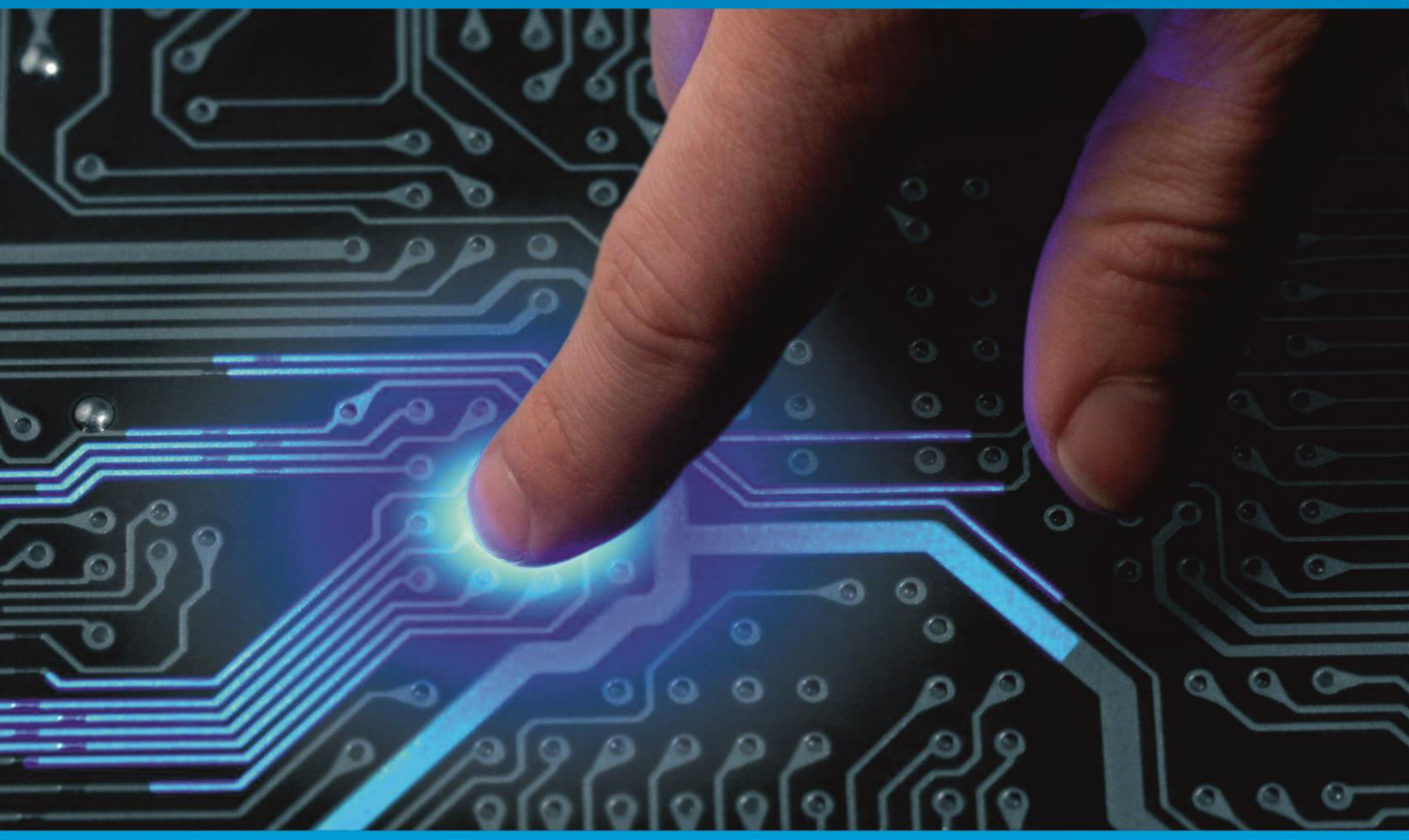
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 9, Issue 3, March 2021

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.488

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.488 |

|| Volume 9, Issue 3, March 2021 ||

| DOI: 10.15680/IJIRCCE.2021. 0903083 |

Efficient Parallel Approach for SCLERA Vein Recognition

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ABSTRACT: The vein structure in the sclera, the white and opaque outer defensive covering of the eye, is anecdotally stable over time and unique to each and every person. As a result, it is well-matched for use as a biometric for human apperception. In this paper, we propose a new method for sclera recognition. In this paper biometric technology is used to give the best result for the authentication. Here sclera recognition is used to perform the authentication process. Segmentation is the process of partitioning the image and extracts the sclera region, for that k-means clustering is used. To filter out the noise and the other part here Gabor filter is used. Feature extraction is the one of the important method to extract the feature of that sclera part. Here LBP method is used to perform the feature extraction process. In the next section classification will be takes place with the presence of the SVM classifier. By considering all these methods the person authentication can be done.

