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Cataract Density Analysis Using Image Processing

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Abstract-
Medical imaging techniques are used in the medical field for finding solutions of many problems. Different types of imaging techniques are used for different applications. The images are used for clinical analysis to detect the issue in the functioning of that organ or body part. Cataract is a layer formed over the eye lens and that blocks the light which passes through the lens.That will affect the sharpness of the image which is reaching to the retina of the eye. As the result our vision becomes blurred. Most of the time cataract will develop slowly but with time it will grow larger and as it grows larger it covers more part of our lens and distorts the light from entering into the eye. This may lead to complete vision loss. To avoid the cataract is to be detected as early as possible and also proper treatment should be taken.
In this paper the digital image processing techniques are used to detect the existence of cataract. Different image processing techniques to detect contours from the image of eye are available. This paper searched for the two different contours of affected and non-affected part of iris. After detecting that the area over which the cataract is present can be defined and also the percentage of that can be calculated and based on that, the proper treatment can be taken to cure that before the major loss.
Keywords— *Cataract Density, Cataract Analysis, Cataract Detection, Cataract*

I. INTRODUCTION

In today's era, image processing technique is very beneficial for the medical field to analysis various diseases.Image processingis the process in which different types of processes are applied to the image or video such as image enhancement, masking, feature extraction and many more, it gives the result corresponding to the necessary part of the picture. The image processing system uses images like two dimensional signals while applying signal processing method and different algorithms for getting the solution for medical problems which deals with effectively and efficiency in technological views. Due to spending a lot of time in the sun, bright area without any protection for eye, constant monitoring of bright screen and cosmetics it will form a cloudy or foggy area on the eye, due to formation of the cloudy area the light entering into the eye become less so ahead object will look blurry, foggy or filmy. Cataract will cause difficulty in seeing the object, changes in the way you see colour, double vision or it may cause blindness. According to the national blindness and visual impairment survey 66.2% of blindness, 96.2% of visual impairment cases in people above 50 years in India. Under medical expert cataract can be detected and prevented at early stage modern technological give major contribution for the solving problems of medical field. Medically cataract is analysis using X-ray image expert solve the problem. In this paper image processing techniques are used to analysis an image.
Usually an ophthalmologist can detect or analysis the cataract from retinal image and other diseases related to visual muscle branching so ophthalmologist give result based on manually observation so

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from this paper we can calculate density of cataract with the help of affected and non-affectedregion of cataract.

II. LITERATURE REVIEW

Image processing has improved with higher scope in recent era under Python base processing. In the medical field eye is very soft tissue so more focus is laid on the study and consultation of eye research technologies and the structure of analysis the cataract is complicated due to this they analysis the cataract in limited scale.

Md. Anayet [8] to analysis NC and CC image employed computer aided (CAD) technique is used. To detect the cataract image processing technique is used which give the result of 2D and 3D colored contour image for visualization and surgical aid.

Ishitaa Jindal [15] to determine the cataract digital image processing is used where in this two different algorithms also used which is varying degree of cataract.

Linglin Zhanga [13] method for cataract consists of two componentspreprocessing and DCNN classifier in themethod of preprocessing, it likewise requires few approachesto enhance the condition of images, for instance, imageimprovement and noise removal. Segmentation and location ofretinal structures, such as retinal lesions, vessels, optic discs,and aneurysms.

Xinting Gao [9] methodto detect cortical and PSC cataract using retro-illumination images. Based on the observation of the images and the graders' expertise on cortical and PSC cataracts, an enhanced texture feature is proposed and used to classify the cataract images from the non-cataract images.

Syed Thouheed Ahmed [12] wavelets and masking terminologies are used to extract the cataract .For the density calculation region of interest is consider in appropriate ratio.

