IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 4, Issue 12, December 2015

Steps of Human Iris Detection for Biometric Application

Mr. Rahul A.Patil[1], Mr.A.H.Karode[2], Mr.S.R.Suralkar[3]

Department of E & TC Engineering, SSBTCOE, Bambhori, Jalgaon, India[1,2,3]

Abstract: Day by day connectivity of person continues to spread across the world , therefore old security methods are very poor ,difficult and time consuming for this purpose world preferred new fastest and advanced , biometric technology which is easily accessible than ever before,genrelly this technology used in various e-security like the PIN on our phone, password of ATM etc. biometric technologies uses fingerprint, palm and full-hand scanning system, voice recognition, facial recognition systems, iris recognition technology, etc. In this paper briefly mention steps of iris detection for biometric technology and parameter is extracted with the help of Gabor filter.

Keyword: iris recognition, face recognition, Gabor filters etc.

I. INTRODUCTION

We know that world goes towards 21[Th]century therefore communication and connectivity will be an increase that's why every government varied about its own e- security for this purpose one of the best solution is biometrics technology. Generally biometric word acronym of : bio, as in biological; and metric, as in measurement. Therefore it is called, biometrics is biological measurements. Which random and unique in nature. It is never stolen and faked it is always with us in biometrics method human various parameter are consider like Fingerprints, voice, iris face, ear etc. Which is used to measurements, and detection, identification and recognition of persons?

In this paper we focus on special biometric parameter Which is an iris At Find iris detection technology that measure biometrics and apply them to identity verification? Sometimes that means proving to a computer that you are you and is allowed to access your email, other times it means law enforcement officers uncovering wanted crooks. In every case biometrics allow for a high level of efficiency and assurance when it comes to every transaction dealing with identity and credentialing.

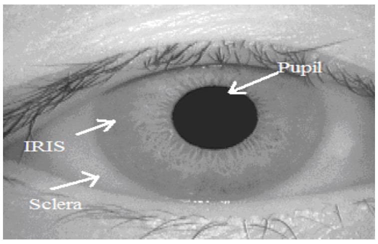


Figure 1. An eye image from CASIA V1 iris database.

Iris recognition is a method of identifying person based on unique patterns above figure show the image of eye in this image it is clearly shows the part of iris which is the ring-shaped region surrounding the pupil of the eye. The iris usually has a brown, blue, gray, or greenish color, with complex patterns that are visible upon close inspection and after the age 2,3year it is never be changed also every person its left and right eyes is different. Because of this it makes use of a biological characteristic, iris detection is considered a form of biometric identification.

In iris detection, the identification process is carried out by gathering one or more detailed images of the eye with a sophisticated, high-resolution digital camera at visible or infrared (IR) wavelengths, and then using Gabor filter, ICA, PCA etc. a specialized computer program called a matching engine to compare the subject's iris pattern with images stored in a database. The matching engine can compare millions of images per second with a level of precision comparable to conventional fingerprinting or digital finger scanning.

In order for iris detection to provide accurate and dependable results, the subject must be within a few meters of the camera. Some control mechanisms must be implemented to ensure that the captured image is a real face, not a high-quality photograph. The ambient lighting must not produce reflections from the cornea (the shiny outer surface of the eyeball) that obscure any part of the iris. The subject must remain stationary, or nearly stationary, with respect to the camera, and must not be hostile to the process. Certain types of contact lenses and glasses can obscure the iris pattern.

Iris detection, like facial recognition, is most often used for security-related applications. Some countries have implemented iris- detection systems in airports, points of entry or exit, and government buildings. The technology has also been used to prevent unauthorized access of personal computers and mobile devices. A small, portable iris-scanning device is available for consumer use, bypassing the need for cumbersome password entry. Iris detection applications are also available for the iPhone and other smartphones.

II. PROPOSED BLOCK DIAGRAM OF IRIS DETECTION SYSTEM

Block diagram of the proposed iris detection system is as shown in Figure 2 that contains the typical stages of iris detection system.

The first stage concerns about the segmentation of the iris. This consists in localize the iris inner (pupillary) and outer

IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 4, Issue 12, December 2015

(Sclera) boundaries, assuming either circular or elliptical shapes for each border. Additionally, it is used to detect regions of the iris texture occluded by any other type of data, as eyelids, eyelashes, glasses or hair. Features of iris image are extracted using the Laplacian of Gaussian (LoG) filter.

