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DIAGNOSTIC METHOD OF SMART SCREENING FOR EYE HEALTH

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Abstract: ***The optical system of the eye consists of the pupil through which light enters the eye and is focused on the retina by the adjustable lens. Blindness is one of the major public health problems in developing countries. The major causes of blindness are Cataract and corneal diseases. Corneal diseases are among the major causes of vision loss and blindness in the world today. In India, it is estimated that there are approximately 6.8 million people who have vision loss due to corneal diseases. About 10.6 million people will suffer from unilateral corneal blindness in India by 2020. It is estimated that there is addition of 25,00030,000 corneal blindness cases every year in the country. This paper proposes a method for eye health screening using image processing. Set of thirty normal and affected eye images are taken for analysis. The images are processed and binarized. The white to black pixel ratio is calculated and compared with a threshold value to identify the image as normal or affected eye.***

Keywords: *Healthy and Affected Eye images, White to Black pixel Ratio, MAT LAB-2015a, Health Screening.*

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I INTRODUCTION

Eyes are the organs of the visual system. They provide us with the ability to see and process visual detail. They do so by detecting light and converting it into electro chemical impulses. The retina converts light into electrical signals and transmits these to the brain via the optic nerves. More and more people are suffering from some forms of eye disease and the numbers have been rising over the years. Most of the patients affected by eye disease are not aware of it as the diseases progress slowly. The eye suffers by many disease like cataracts, dry eyes, night blindness, colour blindness, uveitis, and floaters. So, if the doctors are able to detect the disease earlier then there will be higher chances of preventing visual loss in the patients. Today we have reached a stage where eye diseases can be diagnosed by capturing optical images and processing them in a computer. Feature extraction from the obtained images help in finding out abnormalities. In this paper, we propose a method for eye health screening using image processing. Image processing is reduce the time taken and risk compared to manual detection of eye disease.

II LITERATURE SURVEY

Md. Moniruzzaman.etal[1] Proposed a new method of histogram equalization for preserving brightness of images by testing it on multiple images. The result was then compared with other methods and better performance was noticed.

Mrs. Pallavi Mahajan [2] Proposed a paper in which they created an algorithm that differentiates between cataract eye conjunctivitis or normal eye.the algorithm selects features like big ring area, small ring area of the lens, the eye ellipse and the intensity of the affected area from the optical eye image for computation The eye image is taken computational analysis is done and finally the result in given.

Eduardo Pinos-Velez[3] in the proposed method image processing is done on the eye images to locate the parameters to differentiate between the healthy eye and glaucoma eye. The results obtained served as a tool for early diagnosis of glaucoma.

Ayşe Arslan [4] In this paper study is made in which automatic detection of the region of interest and extraction of it is done on a dry eye, it is done after clinical fluorescence staining. It is done accurately using the algorithms, the algorithms automatically detect and extract the region of interest from the dry eye patient.

Puspita Dash [5] here automatic detection of edema is done for diabetic patients. Then classification of diabetic macular

edema is done using Support Vector Machine binary classifier. This method showed the accuracy of about 99%.

Ayesha Kazi[6] .in this deep convolution of neural networks is done for the identification of exudate and then classifying them into diabetic, retinopathy glaucoma and cataract..