III. PRAPOSED METHODOLOGTY

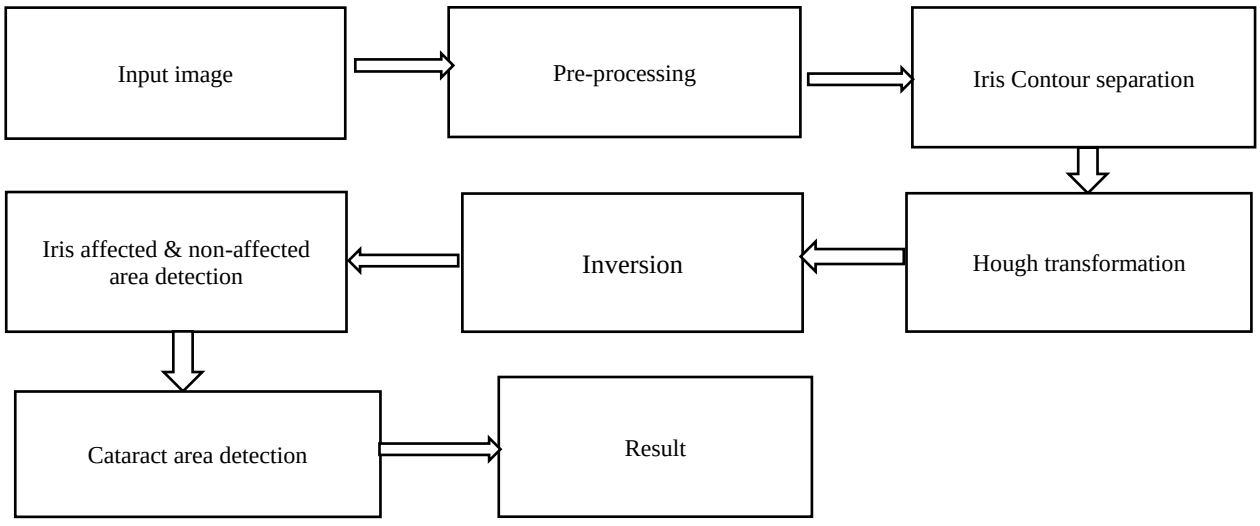

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Fig.1: Block Diagram for Cataract Analysis.

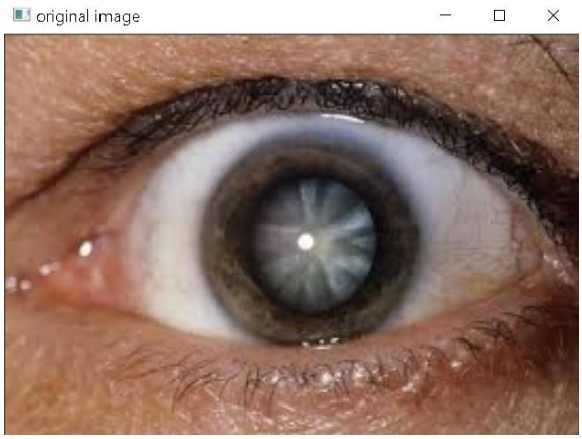

Fig 2: Input image

Cataract suspected images are applied as input shown in fig 2.

A. Pre-processing

Fig 3 : Gray scale image

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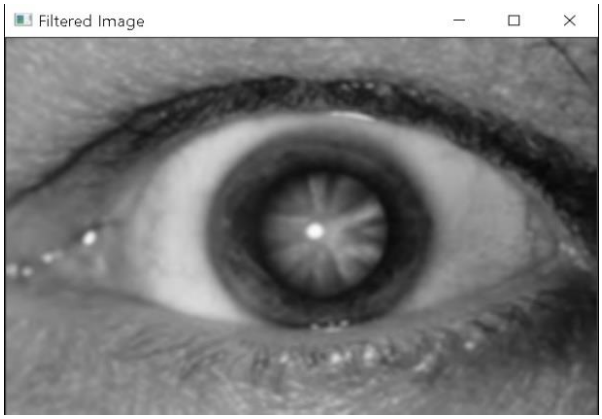

Fig 4: 2D filter output

In pre-processing input colored image is converted into gray scale image shown in Fig 3 and gray scale image is a process with 2D filter for smoothing the image shown in Fig 4.

