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A New Algorithm to Analysis of Eye Fundus Image

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Abstract: The major objective of this project is to found and detect the target lesion in an instantaneous way, her we are considering the target lesions as the drusen deposit which is the initial stage of the age related macular degeneration and the Stargardt's, and to differentiate them in an unique method. The proposed method tells about the strategies by which and how the present technique is better than the previous method in the processing and the determination of the image. Some of the techniques are here which makes better improvement in our project.

Keywords: Optimal Filters, Candidate Extraction, AMD

I. INTRODUCTION

The central assumption of Model Based Segmentation approach is that structures of interest/organs have a repetitive form of geometry. Therefore, one can seek for a probabilistic model towards explaining the variation of the shape of the organ and then when segmenting an image impose constraints using this model as prior. Such a task involves (i) registration of the training examples to a common pose, (ii) probabilistic representation of the variation of the registered samples, and (iii) statistical inference between the model and the image. State of the art methods in the literature for knowledge-based segmentation involve active shape and appearance models, active contours and deformable templates and level-set based methods.

[1] deals with the concept of how to differentiate the fluid filled region boundaries in optical coherence tomography images in the retina. The Optical coherence tomography (OCT) is an optical signal acquisition and processing method. It captures micrometer-resolution, three-dimensional images from within optical scattering media.

Once the contours of the fluid filled regions were outlined, the quantative analysis of the surface area and volume of the fluid filled regions were performed. Therefore by increasing the segmentation method the performance can be improved and the images can be detected automatically.

In [2], the red detection of red lesion method is presented based on a hybrid approach, combining prior works by Spencer and Frame with two important new contributions. The first contribution is a new red lesion candidate detection system based on pixel classification. Using this technique, vasculature and red lesions are separated from the background of the image. After removal of the connected vasculature the remaining objects are considered possible red lesions. Second, an extensive number of new features are added to those proposed by Spencer–Frame. A lesion is any abnormality in the tissue of an organism, usually caused by disease or trauma. Lesion is derived from the Latin word laesio which means injury.

The purpose of the candidate classification system is to classify each of these objects as either a red lesion or a non-red lesion. And thus we can able to detect the red lesions automatically than other various other methods.

[3] aims in detecting any changes that happens in the blood vessel and patterns that are present in the macula of the eye. This also helps in the diagnosis of retinal disease such as Age related macular degeneration and to classify its types in an efficient way. The advantage of this is to detect automatically and segment the disease age related macular degeneration in the macula without any human supervision and interaction stored in the database.

In [4], we describe a hybrid segmentation method for Geographic Atrophy (GA) quantification by identifying hypo-fluorescent GA regions from other interfering retinal vessel structures. Since the manual quantification of GA is time consuming and prone to inter- and intra-observer variability. Automatic quantification is important for determining disease progression and facilitating clinical diagnosis of AMD.

By means of this hybrid segmentation approach, quantification of geographical atrophy can be performed automatically in the fundus auto-fluorescence images and thus used for the diagnosis of age related macular

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degeneration. The robustness of the image analysis can be improved in order to acquire the accurate result which we aim for.

[5] presents a novel segmentation algorithm for the automatic detection and mapping of drusen in retina images acquired with the aid of a digital kit. Ordinary histogram equalization simply uses a single histogram for an entire image. Here we are using the method called local adaptive thresholding method. Thresholding is the simplest method of image segmentation. From a grayscale image, thresholding can be used to create binary images. This is used for denoising and compression purpose. By means of this accurate yellow deposit can be identified. But here we cannot able to differentiate the drusen which is the initial stage of the age related macular degeneration and the fundus- flavimaclatus which is the very first sign of stargardt's.

II. PROPOSED SYSTEM

Generating optimal filters is used to normalize the image samples from maximally representative image samples. The reference samples can be normalized by using this method. The optimal compression framework can be analyzed inorder to get compressed image from the normalized samples for feature extraction. Finally the Principle Component Analysis is done to the filtered images.

A candidate extraction step is required for both selecting reference negative lesion confounders in the direct sampling approach and selecting the samples that should be fed to the classifier when processing unseen images. The first step to extract candidates in an input image is to transform the image. For each pixel pi;j in the transformed image, the intensity of the potential lesion, within sample Si;j with central pixel pi;j , is estimated. If this intensity is outside the normal range of intensities for the target lesions the range observed on the training set plus a margin, pi;j is rejected as a potential lesion center.

The risk of presence should be found out in each sample image in order to detect the place of target lesion, for that we have to compute the $\rho(S)$. And this will obtain from the distance between sample (S) and the representative sample (R) and this should be projected on each principal component analysis.