I. INTRODUCTION

Authentication of any individual is required in a wide range of regions in our everyday life, with individuals authenticating themselves on regular schedule. Every individual conveys numerous human traits that are special to every individual. Biometric is the procedure of distinguishing and confirming the general population based upon their one of a kind physiological and behavioural patterns. In the biometric technology physical biometric plays an important role. This includes the iris scan, finger print, face identification. These are the biometric methods which are more reliable than the token based and Knowledge based technology.

Sclera is white protective covering of an eye, which is encompassing with an iris. Among all the biometric technology sclera is the most imperative and effective biometrics. The sclera of an individual does not change with the age and time. Nowadays it is more important to secure the confidential documents from the frauds and from the hackers. Among all these present technologies sclera is the best method to give the accurate and efficient results. Sclera technology has more advantage than the other systems like the images can take in the visible light also. If the images are bluer or blink it can be used for the process. Even for the twines also having the different sclera regions because of these reasons authentication can be completed more securely. Consider in the case of finger prints with the heavy work in the industries the finger print will be fade so it leads to an inaccurate authentication. In the case of face recognition also, these all techniques have some of the drawbacks so to overcome from this sclera technology is developed. Fig1.Human eye image Sclera vein identification is like other methods of verification that can be used in admitting mobile banking, surety situations, mobile security, airport security, healthcare surrounding and buildin g accesses. Biometrics is the detection of humans using intrinsic physiological, biological, or behavioural features, traits and habits.

Biometrics have the potential to provide this desired ability — to unambiguously and discretely identify a person's identity— more accurately and conveniently than other options. Examples of biometric modalities embrace face, iris, hand, fingerprint, gait, typing, speech, and others. For users, biometric systems can reduce or eliminate the need to retain a key or remember a password, can speed up user throughput, and can be less intrusive. For example, at a border or security turnpike, a biometric system could provide a high-buoyancy identification of a user while they walk through a checkpoint rather than requiring them to stop, produce some detection, and be interviewed by security personnel. From a system standpoint, biometric systems can check much larger databases than are realistic with traditional security systems, are more harmonious, do not have ethnic or personal biases, and can be cheaper to operate.

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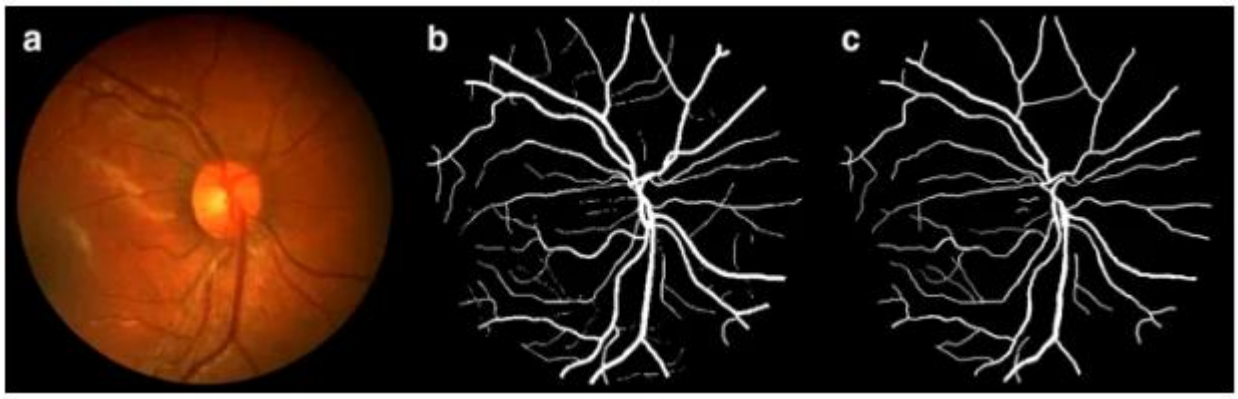
II. LITERATURE SURVEY

