Cataract and Sclera Spot Detection

Using OpenCV

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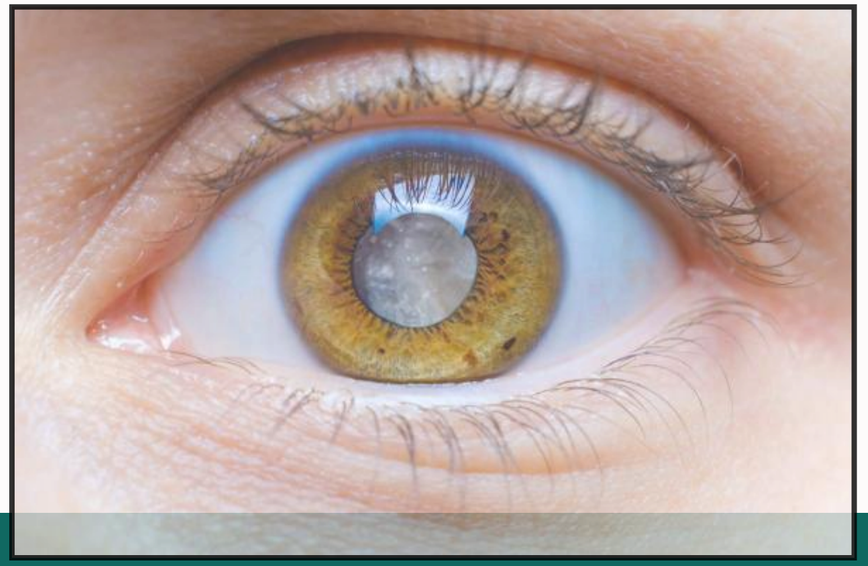


Cataracts cause a clouding effect in the lens, which leads to vision impairment.

Unusual spots in the sclera can be early signs of various eye diseases.

Delivered Outcomes

- Identify and highlight cataract-affected regions in the lens using image Processing Techniques
- Provide a percentage of cataract spread within the iris.
- Detect and monitor the growth of abnormal spots in the sclera
- Enable periodic comparison of spread of the spot by analyzing images over time.
- Build a user-friendly interface for uploading images and displaying results.

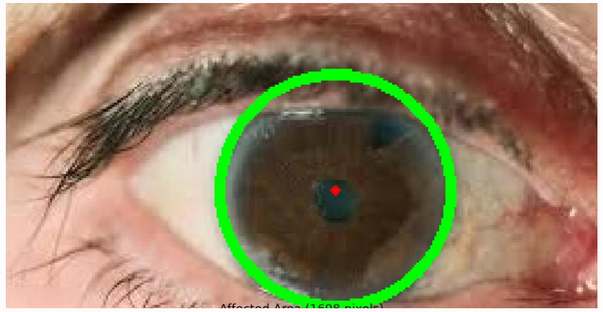
Methodology

- Preprocess the image using CLAHE and Gaussian blur, Bilateral filters.
- Detect iris region using Hough Circles and Contour-Based , Edge-Based Detection..
- Used HSV-Based Thresholding , Texture-Based Analysis, Morphological Operations and contour detection to extract abnormal regions.
- Calculate spread percentage and track changes across images.

Tools and Technologies

- ***Python***
- ***OpenCV***
- ***Matplotlib (for visualization)***
- ***Tkinter (GUI Creation)***

