

The Survey of Complications in Iris Recognition

SarikaB.Solanke¹, Ratnadeep R. Deshmukh²

PhD Student, Department of Computer Science, Dr. B.A. M. University, Aurangabad (MS), India

Professor & Head, Department of Computer Science, Dr. B. A. M. University, Aurangabad(MS), India

ABSTRACT :Authentication systems based on iris play important role to improve efficiency in biometric identification due to its reliability in highly secured areas. Iris recognition has been done by many researchers in last decade.The iris recognition systems have made large progress over the past decade. In this paper we will discuss about the complications and problems of iris recognition system.This paper presents an analysis of how the iris recognition is impacted by eye diseases. The challenge to improve performance of iris recognition has been issued.

KEYWORDS: Biometrics, Iris recognition system, Iridodialysis.

I.INTRODUCTION

Due to reliability and stability of iris recognition it is known to be safe and accurate method of human identification .It involves locating and analyzing a ring around the pupil. The unique structure of Iris and randomly distributed patterns are used for human identification [1]. Foolproof security systems are in demand for public security as the terrorist activities are increasing day by day. The technological growth in biometric systems helps to solve this problem as these systems are able to identify humans automatically. Biometric systems use physical and behavioral patterns e.g. face, fingerprints, iris etc for authentication[2].Several systems are available in market for human identification which employs these features to identify humans. Systems built using iris features are considered to more suitable, trustable and accurate and to support this systems various databases are available for application which contains iris of millions of people. Till date no two irises are found to be exactly same. The left and right iris of individual is different as well as it is found that even iris of twins is not similar. After birth of any individual formation of iris pattern takes place in first year and during later few years' pigmentation of the stroma takes place. Unique iris pattern is formed randomly and it does not depend on genetic influence. The only characteristic which may be influenced by genes is iris color. This epigenetic feature results in formation of independent iris structures hence even twins do possess different iris features and patterns [3].

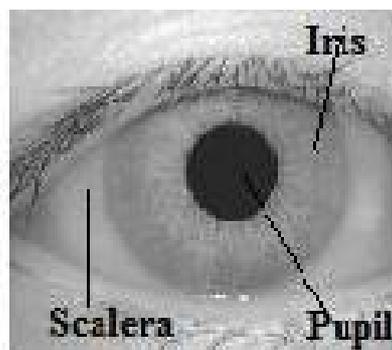


Fig.1 Structure of iris

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The challenges in improving performance of iris recognition have been issued. The iris image has some irrelevant information called noise such as pupil, eyelashes, reflection etc. which degrades the performance. To achieve the better recognition, the correct features should be extracted and matched. When investigating past work it is clear that due to the lack of large, heterogeneous, and availability of public databases appropriate to this subject, we are still far from full understanding of how various eye conditions impact iris recognition. We survey the issues and fault in iris recognition due to iris diseases. This paper describes the problems related to eye conditions and their impact on iris recognition. Many researchers face the problems of database of non-healthy eye images. This paper describes the open challenges and issues in iris recognition system.

II. RELATED WORK

Due to reliability and accuracy iris recognition has increasing demands. There are various systems that are helpful in improving performance and accuracy of iris recognition systems. These techniques are used for improving accuracy, speed and reducing iris recognition errors. These techniques are like cascaded classifiers, indexing algorithm, parallelization of recognition process, wavelength band selection, occlusion estimation method, integration of predictive and selective measures of quality, online iris and periocular recognition, revocable authentication method etc. In iris recognition there are various issues and problems. Iridodialysis is an eye disease which affects the bad result of iris recognition. Therefore it is needed to study the complications which may arise in recognition [4][5][6].

III. IRIS RECOGNITION

The three main stages of an iris recognition system are image preprocessing, feature extraction and matching the template. To obtain useful iris region it is required to preprocess the iris image. Locating iris, normalizing it and enhancing the image are tasks involved in preprocessing. Iris location involves detection of inner and outer boundary of iris. During localization the portions covered by eyelashes and eyelids are removed. During the normalization Cartesian coordinates of iris image are converted into polar coordinates to produce a rectangular image with angular and radial resolution. The image enhancement removes the low contrast and non-uniform illumination caused due to the light source [7][8].

