Biometric Attendance System using Iris Recognition

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Abstract: In this paper we propose an automated attendance management system. This system is based on iris detection and recognition algorithms. It will automatically detect the student when he enters in the class room and marks the attendance by recognizing him. The system architecture and algorithms used in each stage are described in this paper. It can improve the reliability of the attendance records and avoid fraudulent issues that happen when you use a register. When compared to traditional attendance marking this system saves the time and also helps to monitor the students. The iris recognition captures the personal iris image data as the biometric code and applies this data in the attendance management system as the attendance record. The attendance records that use this technology is difficult to replicate by others. This is the main advantages of the paper. That is why it can be use in the different area where the uniqueness and secret is maintained.

Key Words: Iris recognition, Attendance Management System, Iris detection.

INTRODUCTION:

Biometric authentication is the process of verifying an individual based on behavioral and physiological characteristics. Iris recognition verification is one of the most reliable personal identification methods in biometrics. In the beginning, the idea of using iris patterns for personal identification was originally proposed in 1936 by ophthalmologist Frank Burch. By the 1980's the idea had appeared in James Bond films, but it still remained science fiction and conjecture. As biometric of human for identification purpose which cannot be stolen or lost. From the biometric system there exist different types of biometric such as thumb recognition, palm recognition, face recognition and iris recognition etc.

Amongst which the iris is more preferred. The reason for the popularity of iris recognition verifying is the uniqueness, stability, permanency and easily taking. Iris recognition system is highly protected and stable that results in a single enrolment for the lifetime. The unique pattern on the surface of the iris is formed during the first year of life. Formation of the unique patterns of the iris is random and not related to any genetic factors. The only characteristic that is dependent on genetics is the pigmentation of the iris, which determines its color. Due to the epigenetic nature of iris patterns, the two eyes of an individual contain completely independent iris patterns, and identical twins possess uncorrelated iris patterns.

MATERIALS: MATLAB Software

METHOD: A typical iris recognition system generally consists of the following basic methods:

I. Image acquisition, iris location, and pre-processing,

II. Iris texture feature extraction and signature encoding, and

III. Iris signature matching for recognition or verification.

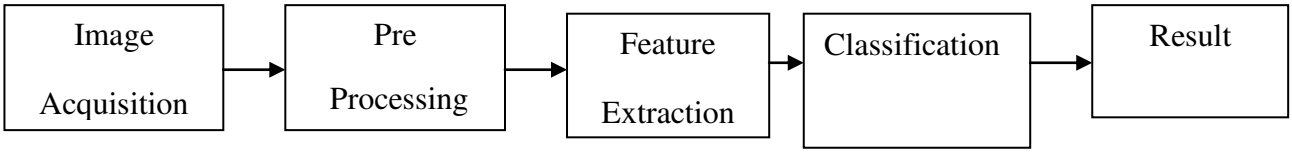

Fig1. Overview of recognition system

IMAGE ACQUISITION: The Camera is mounted at a distance from the entrance to capture the frontal images of the students.

IRIS PRE-PROCESSING: In this section the iris texture is detected and transformed into a rectangular block. In this iris pre-processing system the segmentation process is carried out.

IRIS SEGMENTATION:

The first step in Iris Segmentation is to detect pupil which is the black circular part surrounded by Iris tissues. The center of pupil can be used to detect the outer radius of Iris patterns. The important steps involved are:

- **Pupil detection:**

For detection of darkest pupil region in an image, an appropriate threshold is required such that the resultant image contains pupil area only. From a static value of threshold could not promise satisfactory results for images taken under varying environmental conditions. Thus dynamic threshold is required for every iris image to improve localization. For this reason an input iris image is divided into m×n blocks of size (w × w). For each block mean is obtained using the intensity values.

The first step in the iris verification biometric system is the segmentation of the iris image that includes important features for verification as well as unnecessary and noisy parts. In this paper a novel approach for iris segmentation and feature extraction is proposed for pupil segmentation.

- **Iris Localization:**

The iris localization is a fundamental step for the success of the treatment that follows. To locate the iris, it is proposed to detect its internal and external contours, based on the distribution of gray levels within the iris and its vicinity. The inner contour of the iris corresponds to that of the pupil.