Dataset

Publicly accessible digital retinal images for vessel extraction (DRIVE), structured analysis of the retina (STARE) and Child Heart and Health Study in England (CHASE_DB1) CHASE_DB1 datasets used in this study are amongst the most popular datasets used for developing and testing the performance of various retinal segmentation methods. Datasets used also provide corresponding vessel segmentations manually done by different experts and are considered as the ground truth segmentation. DRIVE dataset includes 40 colour fundus images that were equally divided into training and testing sets. For each image in the dataset, a FOV mask along with manual expert segmentation of the corresponding vessel tree (one expert for the training set and two experts for the testing set) were provided. A Canon CR5 non-mydriatic camera with a FOV of 45° and bit-depth of 8-bit was used to capture the images with a resolution of 768 × 584 pixels.



SCLERA MATCHING

The proposed sclera matching method uses a RANSAC-type registration algorithm to register the sclera vein descriptors, and the proposed sclera template matching method. The proposed sclera matching method is capable of matching the sclera vein patterns even in the presence of noise and deformations.

MATCHING SCHEMES

Many matching schemes have been proposed and used for previous biometric and pattern recognition applications. Some historical examples of matching schemes are presented, along with justification for their use or disuse.

III. SYSTEM ANALYSIS

3.1 Existing System

The edge areas of the sclera may not be segmented accurately. The matching schemes that retain and use the 'crossing points' of the patterns could be problematic with this type of deformation. It is desirable to have a registration scheme that is robust and exhaustive, but does not unduly introduce false accepts by overfitting. It reduces the amount of segmentation errors and also it allows for overlapping vein patterns, multiple independent vein patterns are to be matched even as they change Independently.

3.2 Proposed system

The proposed algorithm is based on two critical procedures the first one is the accurate detection of the optic nerve and the macula. From their location on the retina we extract information about the size of the retina and its general location on the image matrix. The results from this procedure will later be used as reference for the placement procedure, which is part of the first comparison stage of the algorithm. The other critical stage for the algorithm is the detection of the vascular network. The accuracy at that stage colors the general accuracy of the algorithm. That's because the whole identification procedure is based on the detection of the vascular network branching points. High accuracy at the stage of vascular network detection delivers high accuracy for branching points' detection.

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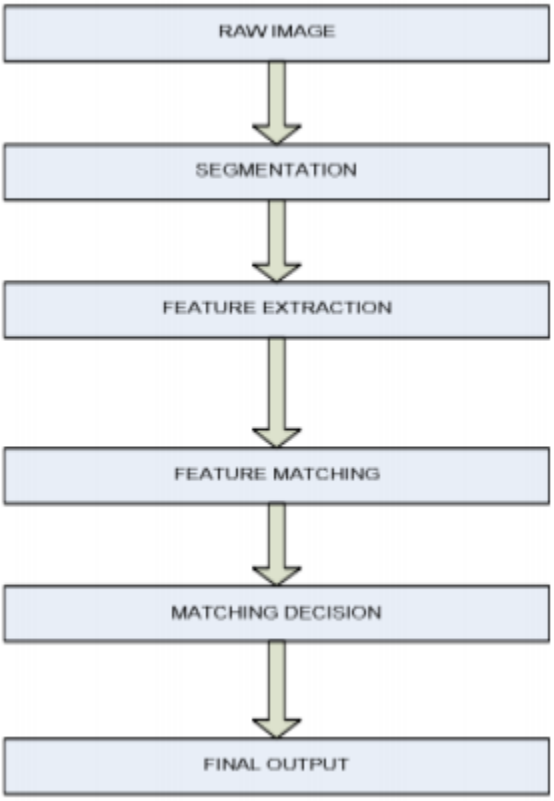
3.3 Architectural Design



IV. SYSTEM IMPLEMENTATION

4.1 INPUT RAW IMAGE

It is observed that most of the insult rates are due to poor quality of input images, therefore better camera resolution is a very important initial requirement for sclera based biometrics. Moreover, the iris should be in the middle of the eye with proper orientation, so that common algorithm can be used for further processing. The mentioned problem can be resolved using sclera ROI registration which is global standard for achieving proper orientation, translation and scaling.