Features such as texture etc are analyzed from a normalized image for accurately identify the iris pattern and generate the template. A matching matrix is used to compare the generated template with the templates stored in database. This matrix gives a similarity measure of two irises. A range of values is generated when comparing the templates from same iris and different irises. Finally, a decision of high confidence level is made to identify whether the user is an authentic or imposter.

IV. IRIS DISEASE

The complications which may arise in iris recognition system are because of iridodialysis iris images.

IRIDODIALYSIS: Iridodialysis is an eye disease in which the iris is partially torn away from its ciliary attachment. A black biconvex area is seen at the periphery. The papillary margin bulges slightly inward which causes the D-shaped pupil. Iridodialysis is common and it is also known as a coreodialysis. It can be corrected through cataract surgery. Iridodialyses are usually caused by blunt trauma to the eye, but may also be caused by penetrating eye injuries. An iridodialysis may be an iatrogenic complication of any intraocular surgery and at one time they were created intentionally as part of intra capsular cataract extraction. Iridodialysis may be single and so small so it is hardly seen by naked eyes. Due to this disease the texture of iris may get damaged and sometimes the black colour of pupil appears on iris texture [9][10].

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IV. THE EFFECT OF IRIDODIALYSIS ON IRIS RECOGNITION SYSTEM

In iris recognition of Iridodialysis iris, there are various issues and problems. These problems are given in following steps:

A. IMAGE ACQUISITION

Iris image acquisition is the first step in digital image processing. Image formation is done with a digital camera or CCD camera. This step is very complicated because the size and color of iris of every person is different. It is very difficult to capture clear images using the standard CCD camera in different environmental conditions. While acquiring iris images and generating database, it is very difficult to know the iridodialysis iris. For example if the iris database of college employee is created and maintained, at that time the employee does not have an eye disease. It may be caused after some time. Every day the attendance of the employee is marked through his/her iris. It is very difficult to match the iris after disease has been caused. It may give the false rejection.

The database should be acquired after the cataract surgery again to avoid false rejection. But it is cost effective as the database is maintained various times. Apart from the accuracy and stability of the iris recognition matching process the performance of a biometric system does matter if a user enroll their data accurately for the later attempt. If a user doesn't present the accurate data then there may be chance of error. In the acquisition process, the errors are failure to enroll and failure to acquire.

i) Failure to enroll rate: This type of error is occur when the estimated amount of the population for whom the system is not capable to generate repeatable pattern. The 'failure to enroll' rate doesn't generate the image of supportable quality at the time of enrollment and doesn't confirm that the user is matched correctly or not. All the process of enrollment depends on the enrollment strategy.

ii) Failure to acquire rate: This type of error is occur when the estimated amount of transaction for which the system is not able to capture or locate an image of supportable quality. The 'failure to acquire' rate depends on the changeable threshold for an image.

B. IMAGE SEGMENTATION

Segmentation is the process of partitioning any image into group of pixels. It eliminate all the different parts of eye such as pupil diameter, eyelashes, eyelid, sclera part of eye, inner and outer part of the eye and other irrelevant details of iris image which is not useful for the next steps such as feature extraction and matching process. Segmentation is a process of getting region of interest. Here iris is the region of interest. For this, inner and outer boundaries are recognized first. The inner boundary may not be recognized correctly as the iris is D-shaped. Iris texture is filled with black colour and ciliary area is detached. Somehow it may be possible to segment the iris correctly. But the challenge is to find the correct iris texture part form the segmented iris. Pupil is bulge slightly in this disease. It creates the problem in correct pupil boundary segmentation. To remove all irrelevant details increase the efficiency and save time of the recognition process.

C. IRIS NORMALIZATION

It is the process which changes iris image to the standard rectangular strips using the radial scan method. In this method all the pixels collected from the iris image portion and converted into the rectangular form. The iris of different people may capture in different size. For the same person also the size may vary due to variation in illumination. That is why iris image is normalized. Iris provides abundant texture information. In this disease, the normalized iris image may not have the iris texture only. It has lot of noise such as black colour of pupil, bulginess in pupil, eyelid and eyelashes reflection etc. This noise must be removed at the time of normalization. The iris texture features may not be seen correctly if noise persists. Even if the noise is removed from an iris image does not ensure that the texture is completely visible.

