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AMD for Fundus Flavimaculatus

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Abstract: Age-related macular degeneration (AMD) could indicate parts of the retina where there might be lesions but where a finer analysis is needed to confirm. By means of the proposed system the Image detection will be fast. When compared to the previous issues, Segmentation and classification of image can be improved. And it also provides the Instantaneous detection of lesions using FLD algorithm. Since a fast lesion detection algorithm is available, it will be possible in future works to analyze several frames of an eye fundus movie and combine lesion detections from consecutive analyzed frames, in order to improve detection performance. In future the usage of image samples can also be increased.

Index Terms: AMD, Mathematical model, Eye fundus, Macula

I. INTRODUCTION

Glaucoma is an eye disorder in which the optic nerve suffers damage, permanently damaging vision in the affected eye(s) and progressing to complete blindness if untreated. It is often, but not always, associated with increased pressure of the fluid in the eye (aqueous humour). The term 'ocular hypertension' is used for cases having constantly raised intraocular pressure without any associated optic nerve damage. Conversely, the term 'normal' or 'low tension glaucoma' is suggested for the typical visual field defects when associated with a normal or low IOP. Diabetic Retinopathy is retinopathy (damage to the retina) caused by complications of diabetes mellitus, which can eventually lead to blindness. It is an ocular manifestation of systemic disease which affects up to 80% of all patients who have had diabetes for 10 years or more. The longer a person has diabetes, the higher their chances of developing diabetic retinopathy.

In [1], The main goal was to detect the target lesions that are present in the macula part of eye. Also the paper provides the detection method for lesion detection particularly for the detection for drusen, which is the initial stage of Age Related Macular Degeneration. By using the concept which was implemented in this paper we can able to detect the target lesions, specifically the drusen for AMD can be analyzed faster when compared to previous other issues. The main drawback is that it can able to detect the drusen for AMD and not the Stargardt's; also there is no ability to differentiate the drusen and Stargardt's.

In [2], the objective of this paper is to detect the abnormal layers that are present in the retina of the eye based on the automated characterization of the spectral domain- Optical Coherence Tomography (SD-OCT) images. By means of this approach we can able to quantify the amount of Symptomatic Exudates-Associated Derangements which are present in the fluid filled region of the retina. It also provides three dimensional methods to determine the SEAD footprint in the SD-OCT images. Thus we can detect the abnormal layers easily by this method, but here the image will be noisy and therefore the quality will be low. By improving the segmentation method the quality of the image can be improved by reducing the noise.

In [3], the major aim was to provide an efficient mechanism in order to improve the performance for detecting the microaneurysms, which is the initial stage of Diabetic Retinopathy. The diabetic retinopathy is the focal dilation of retinal capillaries occurring in diabetes mellitus, retinal vein obstruction, and absolute glaucoma or of arteriolo capillary junctions in many organs in thrombotic thrombocytopenic purpura. By matching the lesion samples with the wavelet transformed images we can able to detect the lesions automatically. Since we are using the efficient mechanism, the detection will be automatic and therefore the performance will be very fast. But it contains no possible effective mechanism for detecting the drusen deposit.

II. RELATED WORK

A. Project Description

Age-related macular degeneration is a medical condition which usually affects older adults and results in a loss of vision in the center of the visual field the macula because of damage to the retina. It occurs in dry and wet forms. It is a major cause of blindness and visual impairment

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in older adults. Stargardt's disease is usually diagnosed in individuals under the age of twenty, when decreased central vision is first noticed. It causes a progressive loss of central vision and, in the early stages, patients may have good visual acuity, but they may experience difficulty with reading and seeing in dim lighting. Other common symptoms of Stargardt's disease include blurriness and distortion.

The image preprocessing is an important step in every image processing mechanism, this preprocessing of image contains various important steps or techniques to reduce noise in an images, and also to detect the edge in an image using various edge detector methods. The next step in the drusen detection is the morphological operation, Mathematical morphology is a theory and technique for the analysis and processing of geometrical structures. MM was originally developed for binary images, and was later extended to grayscale functions and images. Haar wavelet transform based compression is one of the methods that can be applied for compressing images. An ideal image compression system must yield good quality compressed images with good compression ratio, while maintaining minimal time cost.