III METHODOLOGY

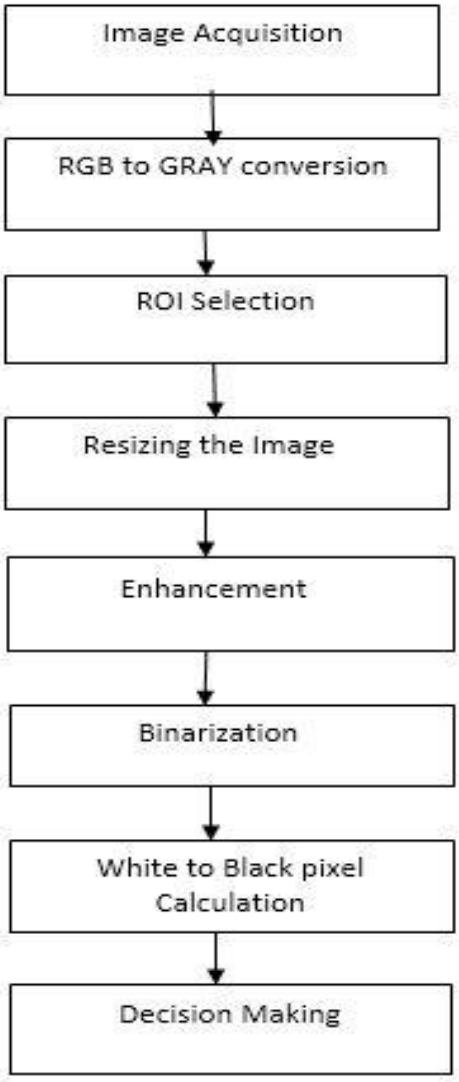

Figure 1: Block Diagram.

Fig 1 shows the block diagram of the proposed method. Fifteen sets of normal and affected eye images are taken for analysis. The images are converted from RGB to grey. The region of interest (ROI) is then selected. The ROI here is the sclera present on the left and right side of the pupil. The selected ROI is filtered and enhanced using binarization. The enhanced ROI are taken and the white to black pixel ratio calculation is applied for both normal and affected eye images and average is taken. The threshold value is calculated for both normal and abnormal eye images. The threshold value to identify the normal and affected eye.

IV RESULTS

Figure 2: Set of Normal Images

Figure 3: Set of affected images.

Table 1: White to black ratio for normal eyes

S. No	Images	White to black pixels ratio
1	Normal 1	2.5331
2	Normal 2	2.5330
3	Normal 3	3.0026
4	Normal 4	4.1916
5	Normal 5	2.5444
6	Normal 6	3.3945
7	Normal 7	4.2935
8	Normal 8	4.7347
9	Normal 9	4.4239
10	Normal 10	4.7624
11	Normal 11	4.1511
12	Normal 12	3.8794
13	Normal 13	2.5411
14	Normal 14	4.5997
Average		4.17468

Table 2: White to black ratio for affected eyes

S. No	Images	White to black pixels ratio
1	Affected 1	0.5464
2	Affected 2	0.2292
3	Affected 3	0.5464
4	Affected 4	0.2326
5	Affected 5	3.5003
6	Affected 6	0.5149
7	Affected 7	1.5586
8	Affected 8	0.9553
9	Affected 9	0.1194
10	Affected 10	2.1631
11	Affected 11	0.0977
12	Affected 12	0.1917
13	Affected 13	0.0969
14	Affected 14	0.1601
Average		0.41098

Table 1 and Table 2

threshold [T] = (average white to black pixel ratio of normal image[PR_N]+ average white to black pixel ratio of affected images[PR_A])/2.

$T=(PR_N+ PR_A) /2$

$T= (4.17468+0.41098)/2=2.29283 \sim 2.3$

V DISCUSSION

Fifteen set of normal and affected eye images are taken for analysis. A region of interest is identified in each sample and it is enhanced. The image is converted into binary. For the binary image white to black pixel ratio is calculated. The average of all the white to black pixel ratio is calculated for both normal and affected images that is PRN and PRA respectively. Then the threshold value is calculated

Threshold [T] = (average white to black pixel ratio of normal image[PR_N]+ average white to black pixel ratio of affected images[PR_A])/2.

$T=(PR_N+ PR_A) /2$

$T= (4.17468+0.41098)/2=2.29283 \sim 2.3$

Decision rule:

If PR >2.3 , Then eye is normal.

If PR <2.3, Then eye is affected.

PR – Pixel Ratio.

PR_N – Pixel ratio of normal images.

PR_A- Pixel ratio of affected images.

Out of the thirty images taken for experimentation, twenty-eight image is identified correctly as a normal or affected one. This leads to 93.33% accuracy of the proposed method.

VI CONCLUSION

The proposed method has been tested on 28 images, 14 normal and 14 affected eye images. Though the experimentation done on a set of 28 images shows that proposed method is 93.33% accurate, the accuracy can be confirmed by experimenting the proposed method on more number of eye images . The accuracy of the proposed method has been calculated only for the 30 images used in this work, to obtain the exact accuracy, this method must be tested on a large set of images. Future work must be aimed at probing into image processing techniques with suitable empirical relations to improve the accuracy of analysis.

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