Cataract Detection Procedure



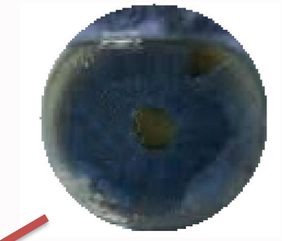
Iris Detected

Hough Circle Transform

Contour-Based Detection

Edge-Based Detection

Input Image



Cropped Iris

HSV-Based Thresholding

Texture-Based Analysis

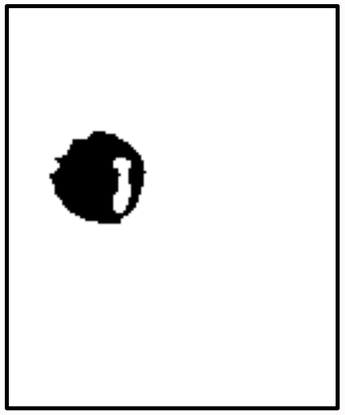
Affected Area of the Iris

Scleral Spot Detection Procedure

Input Image

GrayScale and Blurred

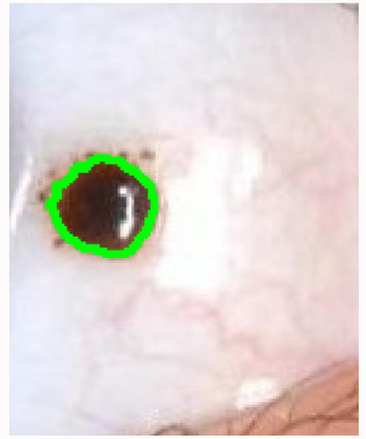
Thresholding



White Mask

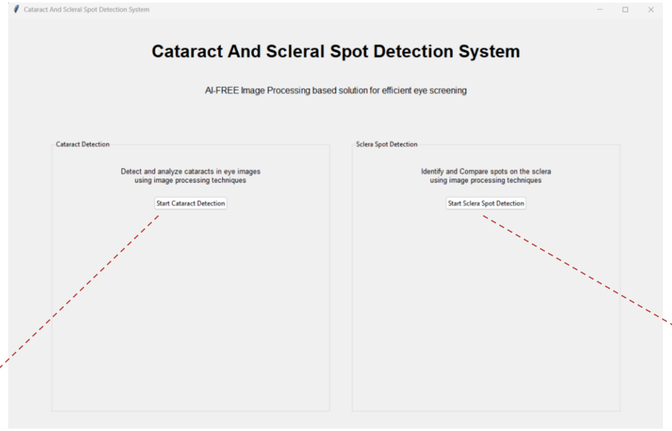
cv2.MORPH_CLOSE
cv2.MORPH_OPEN

Dark Mask

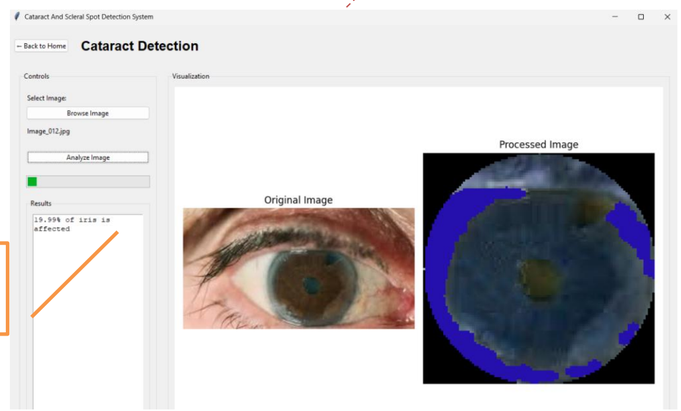


Output Image

Application Workflow



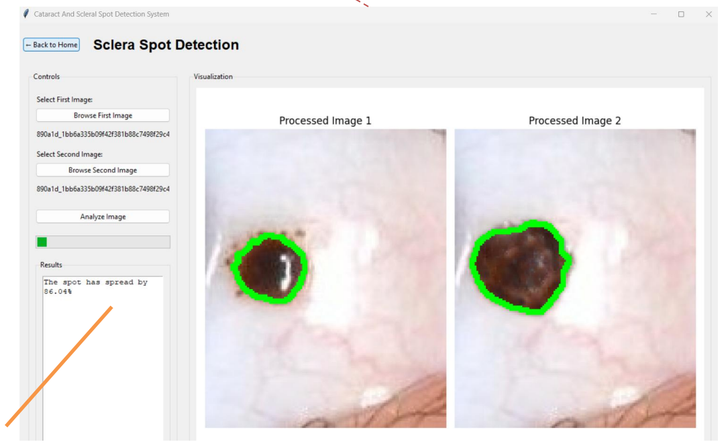
Home page



19.99% of iris is affected

Cataract Detection page

The spot has spread by 86.04%



Scleral spot detection Page

THANK YOU