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Hemorrhages Detection in Retinal Color Fundus Image

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***Abstract*— Diabetic Retinopathy (DR) is an eye disease due to diabetes which causes visual loss. So it is rational to provide treatment for DR at first stages of disease. Hemorrhages are the first symptoms that signify person have diabetic retinopathy. Therefore, their recognition is very essential. In this paper image contrast is improved by pre-processing and then blood vessels are detected as the boundaries of hemorrhages are not differentiate when they are in contact with blood vessels.then classify the image on the basis texture feature such as area, standard deviation etc. finally normal, moderate or Severe DR is detected on the basis of texture feature.**

***Keywords*— Blood vessel, Diabetic retinopathy, Diabetes, Haemorrhages**

I. INTRODUCTION

Diabetes is the major reason for visual loss. Diabetes is nothing but a disorder of metabolism. A hormone called "insulin" is produced by the pancreas. During eating, the pancreas produces the accurate quantity of insulin. In persons with diabetes, pancreas either produces less or no insulin or the cells do not react properly to the insulin that is produced. The quantity of glucose in the blood flows through the urine and then passes out of the body. Therefore, the body doesn't have its key source of fuel even though the blood contains huge amounts of glucose. In earlier days, retina experts identify the symptoms of diabetic retinopathy in the digital color fundus images of retina which taken with the help of ophthalmoscope or fundus photography manually. So it requires highly qualified and capable experts to perform analysis. But as the number of people with diabetes increases it gets complicated to detect DR symptoms from fundus images.

The objectives of this study is to (i)detect blood vessel, (ii) identify haemorrhages and (iii) classify different stages of diabetic retinopathy into normal, moderate and severe diabetic retinopathy. The basis of the classification of different stages of diabetic retinopathy is based on the texture feature such as area, standard deviation etc.

This paper gives brief discussion on diabetic retinopathy in section II. Section III gives proposed plan of work then in section IV outcome of given method is shown while section V gives conclusion.

II. DIABETIC RETINOPATHY (DR)

Diabetic retinopathy is a retinal disorder that occurs in people having diabetes. Diabetic retinopathy, also known as diabetic eye disorder, is when blood sugar level in the blood increases which can lead to loss of vision. Blood sugar causes the retinal tissue to swell, resulting in blurred vision. Sometimes new blood vessel grows in the eyes which are fragile and can bleed cause Blindness. DR usually affects both eyes. If a person has diabetes for longer time, then have more chances of diabetic retinopathy. If this is not treated, diabetic retinopathy can cause permanent visual loss. Symptoms of diabetic retinopathy include:

- Dark spots
- Blurred vision
- Having a dark or empty spot in the center of vision
- Difficulty in sight at night

The risk of diabetic retinopathy is minimizes with controlled blood sugar and blood pressure level. Hemorrhages are one of the diabetic retinopathy diseases which affect the retinal part of the eye. Hemorrhages occur in the deeper part of the retina. Hemorrhages are also called 'blot' hemorrhage because of their round shape. Abnormal new blood vessels forms at the back of the eyes which can rupture and lose blood causes blur vision. The presence of hemorrhages in the retina is the main indication of diabetic retinopathy. The rigorousness of the diabetic retinopathy depends on number and shape of hemorrhages.

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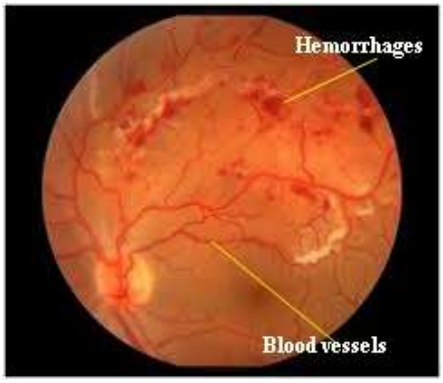

Figure 1: Diabetic retinopathy affected fundus image

Two kinds of DR are shown in Fig .The two stages of Retinopathy are Non-Proliferative and Proliferative diabetic retinopathy. First stage is Non- Proliferative Diabetic Retinopathy (NPDR) in which symptoms will be mild and hardly shown. Retinal hemorrhage is useful to find NPDR. So, earlier detection of NPDR is helpful to improve vision of patients.

Second, advanced or severe stage is Proliferative Diabetic Retinopathy (PDR) occurs due to new blood vessel starting to grow in the eye that are fragile and can bleed which causes Blindness. At first, the people suffering with DR may notice no changes in their vision. But It could get worse over the years and decreases their good vision. Treatment for diabetic retinopathy depends on the stages of the disease.