B. Iris Contour separation

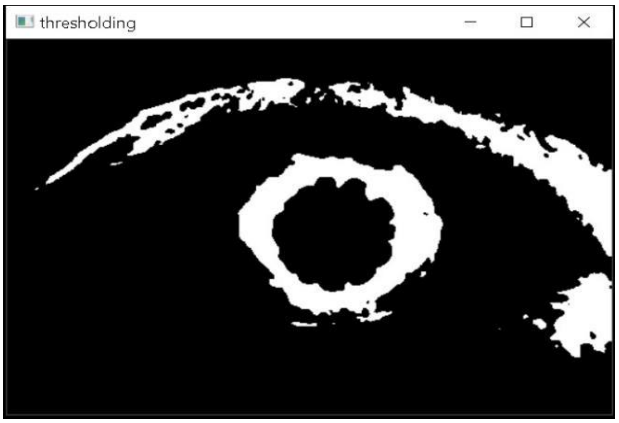

Fig 5.Thresholding

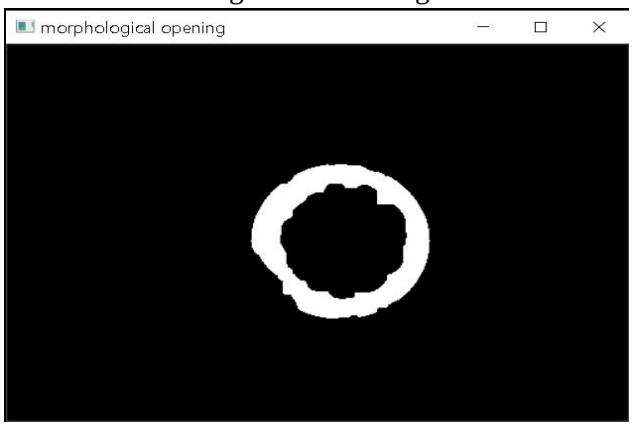

Fig 6: Morphological Opening

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In Iris contour separation technique simplethresholding is done in which threshold value (50).Forevery pixel, the samethreshold values is applied.if thepixel value is smaller than the threshold, it is set to maxvalue, otherwise, it is set to 0 as shownin Fig 5. Morphological opening of an image is basically Erosionfollowed by a Dilation, using the same structuring element. Opening generally smooth the contours of theimage, breaks down narrow bridges and removes smallobjects from the foreground as shown in Fig 6.

C. Hough transformation

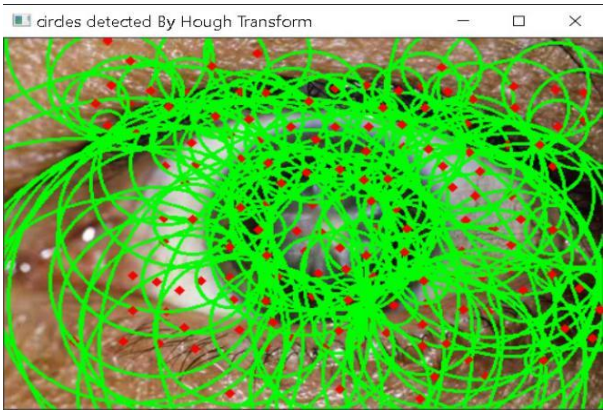

Fig 7: Hough Transformation output

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For detecting the circles in the image hough transformation is used as shown in Fig 7.

