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Eye Biometric For Unconstrained Images In Visible Wavelength

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ABSTRACT

The eye biometric get rapidly increased attention specifically with visible wavelength clarification due to the increased accessibility of camera-based devices. Eye biometric is used to control access to restricted areas, it can be used in passenger control at airports. Major challenging objective in biometrics research is the development of recognition systems to work with unconstrained environments. one transitive research area aim to use visible wavelength (VW) light imagery to get data at importantly larger distances than normal and on moving subjects, which is a hard task because this *real-world* data is different from the NIR setup. The NIR wavelength is particularly dangerous because the eye does not respond to its natural mechanisms i.e, blinking, aversion and pupil compression. However, the use of visible light and unconstrained imaging setups can severely degrade the quality of the captured data, that increases the challenges in performing secure recognition. Eye biometric commonly done through iris recognition and sclera recognition. Iris features of the eye having unique characteristics for each human. Iris features are stable and permanent over human life, and environment effects cannot alter its shape. Sclera recognition has distinctive properties of its blood vessels. The blood vessels within the sclera have various distortion and shapes. Eye images captured under relaxed imaging conditions are taken from the UBIRIS.v2 database. In this paper we made a comparison of the results obtained from the implementation of existing algorithms for iris and sclera recognition systems independently, and then made a comparison of multimodal eye biometric systems.

Keywords: Iris Recognition, Visible Wavelength, Gabor Filter, Wavelet Transforms

I. INTRODUCTION

Security is the most important part of our daily life. Security plays significant role. The biometric person identification technique based on the patterns of the human iris and sclera is well suited for access control and provides strong e-security. E-security needs to be accurate, cost-effective and secure alternatives to passwords and personal identification numbers (PIN). Because financial losses increasing year over year from computer-oriented fraud such as computer hacking and identity theft [1]. Some of the time, usernames and passwords can be forgotten, identity cards can be lost or stolen. This makes it inevitable to improve the methods of human identification and to develop new techniques that are more reliable and more accurate than the traditional ones. Biometric system based authentication address these fundamental problems, because an individual's physical data is unique and cannot be transferred.

Whenever people pass through airports, use their credit cards, login to computers or pass through high security areas, their identities must be verified. In some cases this is done with a username and password but in other cases personal identification cards are used. However, usernames and passwords can be forgotten, identity cards can be lost or stolen. This makes it necessary to improve the methods of human identification and to develop new techniques

that are more reliable and more accurate than the traditional ones[2]. Pattern recognition techniques, such as iris and fingerprint recognition, provide more reliable and secure accessibility.

This research focuses on iris and sclera recognition is the correct form of biometric identification, as the human iris has 249 unique features, even in identical twins the features are unique .Texture of the human iris remains stable over human life. The environmental effects cannot easily alter iris shape [4]. For example Iris identification for authorization as well as for identification for Automated Teller Machines (ATMs) and restricted access to police evidence rooms.

Most of the current iris recognition systems uses NIR light sources to reveal the rich texture of the captured iris images[2]. Current sclera recognition system deals with high resolution sclera images that are captured from the high resolution cameras and from close distance. Many of the current systems deals with images that are captured by continuously looking to the camera without any head movement. Drawback of existing iris recognition system is off-angle imaging [3], whereas drawback of sclera recognition system is,it requires high resolution images. This research aims to capturing the relaxed images by fusing iris and sclera features for authentication purpose.

The remainder of present paper is organized as follows. In section 2, related work A]iris recognition for unconstrained images B] sclera recognition for unconstrained images. C] multimodal Eye Biometric and next in section 3,summary of all the existing systems next in section 4,performance analysis of the above methodologies and finally in section 5,conclusions are drawn.

II. RELATED WORK

A. Iris Recognition for unconstrained images.

Iris Recognition technique is one of the identification and verification of biometric technique which involves fingerprints, retinal and many other features of biological Features, facial. This all represents the novel solutions for recognition of human being, applications of security and authentication [5]. The iris part of a human has been used in biometric traits a few decades. However the idea of iris recognition is more recent came into existence.

Iris recognition has proved to be exceedingly exact for identification of user, but there are some problems leftover for practical use of this biometric traits. By considering example, the situation that the iris of human is 1 cmin diameter so it will makes it very unmanageable to be imaged at richly resolution without advanced camera systems. Traditional systems require cooperation of user as well as interact to capture the images of iris. By detecting the position of their iris on to the camera devices being captured, the user has to adjust the positions of their eye in order to localize the iris contour accurately [6]. This trade is essential in recognition of iris since iris features cannot be used for recognition until the iris region is localized and segmented properly. Many iris localization techniques exist and have been developed.

Table 1. Brief description of previous research under constrained and relaxed images for Iris recognition

Name of author	Iris segmentation	Results	Challenges
C.M.Patil	Simple filtering and Histogram operations	Average rate Euclidean norm-1=98.91% Euclidean Distance=97.98%	Reduces the computation and time load for detecting the inner and outer boundaries.

Chung-Chih Tsai, Heng-Yi Lin	Fuzzy Curve-Tracing (FCT) algorithm	Recognition rate=99.96%	Decrease the performance of our iris recognition system.
Liuyang Cao, Yanhua Zhou	SLIC(Simple Linear Iterative Clustering)	T=0.5 T	Leading to cost a lot of compute time and memory, cannot eliminate the interference caused by eyelids and eyelashes.
Amol M. Patil, Dilip S. Patil	Canny edge detection	Efficiency=97.5%	SVM is used so classification it reduces accuracy.
ArbanUka, AlbanaRoçi	Hough transform algorithm	EER=97.67%	Encoding schemes depends on the quality & resolution of the iris image.

