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# Personal Authentication by Extracting Sclera Veins

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**Abstract:** 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.

**Keywords:** sclera vein recognition, LBP,SVM

## 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 behavioral 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 wit han iris. Among all the biometric technology sclera is the most imperative and effective biometrics. Thesclera 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.

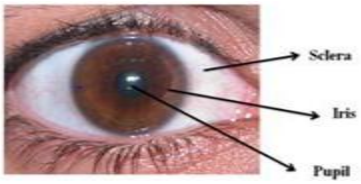


Fig1.Human eye image

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 building accesses.

## II. PROPOSED METHODS

### A. IMAGE SEGMENTATION:

Segmentation is the process of partitioning the image into region of interest on their pixel intensity values. To separate the sclera from the eye image segmentation is necessary. In the image sclera is a white region of connecting tissue and blood vessels which is around the iris this part of the blood vessel inside the sclera part is randomly oriented which creates patterns are used for the biometric identification. Segmentation is the first step for the most of the biometric related researches similarly in the sclera biometrics. Segmentation is performed by the semi-automated technique that is used to separate the sclera from the eye image. Here accurate segmentation is important otherwise, an incorrect segmentation reduces the vessel pattern available, but it alsointroduces the eyelash and eyelids [5].

In this paper for the segmentation automated k-means clustering is used to extract the sclera from the original image. It is a method of vectorquantization, originally here signalProcessing is used, k-means clustering mainly focused on the partition n observation into k clusters in which each cluster belongs to the another cluster with the nearest mean, serving as a prototype of the cluster[1,4]. Like that here the sclera pixel cluster was determined as that cluster which has the largest Euclidean distance from the origin of the coordinate system to its centroid. Each pixel is represented in a Rectangle coordinate system based on their spectral RGB components in a three dimensional view. The partitioning the pixels into three categories based on K-means clustering and the sclera can

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be identified from the eye, as it is white in nature [2]. The K-means clustering algorithm is used separate the scleral pixels from the eye image

Fig2.Original image segmented image

B. SCLERA ENHANCEMENT:

After the segmentation,the vessel structures are not conspicuous, so keeping in mind the end goal to make them clearlyvisible, image improvement is necessary. Before extraction the features it is essential to enhance the vein patterns. Gabor filters are good approximations of the vision processes of the primary visual cortex [3]. Since the vascular patterns could have various orientations, in this paper, a bank ofdirectional Gabor channel are utilized for the vascular patter upgrade.

$$G(x,y,\vartheta,s) = e^{-\pi\left(\frac{(x-x_0)^2+(y-y_0)^2}{s^2}\right)} \times e^{-2\pi i(\cos\vartheta(x-x_0)+\sin\vartheta(y-y_0))} \quad \ldots.1$$

Where ($x0$, $y0$) is the center frequency of the filter, $s$ is the variance of the Gaussian, and $\vartheta$ is the angle of the sinusoidal modulation.

Fig3.Gabor filtered image

For this paper, just the significantly channel was utilized for highlight extraction of the vessels, since the considerably channel is symmetric and its reaction was resolved to distinguish the areas of vessels adequately. Gabor filter is utilized to filter the sclera part and to eject alternate parts like eyelashes.it will get a precise sclera part for the following procedure.

C. FEATURE EXTRACTION:

The vascular pattern could have different thickness at different times,because of dilution and constriction of the vessels, Therefore, vessel thickness is not a stable pattern for recognition [1]. In addition, some very thin vascular patterns may not be visible at all times.

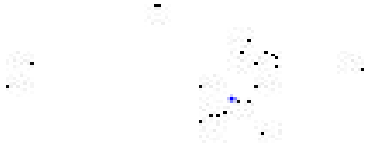

Fig4.LBP image

In this paper, local binary patterns are to be used to extract the feature.in this method mainly divide the image into the cell, after that each pixel value is taken from the cell. Then it will calculate the centroid value and this value will be compare with the each neighbor values, if the centroid value is greater than that the neighbor value it will be assign as the 1 otherwise it will be 0.these value should be converted into a decimal value for the feature extraction.

D. CLASSIFICATION:

Support Vector Machines (SVMs) are used for classification. it is popular supervised method, which performs an implicit mapping into a higher dimensional feature space. After the mapping is completed it finds a linear separating hyper plane with a maximal margin to separate data from this higher dimensional space [5,7].

In this paper depend upon the feature extraction classification can be done. It will compare the hyper plane values of the present extracted feature and with the other feature value which is saved in data base. Performing these operations the authentication can be completed.

## III. EXPERIMENTAL RESULTS

The performance of the sclera feature extraction can be completed efficiently. Here MATALAB is used to simulate the result and produce output of the authenticated persons. In this process all the images are stored in the database which is available locally.These images are considered for the process. In the first section segmentation process is carried by developing three cluster areas to extract the sclera part. After that these sclera area is enhancedand the exact sclera region without any disturbances area will produced. Feature extraction is the process of producing the exact feature of that sclera area. Considering all these methods it will produce the different features for different persons these are stored in the database. After completing these operations the authentication can be completed for the particular person (fig 5). After that these extracted feature of the sclera is stored in the database UBIRIS. In the next section when the person is entered in the office or in the origination it will take the present sclera features this can be taken by performing all the operation which is explained in the above section and compare with the stored sclera image features. This will give the result of authenticated person is present or not, it will be shown in the below figure (fig 5). Here in the bottom figure result of all the process are

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to be shown and comparing the features of the person give the result of the authenticated person.

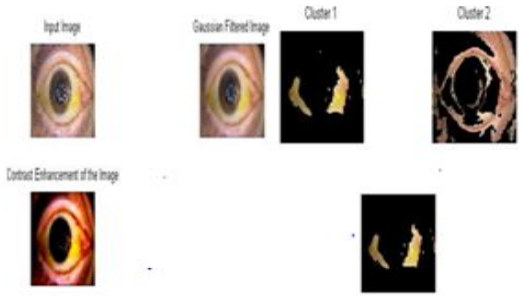


Fig5. Shows the result of segmentation, enhancement and feature extraction of the sclera image

## IV. 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 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.

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