4.2 SEGMENTATION

Locating and isolating sclera area. This work is divided into following steps: The input RGB image is first converted to gray scale by calculating 8-bit gray value. This can be easily done using MATLAB inbuilt method:new_img=rgb2gray("RGB_image")

4.3 FEATURE EXTRACTION

Sclera feature extraction is extraction of blood vessel pattern in the form of template of several line segments. Firstly, as mentioned above with the help of histogram equalization the veins in the sclera are enhanced and then with the help of adaptive thresholding technique these line segments' are binarized. However, these binary-pixel lines are not suitable for recognition because the vessel thickness can change due to various external features like fatigue, non-fatigue, etc. Hence they are thinned to singlepixel wide lines which are obtained by several binary morphological operations that are used to thin the detected lines. These lines are then resolved recursively into smaller segments. We will keep on doing this till we get line segments which are nearly linear. In this, the size of each line is five pixels. Using these line segments we create template for vein structure. Three quantities are required to describe each segment.

4.4. FEATURE MATCHING

Using Database Firstly, matching (image processing) algorithms are designed and used for matching purpose. These algorithms' should be tolerant to segmentation errors. Each individual templates are registered after acquiring them through feature extraction processes. After that each line segment in the test template is compared with the segment from the registered template, to check if the match is found. Initially, an individual match score for each segment descriptor is found. If the matching score("S(Li, Lj)") is non-zero then the segments are removed and further

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processing is done on it and final matching score for that segment is noted down. Here, S(Li,Lj) is the matching score for a particular segment.Li and Lj are the two segments one from the test template and the other from the target template. After this is done the final matching score is to be found for the entire template. This can be done by adding the individual matching scores of each segment descriptor and then dividing it by the maximum of the minimal sets between the test and registered template.

4.5 SCLERA MATCHING TECHNIQUES

4.5.1. Sclera Template Registration

When acquiring the eye images, the eyelids can have distinct shapes, the iris location can differ, the pupil size can be different, and the eye may be tilted with respect to the camera. The camera-to-object distance and camera zoom can also fluctuate. All of these factors could affect the size, the location, and the observed patterns of the acquired sclera region in the image. It is important to take these variances into account in a sclera matching algorithm. Therefore, the first step is to perform Sclera region-of-interest, or ROI, registration to achieve global rendition, revolution and scaling-invariance. In addition, due to the complex deformation that can occur in the vein archetype, it is desirable to have a registration scheme that is robust and exhaustive, but does not unduly introduce false accepts by over-fitting. The sclera vascular patterns deform non-linearly with the movement of the eye, eyelids, and the contraction/dilation of the pupil. As a result, the segments of the vascular patterns could move individual.y, and this must be accounted for in the registration scheme.

4.5.2 Sclera Template Matching:

It is important to design the matching algorithm such that it is tolerant of segmentation errors. In general, the edge areas of the sclera may not be segmented accurately; therefore the weighting image is created from the common regions of the two registered sclera masks — i.e., only regions that are included in the segmented sclera regions of both images are used for matching. Then, the interior pixels of the mask are set to 1, pixels within some distance of the boundary of the mask to .5, and pixels outside the mask to 0. This allows for a contrasting value between two segments to be between 0 and 1, and allows for weighting the contrasting results based on the segments that are near the mask's boundaries. This reduces the effect of dissection slip, in particular for under segmentation of the boundary between the sclera and eyelids. For this work, the width of the boundary of the mask was set to the average width of the lower eyelid boundary in the database, in an attempt to reduce the effect of mis-segmented results near the boundary. After the templates are itemized, each line segment in the test stencil is compared to the line segments in the target template for matches.

V. CONCLUSION

Sclera vein recognition technology provides solution for the strong user authentication. The Proposed approach of the biometric system can increase the overall security. Sclera vein recognition can be achieved with the help of automated technique where clustering algorithm used to classify the color eye images into three clusters - sclera, iris, and background. The system can use visible light acquired images — which can be acquired at longer distances and in more varied operational environments than traditional iris recognition systems. The biometric system has the potential to expand the operational range of biometric systems in surveillance and non-compliant situations. The local binary pattern, which can greatly help to extract the feature and give the efficient result, SVM is used to classify the authentication persons. So that proposed method provides highly steady secure system.

VI. FUTURE ENHANCEMENT

In future is a very challenging research for human identification. It has several advantages over iris based recognition. A future step is to overcome the challenges in acquiring the image and combing sclera recognition with iris recognition. Also the template's aging effect ought to be studied.

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