A. Sclera Recognition for unconstrained images.

Sclera segmentation is an important in the sclera recognition system. A new method for segmentation of the sclera part were introduced which reduces the distance on the recognition of sclera.

The feature extraction of sclera identification system includes in building a reliable mathematical model of the abstract sclera pattern to reliably identify persons for authentication and recogntion intend. In some paper of sclera literature vein enhanced images were directly used for classification by template matching after performing image registration. Here the study was taken with respect to global and local information, which are extracted from the periocular region using texture and point operators resulting in a feature set that can be used for matching.

Table 2. Brief description of previous research under constrained and relaxed images for Sclera recognition

Year	Author	Methodology	Result	Challenges
2010	SimonaCrihalmeanu,Arun Ross	Coarse sclera segmentation for multispectral eye images	Performance of conjunctival vasculature segmentation , feature extraction improved	specular reflection and pose variation degrades the performance
2012	ZhiZhou ,ElizaYingzi Du, N. Luke Thomas.	Time adaptive active contour method.	Recognition accuracy is high.	Outcome of template ripening in sclera identification can be use in the future.
2015	J.A. Chambers, S.S.Dlay S. Alkassar,	Image processing, thresholding	Avoids expensive processing times. Increase the robustness of the system.	Use of off-angle scleraimages which need to be deliberated as future work.

2016	SinanAlkassar,Wai-LokWoo,SatnamDlay, Jonathon Chambers.	STRADS-Sclera template revolution alignment and distance measuring.	Better recognition rate, greater image resolution, better sclera segmentation accuracy.	Shading sclera features with iris and surrounding features for unconstrained image captured.
2017	VrushaliPravinBhokare, S.N.Dharwadkar	Euclidean distance algorithm, Squared Euclidean distance.	Preprocessing,ROI of the original eye images.	Exhausting process for different mobile applications.

A. Multimodal Eye Biometric :

Biometric system based on single biometric trait generally suffers from various factors, which includes lack of singularity, non-catholicity and noisy data [1]. Multi-biometric systems removes the disadvantages of the unibiometric devices by combining more than one sources of information.

Multimodal Eye Recognition can improve the accuracy of biometric recognition systems by merging various parts of eye.

However, there might be chances of affection of the system performance by getting poor quality images from unconstrained eye images.In previous papers, they proposed multimodal eye recognition system with constrained images. However, it is not possible to get the accurate results from unconstrained eye images.

In this paper, we proposed multimodal eye recognition system by fusing iris and sclera recognition for unconstrained images.

III. SUMMARY

Iris recognition is a machine driven method of biometric recognition that uses mathematical pattern-identition technology on video pictures of one or both of the irises of an individual's eyes, whose patterns are uncommon, static, and can be seen from some distance. Iris is an internal organ that is well saved against harm and wear out by a richly crystal clear and sensible membrane. This separates it from fingerprints, which can be hard to realize after years of definite types of manual task. The iris is generally level, and its geometric configuration is the only ensure by two complemented muscles that control the diameter of the pupil. This makes the iris pattern far more predictable than, that of the face.

Among the different physical traits, sclera is one of the new and bright biometric technology Among the different biometric techniques, identifition of sclera is regard a good technique to accompaniment old traits, because sclera areas are extremely preserved part of the eye, which are hard to taken off. Recognition of a human by the design of vessels of the sclera is possible because firstly, these patterns have a eminent degree of entropy, which is never the same for any two persons, even for the identical twins, and this makes it idealistic for recognition of person. Secondly, the designs remains unchanging throughout a lifetime of person.

The most require performance degree cannot be receive through with the function and covering of a single biometric characteristic such as signature, fingerprint, palm face, iris, ear, and so on. At the same time, with the innovation of fusing multiple biometrics provides indexing of big databases, step-

up the performance. Furthermore, multiple biometrics is also at the same time to a greater extent robust against attacks than compared to the single form biometrics technologies. The research results indicates the fusion of iris and sclera are better than their individual performances.

IV. PERFORMANCE ANALYSIS

The Hough transform is a standard algorithm that can be used to find out the parameters of simple geometrical objects, such as lines and circles, present in an image. The circular Hough transform can be employed to derive the radius and center coordinates of the pupil and iris regions. An automatic segmentation algorithm based on the circular Hough transform is employed by Wildes.

For relaxed imaging conditions where the person may walk back and frontwards to the camera, changing the positions of the heads to the left and to the right with the various eye gaze direction could affect the process of recognition. Therefore, and for the non-corruptive user scenario, we need to overcome these challenges in order to produce an efficient sclera recognition system. We therefore develop our method for sclera template rotation alignment and distance sclera (STRADS) which is changeless to get rotation and catch the distance.

V. CONCLUSION

This paper presented a review of existing methods and algorithms used for iris segmentation and sclera segmentation individually and with the multimodal eye biometric systems.In this paper we find out that fusion of iris and sclera features gives the best result for authentication. The individual iris and sclera not giving suitable result because of that we propose fusion of iris and sclera segmentation. This technology needs more attention towards the disadvantages of existing system.

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