D. Inversion

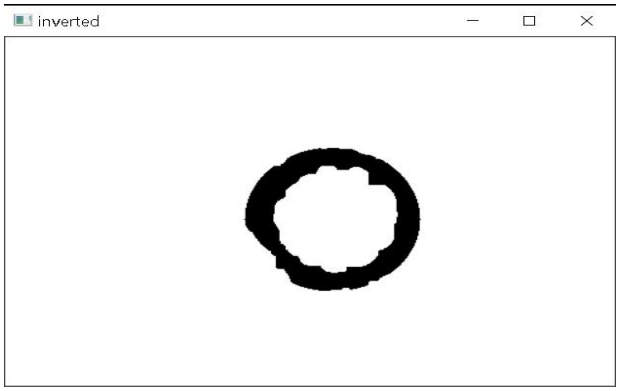

Fig 8: Inversion output

To reduce the confusion between outer area and the cataract inversion technique is used as shown in Fig 8

E. Iris affected & non-affected area detection

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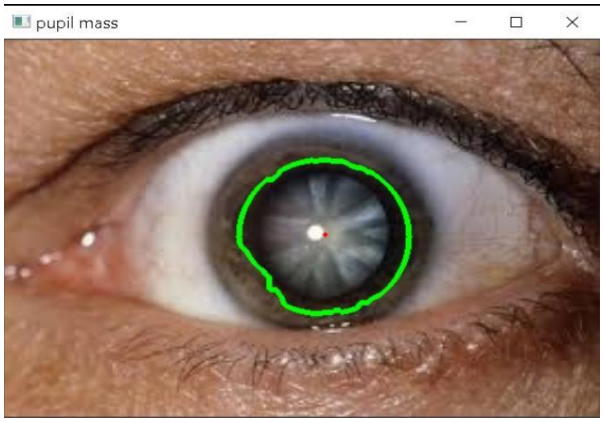

Fig 9: Iris area detection

Here detect the area of the whole iris where the cataract may be formed shown in Fig 9.

F. Cataract area detection

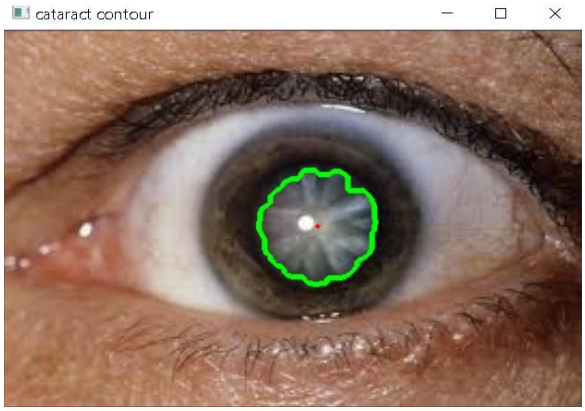

Fig 10: Cataract Area Detection.

To detect the area over which the cataract is formed shown in Fig 10.

F. Result

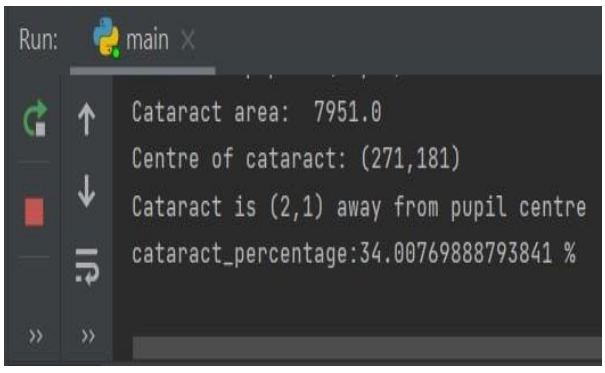

Fig 11: Result

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After finding both the areas we can conclude the percentage of the cataract formed on the iris shown in fig 11.

IV. CONCLUSION

This paper presented the technique in which different filters and image processing techniques are used to detect two different contours of the non-affected area and affected area. Then the density of the cataract is calculated using the ratio of an affected and non-affected region of the iris.This technique gives the percentage of the area of iris over which the cataract is present. This technique delivers the result with an accuracy of 85%. This technique can also useful for checking the presence of the cataract.This can be used for early satge detection of cataract.

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