B. Module Architecture

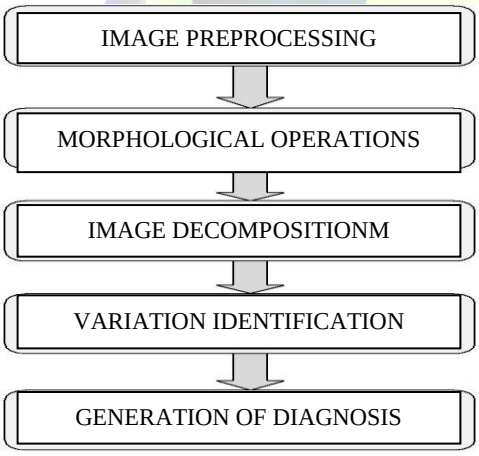

Fig.1.Module Architecture

C. Steps Involved

Image pre-processing suppresses undesired distortions or enhances some image features important for further processing. It does not increase image information content. Its methods use the considerable redundancy in images. Neighboring pixels corresponding to one object in real images have the same or similar brightness value. Image pre-processing tool, realizes many brightness transformations and local pre-processing methods.

After the image pre-processing stage the actual candidate objects were extracted from original pre-processed image, the morphological operations are used to use to extract image components that are useful in the representation and description of region shape such as morphological filtering, thinning, and pruning. There are various forms of morphological operations; one such way is image dilation and erosion. The dilation is the basic form of greyscale image dilation computes, for each image pixel, the maximum value of its neighboring pixels. The neighborhood is defined by the structuring element. Dilation generally increases the sizes of objects, filling in holes and broken areas, and connecting areas that are separated by spaces smaller than the size of the structuring element. With gray scale images, dilation increases the brightness of objects by taking the neighborhood maximum when passing the structuring element over the image. With binary images, dilation connects areas that are separated by spaces smaller than the structuring element and adds pixels to the perimeter of each image object.

Here we are going to preprocess the image by means of converting the original image into gray scale, this makes the image to be brightened and also this will remove noise in an image. And we are also using edge detection operator for detecting the edges present in the image.

Erosion processes involve a special mechanism of combining two sets of pixels. Usually, one set consists of the image being processed and the other a smaller set of pixels known as a structuring element. Two very important transformations are opening and closing. Opening performs erosion followed by dilation whereas Closing performs dilation followed by erosion. Here, dilation expands an image object and erosion shrinks it. Opening generally tends to smooth the contour in an image, breaking narrow isthmuses and eliminating thin protrusions. Closing tends to narrow smooth sections of contours, fusing narrow breaks and long thin gulfs, eliminating small holes, and filling gaps in contours.

To enhance the contrast between background and red lesions, matched filter was used. The matched filter is a 2-D Gaussian with $\alpha=1$ and has a size of 11×11pixels. Next

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the filtered image *I*bin, was threshold to produce a binary image match. The threshold was fixed at a certain level above the modal value of the image. In this implementation 4 was used as the threshold. The extracted binary objects are not a good representation of the pathologies as found in*I*org. A region growing procedure was used to grow back the original pathologies.

III. RESULTS AND DISCUSSION

TABLE I
PERFORMANCE ANALYSIS

Disease	No. of Samples	Algorithm			
		Maths Model	%	Fast Lesion Detection	%
Age Related Macular Degeneration	30	22	73.33	25	83.33
Stargardt's	25	-	0.00	22	88.00

Table I shows the performance analyzed for detecting the fundus disease, based on two approach such as, Mathematical modeling and Fast Lesion Detection Algorithm, Here we processed a total of 55 image samples (30 for AMD and 25 for Stargardt's) and after processing we get highest performance percentage by means of Fast Lesion Detection Algorithm.

IV. CONCLUSION

Age-related macular degeneration (AMD) could indicate parts of the retina where there might be lesions but where a finer analysis is needed to confirm. By means of the proposed system the Image detection will be fast. When compared to the previous issues, Segmentation and classification of image can be improved. And it also provides the Instantaneous detection of lesions using FLD algorithm. Since a fast lesion detection algorithm is available, it will be possible in future works to analyze several frames of an eye fundus movie and combine lesion detections from consecutive analyzed frames, in order to improve detection performance. In future the usage of image samples can also be increased.of this template is V2. Most of the formatting instructions in this document have been compiled by Causal Productions from the IEEE LaTeX style files. Causal Productions offers both A4 templates and US Letter templates for LaTeX and Microsoft Word. The LaTeX templates depend on the official IEEEtran.cls and IEEEtran.bst files, whereas the Microsoft Word templates are self-contained.

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