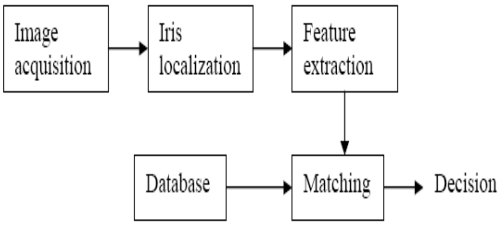


Figure 2. Proposed Block dig. Of iris recognition system

These extracted features are stored in the database during enrollment. While matching features of the query image are correlated with the feature vectors of templates in the database and decision is formulated.

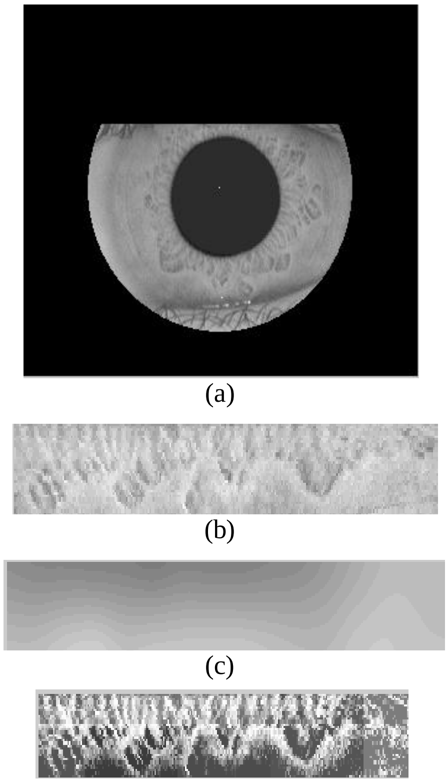
A. Iris localization and preprocessing

Image acquisition of the iris cannot be expected to yield an image containing only the iris. It will also contain data derived from the surrounding eye region. Therefore, prior to iris pattern matching, it is important to localize that portion of the image derived from inside the limbus (the border between the sclera and the iris) and outside the pupil. If the eyelids are occluding part of the iris, then only that portion of the image without the eyelids should be included.

For the localization of iris first any random circular contour is formed which contains iris and pupil region to eliminate the remaining portion of the eye .A circular pseudo image is formed of desired diameter. The inside region of the circle is set at gray level '1' and the outside region to '0'. The diameter selected is such that the circular contour will encircle the entire iris. This diameter selection is crucial as it should be common for all iris images.

Thus when the product of the gray levels of the circular pseudo image and the original iris image are taken, the resultant image will have the circular contour enclosing the iris patterns and the outside of the circular contour will be at gray level '0'. The resultant image is the localized iris image. This is done by finding the row and column having the maximum number of pixels of gray level '0', which corresponds to the center of the pupil. Knowing the center of the pupil, we now shift the center of the circular contour to the center of the pupil. The resultant image will have the pupil and the iris regions concentric image processing techniques such as thresholding and gray-level slicing (without the background) on the resultant localized image to eliminate every other feature except the pupil of the eye.

The pupil of the eye is set at gray level '0' and rest of the region is at '255' .Next step involves determining the center of the pupil with the circular contour and the localized iris image to the center of frame is performed as shown in Figure 3.Pupil diameter is known to us and to find iris diameter get binary image of semicircular iris using image point processing operators, mainly gray level slicing with and without the background and a digital negative, we obtain only the iris at gray level '0' and the remaining portion of the image is at gray level '255'.



(a) (b) (c) (d)

Figure 3. Flat bed iris localization (a) circular (b) Unwrapped normalize image, (c) Estimated background illumination, (d) Enhanced unwrapped iris image.

The shape of the iris in this case can be considered to be semi-circular. Now scanning row-wise, a counter determines the number of pixels having gray level '0' in each row and the maximum count can be considered as the diameter of the iris along the row. Now scanning column-wise, a counter determines the number of pixels having gray level '0' in each column and the maximum count can be considered as the radius of the iris. Doubling gives the diameter of the iris along the column. Taking the average of the two, we get the average iris diameter. Final Result of iris localization eye with iris and pupil are circled correctly as shown in Figure 3

Removing the portion of the iris occluded by the eyelids is carried out next. The eyelids are occluding part of the iris, so only that portion of the image below the upper eyelids and above the lower eyelids are included. This is achieved by changing the gray level above the upper eyelids and below the lower eyelids to '0'. Figure 5 shows entire steps performed on another eye image

B. Feature extraction

After localizing and aligning the image containing the iris, the next task is to decide if this pattern matches with the

IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 4, Issue 12, December 2015

one existing in the database. The pattern matching is decomposed into three parts. Firstly a representation of the localized and aligned iris image is chosen that makes their distinctive patterns apparent.

