Microsoft

Imagine Cup Junior Submission

Submitting institution/school: ON MY OWN TECHNOLOGY

Student Team Name: Raunak Dhoot | EyeCare

Project title: Dark Circles Detection of Eye and Measures to Prevent Damage

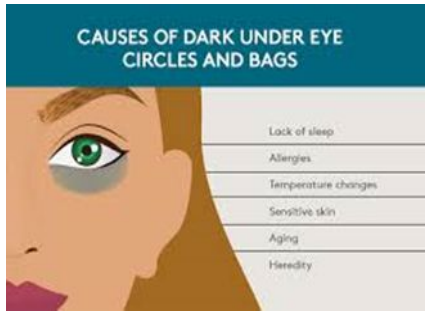
Number of team members: 1

Age range of team members: 13+

AI for Good Initiative: AI for Health

(Select one from: Accessibility/Earth/Cultural Heritage/Humanitarian Action)

The Problem – Eye Strain in many ways at every age



Digital Exposure

With everything being suspended around the world, social interaction and work interaction everything is becoming digital

Problems

Extreme digital exposure leads to problems such as black circles around eyes and physical inactivity which may lead to many generic diseases in the future.

Black circles

Black circles around eyes can lead to anemia and dehydration in the future if not taken care of. Black circles are caused mainly due to extreme digital exposure.

Blue Ray

Blue ray from computer screens and digital devices can decrease contrast leading to eyestrain.

Effects of Blue Ray

Research has shown that blue rays may increase the risk of a retina disease and can cause major damage to the eyes.

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Research

Primary research:

What causes black circles?

1. Lack of sleep
2. Digital exposure
3. Stress
4. Iron deficiency
5. Drug consumption

What are puffed eyes?

Fluid retention is known as edema. The thin skin around your eyelid can cause fluid retention to be very prominent, resulting in puffed eyes.

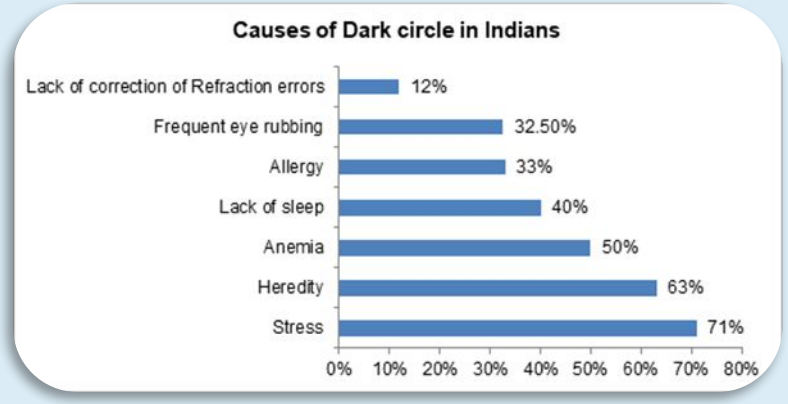
What do black circles indicate:

Black circles can sometimes be sign to change your lifestyle, such as improvements in sleep and eating habits. On the other hand, sometimes black circles also indicate lack of iron and minerals in the body.

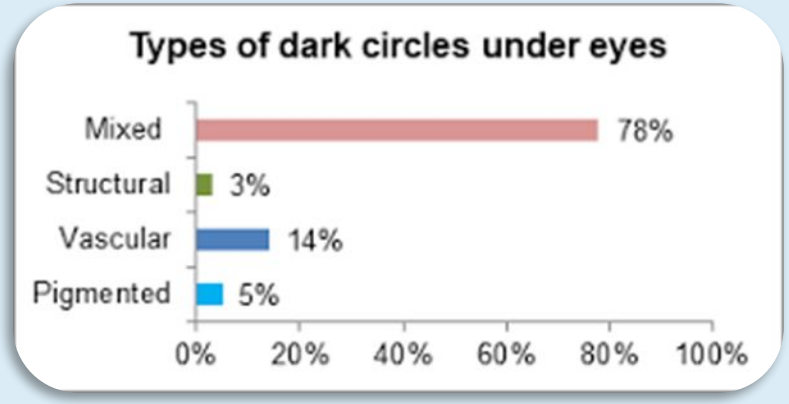
Why has digital exposure increased drastically in the last few months?

With everything in the world being suspended, social interaction as well as work interaction has become digital.