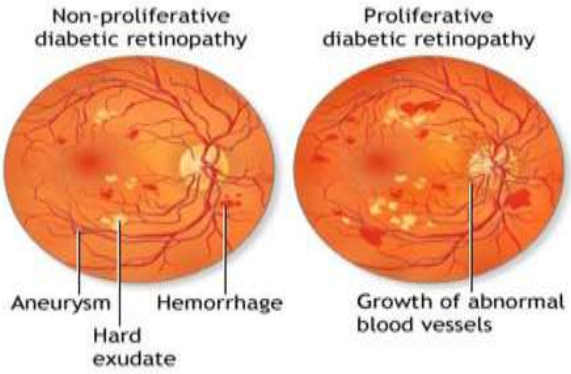

Figure 2: kinds of Diabetic Retinopathy (a) Proliferative DR.(b) Non-proliferative DR

III. PROPOSED PLAN OF WORK

The main goal of the proposed system is to automatically classify hemorrhages from other symptoms of DR. The input retinal images are taken from Internet which is given as input to the pre-processing. After pre-processing, the blood vessels are detected. After detection of blood vessels extract the features from the abnormal images and then classify these retinal images does contain hemorrhages problem on the basis of feature extracted. Block diagram of the proposed system is shown in Figure 3.

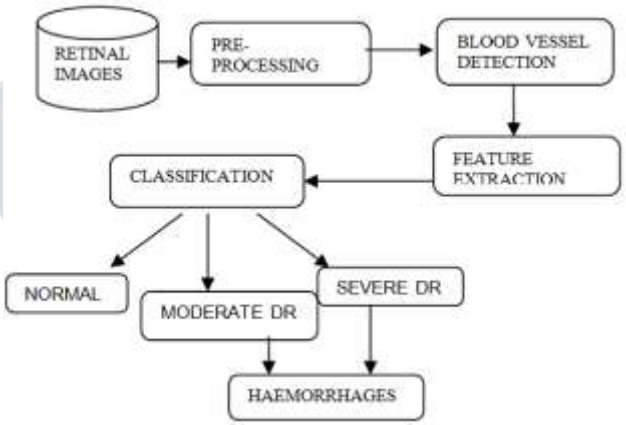

Figure 3: Block Diagram of the Proposed System

proposed system consists of four modules which are A) Pre-processing the retinal image, B) Blood Vessel Detection C) Feature Extraction and D) Classify the output

A. Pre-processing

Pre-processing is the initial step in all the case of image related diagnosis system and it helps in accurate feature extraction The input of the automated system is color fundus retinal image which is taken from internet. This stage corrects the problem of illumination variation of the picture taken. The pre-processing steps consist of :

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1) Resizing the retinal gray images

The input retinal images are resized into small images. It is mainly to avoid overloading and time consumption.

2) Color to green channel extraction

To convert RGB color fundus images into green channel conversion.

3) Adaptive histogram technique

Histogram equalization is defined as the process of adjusting intensity values of the image. Adaptive histogram is used to increase the "contrast" and to enhance the quality of retinal image. Adaptive Histogram Equalization Method (AHEM) gives improved performance, increase processing speed and work for all images are of variant sizes, hence it is used as method of correcting variant intensities. Here contrast-limited adaptive histogram equalization (CLAHE) is performed. it operates on small data regions rather than the entire image at a time. Contrast of each region is enhanced so that the histogram of each output region approximately matches the specified histogram. The contrast enhancement can be limited in order to avoid the enhancement of noise which might be present in the image

4) Morphological Operation

Morphological processing is used for operations on sets of pixels. Binary morphology uses only set membership and is similar to the value, such as gray level or color of a pixel.

The basic morphological operators

- Erosion
- Dilation
- Opening
- Closing

Binary dilation and erosion: The set of black and white pixels describes a binary image. Only black pixels are measured and the others are treated as a background. The primary morphological operations are dilation and erosion, and from these two operations such as opening, closing, and shape decomposition are formed.

Dilation: The dilation operation thickens the image. The extent of how much it should be thicken is based on the structuring element.

Erosion: The erosion operation performs either shrinking or thinning of the object. The extent of this operation is decided by the structuring element.

B. Blood Vessel Detection

After enhancing the contrast of the image, The designed matched filter is applied on the image to detect the blood vessels. A binarised image is obtained by thresholding. A matrix was generated to store the number of matched filter which was responsible for detecting that particular pixel of the blood vessel. The gray level value of the pixels in a particular direction of detection was multiplied by a factor. The value was then checked to Be checked against threshold level. For 0°, 15° and 180° pixels in the horizontal direction were checked; for 30°, 45° and 60°, pixels in the 45 degree and 225 degree directions were checked; for 75°, 90° and 105°, pixels in vertical direction and for 120°, 135° and 150°, pixels in 135 degree directions were checked. If gray value multiplied by a factor was greater than the threshold, then that pixel was counted as blood vessel. Finally, the blood vessels are extracted pixel by pixel.

C. Feature Extraction

In feature extraction, Texture analysis used to take out feature values from the input images. These features are used to calculate behavior that is described in terms of rough, smooth and silky. Texture analysis can be supportive when objects in an image are more characterized by surface than by intensity.

