to authenticate an individual's identity while maintaining a low false rejection rate.
5	Hematian, Amirshahram, Asrulnizam Abd Manaf, Suriayati Chuprat, Reza Khaleghparast, and Sajjad	The paper deals with the Field-Programmable Gate Array (FPGA) technique. In this paper they proposed a prototype design for iris recognition based on field-programmable gate array in order to improve iris recognition performance by

	Yazdani. [12]	similar computing. Time-consuming iris recognition sub-processes are fully implemented in parallel to achieve best performance.
6	Zhonghua Lin, Bibo Lu et. al [13]	The paper deals with the Morlet wavelet transform technique. This paper presents an iris recognition method based on the imaginary coefficients of Morlet wavelet transform. Firstly, it locates the iris, after that makes normalization to the iris image. Secondly, it makes one measurement Morlet wavelet transform row by row to the iris image in the useful iris area.
7	Nguyen, K., Fookes C., Sridharan S., Denman, S. [14]	The paper deals with Super-resolution method. Uncooperative iris identification systems at a distance suffer from poor resolution of the captured iris images, which considerably degrades iris recognition performance. Super resolution methods have been employed to enhance the resolution of iris images and improve the recognition performance.
8.	Vijay Prakash Sharma, Sadhna K. Mishra, Deepika Dubey et. al [15]	The paper deals with the optimization technique i.e. Ant Colony Optimization(ACO) and Wavelet Transform and compared with the Hough circular transform recognition technique. The paper describes the authentication with some drawback is that the process of feature selection in iris recognition using wavelet and colony optimization process is very complex.
9.	Weijie Zhao, Xiaodong Chen, Ji Cheng, Linhua Jiang et. al [16]	The paper deals with the Scale invariant feature transform(SIFT) technique which uses segmentation, matching and evaluation by generating the key point descriptors. They focused to find the more specific key points to improve the accuracy.

Table-1 Previous Techniques

IV. CONCLUSION AND FUTURE SCOPE

Iris recognition is one of the most effective biometric techniques used for security purposes. In this paper various feature extraction and matching techniques has been discussed which is used for classification. The previous techniques help us to design an optimized authentication so that we will get high accuracy rate, less False Acceptance rate and less False Rejection rate.

REFERENCES:

[1] Wayman, J., Jain, A., Maltoni, D., Maio, D.: Biometric Systems. Springer (2005).
[2] Pankanti, Sharath, Ruud M. Bolle, and Anil Jain. "Biometrics: The future of identification" *Computer* 33, no. 2 (2000): 46-49.
[3] Daugman, John G. "High confidence visual recognition of persons by a test of statistical independence." *Pattern Analysis and Machine Intelligence, IEEE Transactions on* 15, no. 11 (1993): 1148-1161.
[4] Ma, Li, Tieniu Tan, Yunhong Wang, and Dexin Zhang. "Efficient iris recognition by characterizing key local variations." *Image Processing, IEEE Transactions on* 13, no. 6 (2004): 739-750.
[5] Boles, Wageeh W., and Boualem Boashash. "A human identification technique using images of the iris and wavelet transform." *IEEE transactions on signal processing* 46, no. 4 (1998): 1185-1188.

[6] Tisse, Christel-loic, Lionel Martin, Lionel Torres, and Michel Robert. "Person identification technique using human iris recognition." In *Proc. Vision Interface*, pp. 294-299. 2002.

[7] Wildes, Richard P. "Iris recognition: an emerging biometric technology."*Proceedings of the IEEE* 85, no. 9 (1997): 1348-1363.

[8] Padma Polash, P., and M. Maruf Monwar. "Human iris recognition for biometric identification." In *Computer and information technology, 2007. iccit 2007. 10th international conference on*, pp. 1-5. IEEE, 2007.

[9] Miyazawa, Kazuyuki, Koichi Ito, Takafumi Aoki, Koji Kobayashi, and Hiroshi Nakajima. "A phase-based iris recognition algorithm." In *Advances in biometrics*, pp. 356-365. Springer Berlin Heidelberg, 2005.

[10] Srivastava, Himanshu. "Personal Identification Using Iris Recognition System, a Review." *International Journal of Engineering Research and Applications (IJERA)* 3, no. 3 (2013): 449-453.

[11] Vatsa, M., R. Singh, and A. Noore. "Reducing the False Rejection Rate of Iris Recognition Using Textural and Topological." *International Journal of Signal Processing* 2, no. 2 (2005).

[12] Hematian, Amirshahram, Asrulnizam Abd Manaf, Suriayati Chuprat, Reza Khaleghparast, and Sajjad Yazdani. "Field programmable gate array system for real-time IRIS recognition." In *Open Systems (ICOS), 2012 IEEE Conference on*, pp. 1-6. IEEE, 2012.

[13] Lin, Zhonghua, and Bibo Lu. "Iris recognition method based on the imaginary coefficients of Morlet wavelet transform." In *Fuzzy Systems and Knowledge Discovery (FSKD), 2010 Seventh International Conference on*, vol. 2, pp. 573-577. IEEE, 2010.

[14] Nguyen, Kien, Sridha Sridharan, Simon Denman, and Clinton Fookes. "Feature-domain super-resolution framework for Gabor-based face and iris recognition." In *Computer Vision and Pattern Recognition (CVPR), 2012 IEEE Conference on*, pp. 2642-2649. IEEE, 2012.

[15] Sharma, Vijay Prakash, Sadhna K. Mishra, and Deepika Dubey. "Improved Iris Recognition System Using Wavelet Transform and Ant Colony Optimization." In Computational Intelligence and Communication Networks (CICN), 2013 5th International Conference on, pp. 243-246. IEEE, 2013.

[16] Zhao, Weijie, Xiaodong Chen, Ji Cheng, and Linhua Jiang. "An application of scale-invariant feature transform in iris recognition." In Computer and Information Science (ICIS), 2013 IEEE/ACIS 12th International Conference on, pp. 219-222. IEEE, 2013