We have employed an isotropic circularly symmetric band-past decomposition derived from the application of Laplacian of Gaussian filter to the image. This result in a pyramid formation of the iris image i.e. a Multiscale Representation which is used for iris pattern matching realized by the filter.The main idea of using a multi-scale representation in this paper is to capture range of spatial detail to detect and characterize edges of the numerous iris patterns known.

As the name suggests, a multi-scale representation gives us iris images at varying spatial scales. It is observed that different structures give rise to edges at varying scales; small scales correspond to fine details and large scales correspond to gross structures.

C. Matching

Thus, when comparing two iris images, their corresponding binary feature vectors are passed to a Function

$$H.D. = \frac{1}{N}\sum_{J=1}^{N} Ca(j) \oplus Cb(j)$$

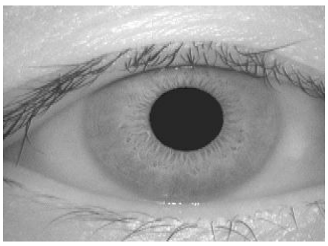
Where, Ca and Cb are the coefficients of two iris images and N are the size of the feature vector. The formula contain known Boolean operator that gives a binary 1 if the bits at position j in Ca and Cb are different and 0 if they are similar.

The Hamming distance is chosen as a metric for matching, which gave a measure of how many bits disagreed between two templates. If the hamming distance between two code vectors is less than the selected threshold, the two irises are of the same person, otherwise not.

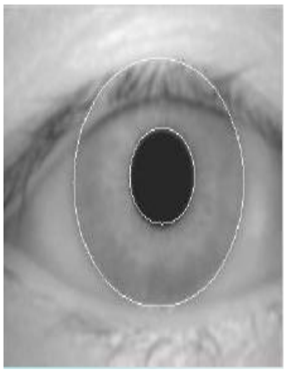
III. RESULT AND DISCUSSION

In this paper iris detection algorithm have been developed using MATLAB 7.1. It is tested on 2.4 GHz CPU with 1 GB ram. And used database CASIA V1 Iris, which is available in the public domain have been selected for experiments.

The database consists of photographic of 30 images (320*280) and also each image consists of 3 different positioned images. . And using MATLAB7.1 GUI is developed and which show stepwise result by matching hamming code and finally person is recognize.



a)select image



b) Localize image

c) Region of interest

d) Segment of image with enhanced region of interest

Experimental analysis is done by calculating the Hamming distance between the two iris codes. . The results of Hamming distance are shown here.

SR NO	Database Image	Query Image	Hamming Distance
1.	01_1	01_1	0
2.	01_1	01_2	0.2017
3.	01_1	01_3	0.2461
4.	02_1	02_1	0
5.	02_1	02_2	0.2043
6.	02_1	02_3	0.2186
7.	03_1	3_1	0
8.	03_1	03_2	0. 3036
9.	03_1	03_3	0.3302
10.	04_1	04_1	0
11.	04_1	04_2	0.2359
12.	04_1	04_3	0.2359
13.	05_1	05_1	0
14.	05_1	05_2	0.2745
15.	05_1	05_3	0.2461
16.	06_1	06_1	0
17.	06_1	06_2	0.2225
18.	06_1	06_3	0.2225
19.	07_1	07_1	0
20.	07_1	07_2	0.3176
21.	07_1	07_3	0.3176
22.	08_1	08_1	0
23.	08_1	08_2	0.2497
24.	08_1	08_3	0.2993
25.	09_1	09_1	0
26.	09_1	09_2	0.3043
27.	09_1	09_3	0.2478
28.	10_1	10_1	0
29.	10_1	10_2	0.1675
30.	10_1	10_3	0.2039

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
Vol. 4, Issue 12, December 2015

IV.CONCLUSION

It is to be observed in the biometric system no. of method is used to authentication and person identification in various applications but iris detection is the one of most suitable and economical method also using Gabor filter various parameter is extracted like frequency, bandwidth, this parameter help us to improved recognition rates and reduced blurring, sensitivity to variations between iris images caused by changes in illumination and viewing directions.