FEATURE EXTRACTION AND CLASSIFICATION:

The performance of a Iris Recognition system also depends upon the feature extraction and their classification to get the accurate results. Feature extraction is achieved using feature based techniques. In some techniques we can make use of dimensionality reduction before classification. We compared the results of different approaches used for feature extraction and classification in real time scenario. In order to provide accurate recognition of individuals, the most discriminating information present in an iris pattern must be extracted. Only the significant features of the iris must be encoded so that comparisons between templates can be made. Most iris recognition systems make use of a band pass decomposition of the iris image to create a biometric template. The template that is generated in the feature encoding process will also need a corresponding matching metric, which gives a measure of similarity between two iris templates. This metric should give one range of values when comparing templates generated from the same eye, known as intra-class comparisons, and another range of values when comparing templates created from different irises, known as inter-class comparisons.

RESULT: Finally we get the result and the attendance gets automatically marked.

DISCUSSION:

Eye Anatomy: The human eye is the organ of vision, which transmits the picture through the visual paths into the brain. The structure of this organ is very complex. The part that we are interested in is only the visible outer part. It has a round shape of different colors surrounded by sclera, which is normally white. For an image of an iris it is very likely to be center of the iris there is a black circle named pupil, which controls the amount of light that passes into the eye and further into the brain processing center. Information gained from research shows that the diameter of a human iris ranges somewhere between 10 mm to 12 mm, on the other hand, there is difficult to determine the diameter for the pupil since it varies both with age as well as with the current mental state of a person. The very front of the eye is essentially made up of two parts: the sclera, or “white” of the eye, and cornea. The sclera consists of closely interwoven fibers and covers the entire surface of the eye, except for a small section in the back, where the optic nerve leaves the eye, and a small section directly in front and centered, known as the cornea. As shown in Fig.

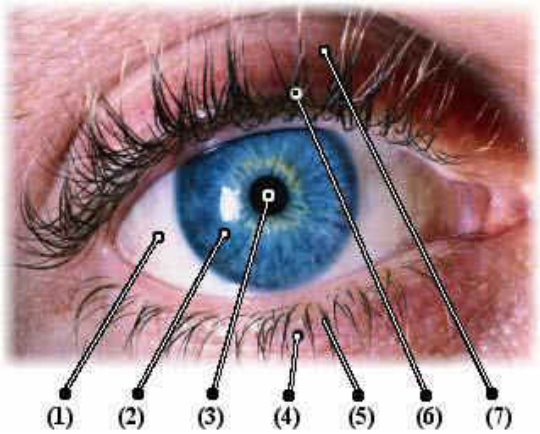

Fig2. Human eye, where (1) is sclera, (2) iris, (3) pupil, (5, 6) eyelashes And (4,7) eyelids.

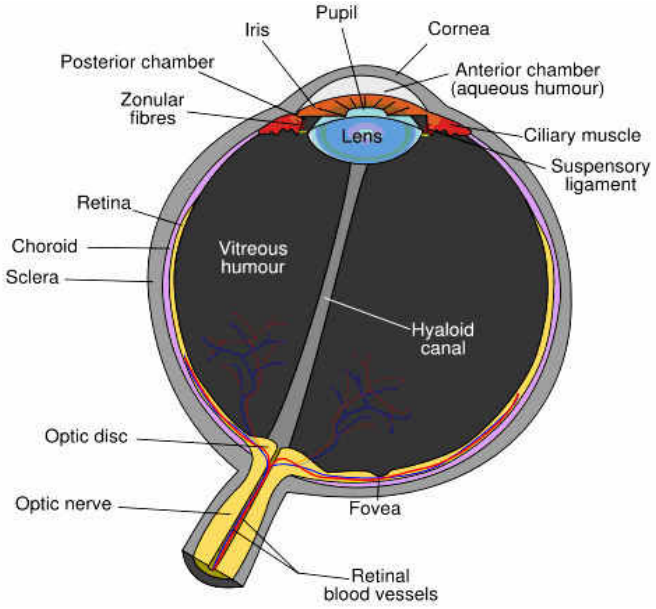

Fig3. Anatomy of frontal image of the eye.

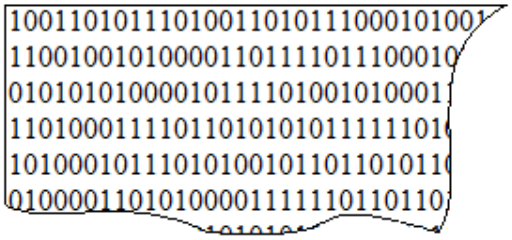

Fig4. Sample of the iris bit template.