1) Range Filter

Range Filter is used to find the local range of the gray scale images. Matlab function of range filter is used to generate ranges for the input images. It returns each output pixel that contains the range value which is greater value – smaller value find for every 3-by-3 matrix for the corresponding pixel in the input image.

2) Standard Deviation Filter

Standard Deviation Filter calculates the local standard deviation for the input gray scale images. Standard Deviation function returns output pixel contains the standard deviation of the 3*3 matrix for the corresponding

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pixel in the input image. The preprocessed image after the removal of optic disk and blood vessels contains only hemorrhages which are used for feature extraction. The statistical features extracted are hemorrhages, area, standard deviation and mean. The extracted feature values have different ranges of values. Thus it is important to normalize the values to an acceptable range. From these extracted features, effective features are selected for the classification.

D. Classification

This defines a grouping of all the categories in disjoint teams. We prefer classification of hemorrhages on the basis of area and size of the pixels of image which is extracted during feature extraction of an image, since it provides more accuracy on a larger dataset.

IV. OUTCOME

The color fundus images were used in this experiment to detect the retinal images having Diabetic Retinopathy problem or not. We take sample retinal images from internet for evaluating the proposed approach. In first step pre-processing is done for removing noise and other factor, then blood vessels are detected as the boundaries of hemorrhage does not preserved when they are in contact with blood vessels. After that feature are extracted and classify retinal images whether it is normal, moderate or severe DR. and finally as hemorrhages. The experimental results are shown in Figures.

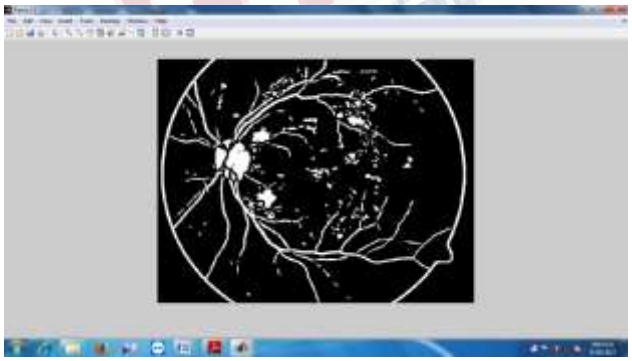

Fig 4: Detection of blood vessels

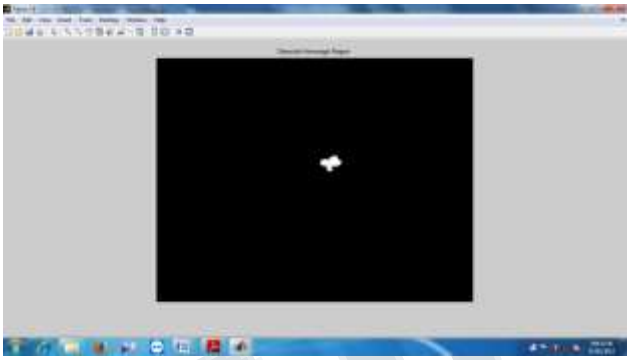

Fig 5: Detection of hemorrhage

V. CONCLUSION

The proposed automated system use to identify patients having diabetic retinopathy using fundus images. pre-processing needed for color fundus image taken from internet as it contains noise. then we detect blood vessels as the boundaries of hemorrhage does not differentiate when they are in contact with blood vessels. then we extract texture features like standard deviation, area and size of pixels of image and apply classification on the basis of area and detect diabetic retinopathy diseases such as hemorrhages (red patches) which falls between normal, moderate and severe DR.

REFERENCES

[1] Kanika Verma, Prakash Deep and A. G. Ramakrishnan, Senior Member, IEEE Medical Intelligence and Language Engineering Lab Department of Electrical Engineering, Indian Institute of Science, Bangalore India.," Detection and Classification of Diabetic Retinopathy using Retinal Images".

[2] L.R.Sudha,S.Thirupurasundari,"Analysis And Detection Of Hemorrhage And Hemorrhages In Retinal Images", International Journal of Scientific and Research Publications, Volume 4, Issue 3, March 2014 1 ISSN 2250-3153

[3] Inbarathi.R, Karthikeyan.R, Dept of Computer Science & Engineering, PSNA College of Engineering &

Technology, Dindigul, Anna University, Chennai, India," Detection of Retinal Hemorrhage in Fundus Images by Classifying the Splat Features Using SVM", International Journal of Innovative Research in Science, Engineering and Technology Volume 3, Special Issue 3, March 2014

[4] Sumathi.P, Sundar.R," Study of Detection of Retinal Hemorrhage in Fundus Images by Splat Feature Classification Method", International Journal of Innovative Ideas in Research (IJIIR), Vol.1, no.1, September 2015.

[5] Athira R V, Ferlin Deva Shahila D," Detection of Retinal Hemorrhage Using Splat Feature Classification Technique", Int. Journal of Engineering Research and Applications ISSN : 2248-9622, Vol. 4, Issue 1(Version 3), January 2014, pp.327-330-345, May 1971.