REFERENCES

[1] Jain A K, Ross A, Prabhakar S. "An introduction to biometric recognition," IEEE transactions on circuits and systems for video technology-special issue on image and video-based biometrics, vol. 14(1); 2004.

[2] Kashima H, Hongo H, Kato K, Yamamoto K., "A robust iris detection method of facial and eye movement," Canadian conference on computer and robot vision ,2001.

[3] Daugman J G, " Recognizing people by their iris patterns," Information Security Technical Report, Vol 3, Issue 1, 1998, pp 33-39.

[4] Daugman J G, " Recognizing people by their iris patterns," Information Security Technical Report, Vol 4, Supplement 1, 1999, pp 29.

[5] Daugman J G, "The importance of being random: statistical principles of irisrecognition," Pattern Recognition, Vol36, Issue 2, Feb 2003, pp279-291.

[6] Daugman J G, "How Iris Recognition Works," Handbook of Image and Video Processing (Second Edition), 2005, pp 1251-1262.

[7] Kawaguchi, T, Rizon, M, "Iris detection using intensity and edge information," Pattern Recognition, Vol36, Issue 2, Feb 2003, pp 549-562.

[8] Bowyer, K W, Hollingsworth, K P, Flynn, P J, "Image Understanding for Iris Biometrics: A survey," CVIU, May 2008, pp 281-307.

[9] Wildes R.P., "Iris recognition: an emerging biometric technology," Proceedings of the IEEE, vol. 85(9);1997. pp. 1348–63.

[10] L. Ma, T. Tan, Y. Wang, and D. Zhang., "Personal Identification Based on Iris Texture Analysis," IEEE Transactions on Pattern Analysis and Machine Intelligence, 25(12):1519-1533, Dec 2003.

[11] L. Ma, Y. Wang, and D. Zhang, "Efficient iris recognition by characterizing key local variations," IEEE Transactions on Image Processing, vol. 13, no. 6, pp. 739–750, June

[12] J. Huang, Y. Wang, T. Tan, and J. Cui, "A new iris segmentation method for recognition," in Proceedings of the 17th International Conference on Pattern Recognition, vol. 3, 2004, pp. 23–26.

[13] L. Ma, Y. Wang, and T. Tan, "Iris recognition using circular symmetric filters," in Proceedings of the 25th International Conference on Pattern Recognition, vol. 2, 2002, pp. 414–417.

[14] H. Proenca and L. A. Alexandre, "Iris segmentation methodology for non-cooperative iris recognition," IEE Proc. Vision, Image & Signal Processing, vol. 153, issue 2, pp. 199–205, 2006.

[15] Y. Du, R. Ives, D. Etter, T. Welch, and C. Chang, "A new approach to iris pattern recognition," in Proceedings of the SPIE European Symposium on Optics/Photonics in Defence and Security, vol. 5612, Oct 2004, pp. 104–116.

[16] J. Mira and J. Mayer, "Image feature extraction for application of biometric identification of iris - a morphological approach," in Proceedings of the 16th Brazilian Symposium on Computer Graphics and Image Processing, Oct 2003, pp. 391–398.

[17] E. Sung, X. Chen, J. Zhu and J. Yang, "Towards non-cooperative iris recognition systems", Seventh international Conference on Control, Automation, Robotics And Vision, Dec. 2002, pp. 990-995.

[18] J. Cui, Y. Wang, J. Huang, T. Tan and Z. Sun, "An Iris Image Synthesis Method Based on PCA and Super- resolution", IEEE CS Proceedings of the 17th International Conference on Pattern Recognition

[19] H. Gu Lee, S. Noh, K. Bae, K.-R. Park and J. Kim, "Invariant biometric code extraction", IEEE Intelligent Signal Processing and Communication Systems (ISPACS 2004), Proceedings IEEE ISPACS, 18-19 Nov. 2004, pp. 181-184.

[20] K Miyazawa, K Ito, T Aoki, K Kobayashi, H. Nakajima, "An Efficient Iris Recognition Algorithm Using Phase- Based Image Matching", IEEE Image Processing Conference, 2005 Sept 2005, Vol. 2, pp. 49-52.

[21] Chinese Academy of Sciences. Specification of CASIA Iris Image Database (ver1.0). March 2007. http://www.nlpr.ia.ac.cn/english/irds/irisdatabase