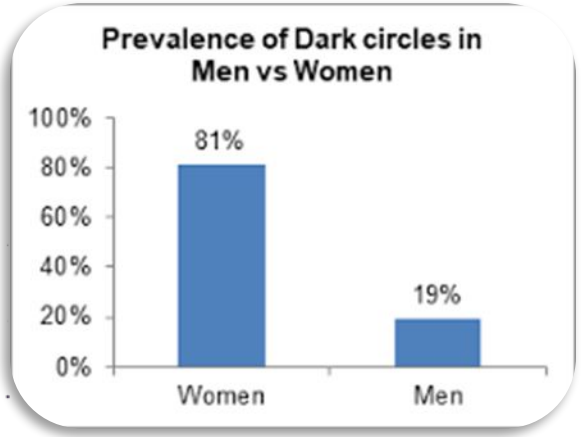
Secondary Research:



Bar Graph showing the causes of dark circles in India.



Bar graph showing the types of dark circles.



Bar graph showing the prevalence of dark circles in men and women

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The Concept

Masking the face and eyes from the surroundings

Mask the face and the eyes from the background making it easier to detect the black circles if any are present.

Examine eyes successfully using image processing

Using image processing and OpenCV examine the eyes and detect black circles is one of the goals of this project.

Black circles caused due to extreme digital exposure

Detect the intensity and the area covered up by the black circles

Detect the intensity and rate the intensity of the black circles from 1-10 and detect the area covered by the black circles

- The area covered by black circles usually
- Black circles around eyes intensity chart

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The Concept

Mask the face

- Masking the face from the image we get separates the face from the surroundings present in the picture. This makes it easier to examine the eye. Masking of the face can be done through image processing.

Mask the eyes

- After masking the face, the next step is to mask the eyes separating the eyes from the face.

- Picture of masking of the eyes from code

Mask the black circles

- Furthermore, masking the eyes is followed by masking the black circles which shows the user if they have black circles or no.

Picture of masking the black circles from code

Mask the intensity of the black circles

- If black circles have been detected while masking the black circles, then we later mask the intensity of the black circles. This tells the user weather the black circles is yet developing or already has been developed.
- Picture of masking the intensity of the black circles.

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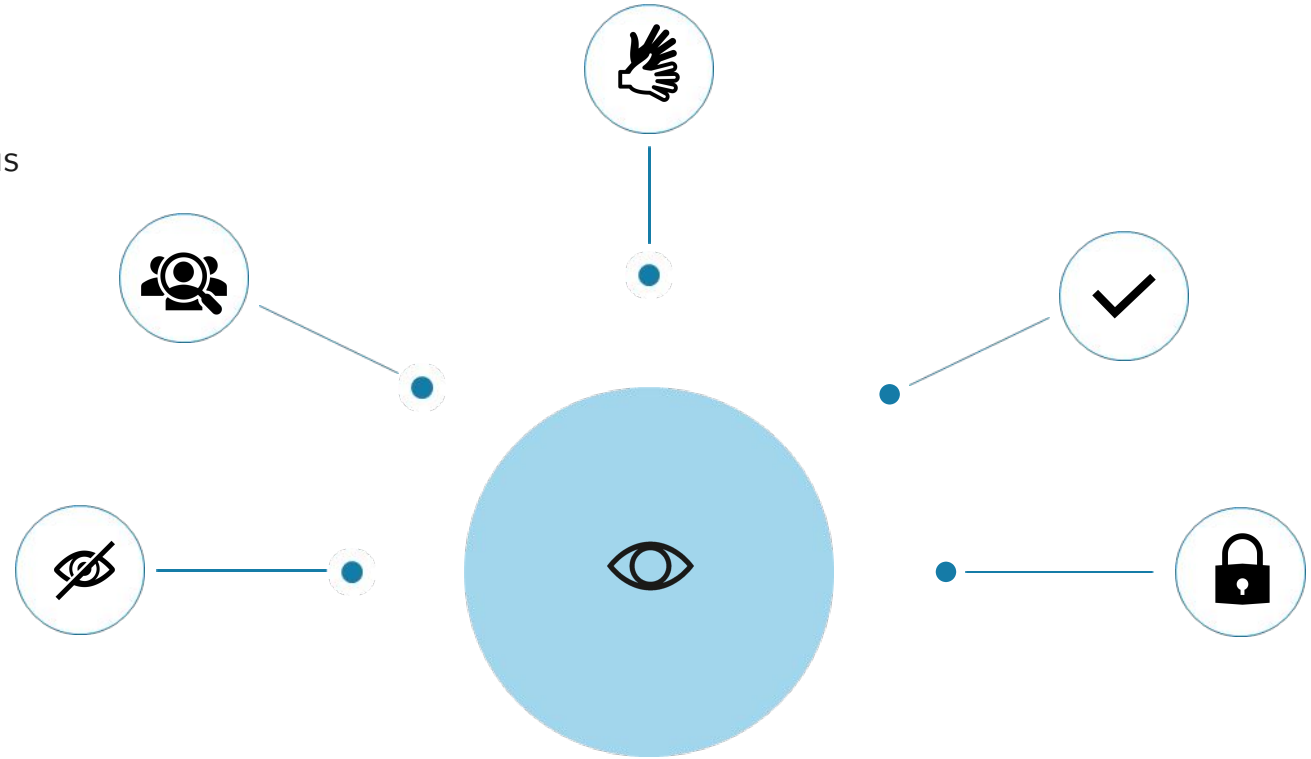
Ethics

03. INCLUSIVITY

The data has all types of different dark circles intensity and will be used to compare them

02. RELIABILITY

The data collected by anonymous



04. ACCOUNTABILITY

This web application can have huge impact on the people as Work from home made large viewing of screen to take measure.