ADVANTAGE:

1. Uniqueness of iris patterns hence improved accuracy.
2. Highly protected, internal organ of the eye
3. Stability: Persistence of iris patterns.
4. Non-invasive: Relatively easy to be acquired.
5. Speed: Smaller template size so large databases can be easily stored and checked.
6. Cannot be easily forged or modified
7. Concerns / Possible improvements
8. High cost of implementation
9. Person has to be “physically” present.
10. Capture images independent of surroundings and environment / Techniques for dark eyes.

APPLICATIONS:

1. Authentication Applications
2. Identification Applications
3. Application by Technologies
4. Commercial Product

CONCLUSION: A iris recognition system based on human iris identification is presented.

REFERENCES:

1. I. Khanfir Kallel, D. Sellami Masmoudi and N. Der-Tabl 1h.eA reO Cu ncerr veshoingtheperor- bel, "A Wavelet Network Based Approach For Iris Tabl 1h.eA reO Cun ecrr veshoingtheperor- Localization",

Transactions on Systems, Signals and mance when sum rule is used to combine the matching Devices, Vol. 3, No. 3, pp. 349-369, 2008.

2. S. I. Noh, "Iris recognition system based on independent component analysis," Department Elect. Electron. Eng., Grad. Sch. Yonsei Univ., Seoul, Korea, 2005
3. S. I. Noh, K. H. Bae, K. R. Park, and J. Kim, "A new iris recognition method using independent component analysis," *IEICE Trans. Inf. Syst.*, vol. E88-D, no. 11, pp. 2573–2581, Nov. 2005.
4. Y. J. Lee, H. G. Lee, K. R. Park, and J. Kim, "Invariant biometric key extraction based on iris code," in *Proc. IEEK Fall Conf.*, Seoul, Korea, 2005, vol. 28. no. 2.
5. Y. J. Lee, K. R. Park, and J. Kim, "Invariant iris code extraction for generating cryptographic key based on fuzzy vault," in *Proc. IEEK Summer Conf.*, Seoul, Korea, 2006, vol. 29. no. 1.
6. S. C. Chong, A. T. B. Jin, and D. N. C. Ling, "Iris authentication using privatized advanced correlation filter," in Proceedings ofthe 1st International IAPR Conference on Biometrics (ICB'06), 2006, vol. 4642 of Springer Lecture Notes on Computer Science, pp. 382–388.
7. K.W. Bowyer, K. Hollingsworth, and P.J. Flynn, "Image Understanding for Iris Biometrics: A Survey," Computer Vision and Image Understanding, vol. 110, no. 2, pp. 281-307, 2008.
8. E.M. Newton and P.J. Phillips, "Meta-Analysis of Third-Party Evaluations of Iris Recognition," IEEE Trans. Systems, Man, and Cybernetics, vol. 39, no. 1, pp. 4-11, Jan. 2009.
9. A.K. Jain, K. Nandakumar, and A. Nagar, "Biometric Template Security," EURASIP J. Advances in Signal Processing, Special Issue on Biometrics, vol. 2008, no. 113, pp. 1-17, 2008.
10. N.D. Kalka, J. Zuo, N.A. Schmid, and B. Cukic, "Image Quality Assessment for Iris Biometric," Proc. SPIE Conf. Biometric Technology for Human Identification, p. 6202, 2006.
11. H. Proenca and L.A. Alexandre, "A Method for the Identification of Noisy Regions in Normalized Iris Images," Proc. Int'l Conf. Pattern Recognition, pp. 405-408, 2006.
12. X.-D. Zhu, Y.-N. Liu, X. Ming, and Q.-L. Cui, "Quality Evaluation Method of Iris Images Sequence Based on Wavelet Coefficients in Region of Interest," Proc. Fourth Int'l Conf. Computer and Information Technology, pp. 24-27, 2004.
13. K.P. Hollingsworth, K.W. Bowyer, and P.J. Flynn, "Image Averaging for Improved Iris Recognition," Proc. Third Int'l Conf. Advances in Biometrics, 2009.
14. N.A. Schmid, M.V. Ketkar, H. Singh, and B. Cukic, "Performance Analysis of Iris Based Identification System at the Matching Score Level," IEEE Trans. Information Forensics and Security, vol. 1, no. 2, pp. 154-168, June 2006.
15. S. Kanade, D. Petrovska-Delacretaz, and B. Dorizzi, "Cancelable Iris Biometrics and Using Error Correcting Codes to Reduce Variability in Biometric Data," Proc. IEEE Conf. Computer Vision and Pattern Recognition, 2009.