III. RESULTS AND DISCUSSION

Here we are going to see about some of the screen shoots for the image samples that under goes certain process, the following shows the orginal image before processing, In the following figure fig(8.2), fig(a) shows the orginal image of an eye fundus , fig(b) shows the drusen affected eye fundus and the fig(c) shows the flecks affected eye fundus before preprocessing

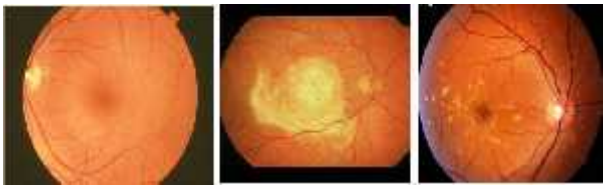

Fig.1.(a)Orginal fundus (b)Drusen affected fundus (c)Flecks affected fundus

The orginal images are undergoing the preprocessing step inorder to remove the noise in the image and to improve the quality of the image. The following Fig.1. shows the preprocessed image, Fig(a) shows original image of an eye fundus after pre-processing (b) Image of an eye fundus affected by AMD after pre-processing(c) Stargardt's affected image after pre-processing

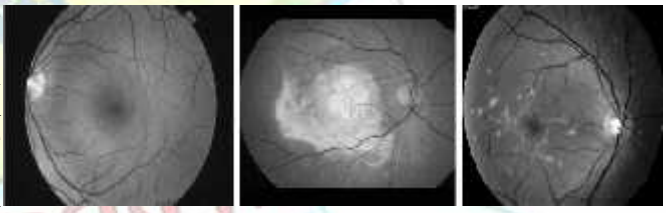

Fig .2. (a) Fundus image after pre-processing (b) Fundus image affected by AMDafter pre-processing(c) Stargardt's affected image after pre-processing

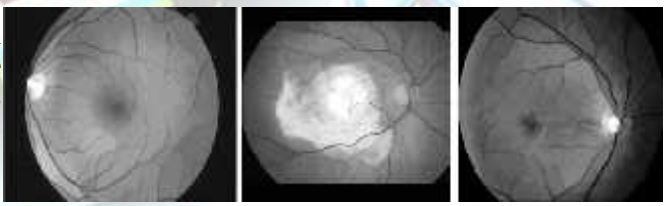

Fig.3. a) Fundus image after reconstruction (b) Fundus image affected by AMD after reconstruction (c) Stargardt's affected image after reconstruction

After the reconstruction of the pre-processed image**,** The haar wavelet transform is applied to the image for the decomposition purpose and for analyzing the presence of the target lesions in an image in an efficient way. The following Fig.2. (a) shows the image of an eye fundus after decomposition using haar wavelet (b) shows the image of an eye fundus affected by AMD after decomposition using haar wavelet (c) shows the stargardt's affected image after decomposition using haar wavelet.

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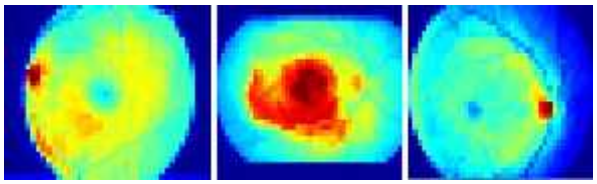

Fig.3. (a) Fundus image after decomposition using haar wavelet (b) Fundus image affected by AMD after decomposition using haar wavelet (c)Stargardt's affected image after decomposition using haar wavelet

The Hough transform is a feature extraction technique used in digital image processing. The purpose of the technique is to find imperfect instances of objects within a certain class of shapes. Fig.3. shows the Hough matrix for the original Image of an eye fundus, (b) shows the Hough matrix for the Image of an eye fundus affected by AMD and the fig (c) shows Hough matrix for the Stargardt's affected image, the difference between the ordinary eye fundus and the lesion affected eye fundus can be found clearly by means of the hough transform.

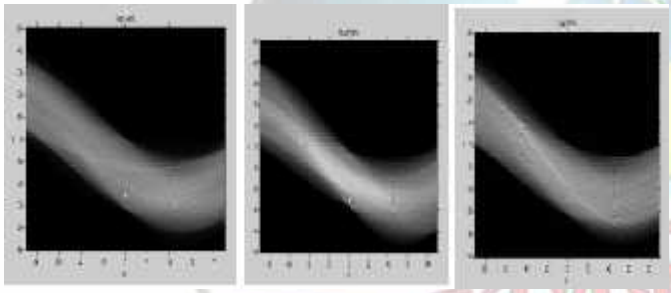

Fig.4. (a) Hough matrix for the original Image of an eye fundus (b) Hough matrix for the Image of an eye fundus affected by AMD (c) Hough matrix for the Stargardt's affected image

IV. CONCLUSION

The major objective of this project is to found and detect the target lesion in an instantaneous way, her we are considering the target lesions as the drusen deposit which is the initial stage of the age related macular degeneration and the Stargardt's, and to differentiate them in an unique method. The proposed method tells about the strategies by which and how the present technique is better than the previous method in the processing and the determination of the image. Some of the techniques are here which makes better improvement in our project.

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