D. FEATURE EXTRACTION

This process enhances the iris image so that the poor image quality can be accepted by next step of iris recognition system. The iris features are extracted from the normalized image and a feature vector is generated. If some part of iris

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texture is visible, then the features can be extracted. But if the iris is fully detached from ciliary muscle or having occlusion of pupil black colour or no iris texture is visible then it is a challenging task. It is most difficult to generate the correct feature vector. A small window can be used to generate the feature vector on the visible iris texture. Wavelet or Multiwavelet approach can help in this case.

E. MATCHING

This is the last step of iris recognition process. In this step the encoding process extract the feature from iris image and used for the matching process. Matching is the process where available feature vector of trained database is tested with the test database feature vector. The different distance measures are used to match the feature vector. Hamming distance, Euclidian distance can be used to match the two irises correctly. The iris from database and accepted image should match correctly.

All the above steps were carried out on few iris images of iridodialysis caused person. It has been observed that the D-shaped iris is not localized correctly. Some part of pupil is considered for iris texture. Therefore the normalized iris image has to be corrected and only iris texture should be considered. But the iris image is also corrupted due to iridodialysis. It is quite difficult to get the correct feature vector for matching[11][12].

V. CONCLUSION

Iris recognition is the highly secure and reliable method for identification of the person. This paper describes the complications of iris recognition. We address the problems of non-healthy eye images which may occur due to eye disease. Iridodialysis is an eye disease which causes iris texture problems. Iridodialysis may create various problems in iris recognition. These problems can be solved by cataract surgery. Sometimes it does not give proper solution. In such cases, it may be enroll second eye of the person if it is healthy. For improving the results of iris recognition, we should develop the new techniques.

REFERENCES

- [1] Sarika B. Solanke, "Biometrics – Iris Recognition System" a study of promising approaches for secured authentication", 3rd International Conference on "Computing for Sustainable Global Development", BVICAM, 2016.
- [2] J. Daugman, "High confidence visual recognition of person by a test of Statistical Independence", IEEE Transaction Pattern Anal, Mach. Intell. 15(11), 1148-1161, 1993.
- [3] J. Daugman, "How iris recognition works", IEEE Transaction Circuit Systems Video Technology, 14(1), 21-30, 2004.
- [4] Sarika B. Solanke, "Different Iris Recognition Techniques: A Review", Pre Science Congress-2014, Conference on Science and Technology for Human Development.
- [5] Nishit Shah. "Iris Recognition System – A Review", International Journal of Computer and Information Technology (ISSN: 2279 – 0764) Volume 03 – Issue 02, March 2014.
- [6] Javier Galbally, "Image Quality Assessment for Fake Biometric Detection: Application to Iris, Fingerprint, and Face Recognition", IEEE Transaction On Image Processing, VOL. 23, NO. 2, FEBRUARY 2014.
- [7] Sachin Gupta, "Proposed Iris Recognition Algorithm through Image Acquisition technique", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 4, Issue 2, February
- [8] Wildes R., "Iris recognition: an emerging biometric technology", Proc. IEEE, 85: 1348-1363, September 1997.
- [9] Ms. Kavita Khobragade, "Iridodialysis : Open Challenges and Issues in Iris Recognition", Spvryan's International Journal of Engineering Sciences & Technology (SEST) ISSN : 2394-0905
- [10] Samar K. Basak, "Essentials in Ophthalmology", Current Book Internationals, ISBN: 81-86793-70-4, 2008.
- [11] Vanaja Roselin E. Chirchi, "Feature Extraction and Pupil Detection Algorithm Used for Iris Biometric Authentication System", International Journal of Signal Processing, Image Processing and Pattern Recognition Vol.6, No.6 (2013), pp.141-160, ISSN: 2005-4254 IJSIP.
- [12] Wildes R., "Iris recognition: an emerging biometric technology", Proc. IEEE, 85: 1348-1363, September 1997.