01. FAIRNESS

The data that we have collected is unbiased.

05. PRIVACY AND SECURITY

Data is kept making sure of the security breach.

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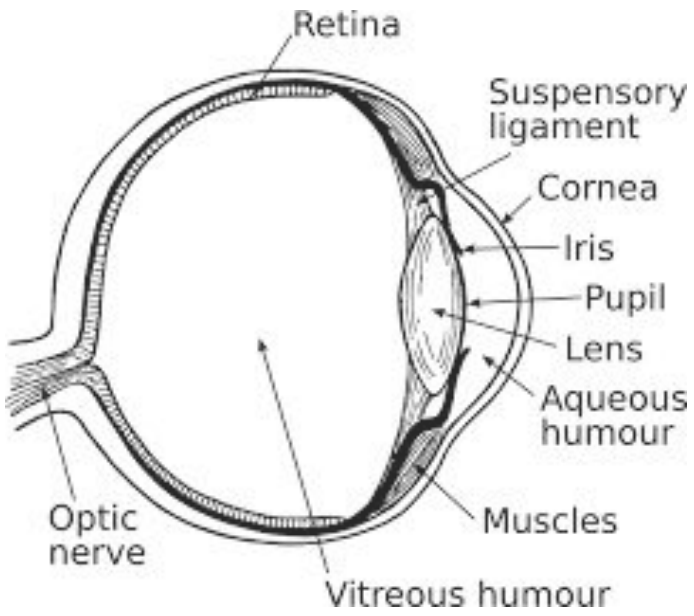
Solving the Problem – Track & Train for healthy eyes

Detecting the **eyestrain and examine** the eye using image processing and OpenCV to solve the problem of black circle.

Examining the eyes will not only solve the problem of black circles other problem that are caused in the eyes too.



Telling the user, **the intensity of the black circles** as well as the area covered by the black circles, makes it easier for the user to act immediately.

Black circles can also cause many dangerous diseases in the future and this project will help the user to take take immediate action to reduce the intensity of the black circles.

It tells Intensity of strain and how much less you should expose yourself

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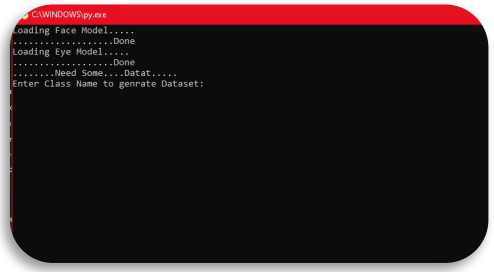
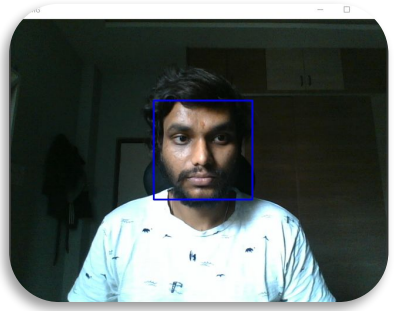
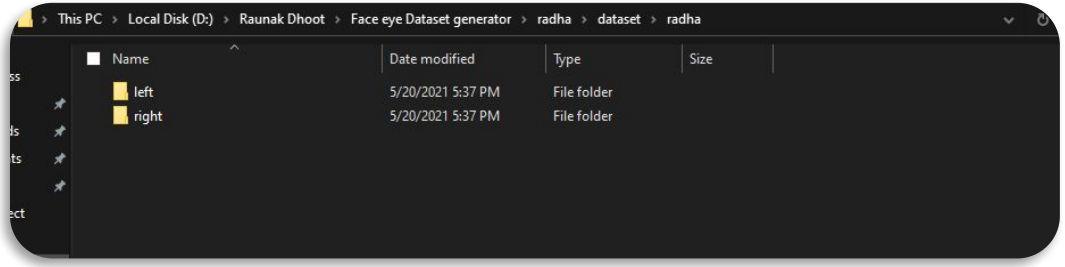
Solving the Problem



The algorithm Is first doing image processing by taking the test of the name of customer. Which helps to keep the data.

As the algorithm runs It recognizes the faces and eyes and save it perfect 224x224 image that is ideal of perfect deep learning process

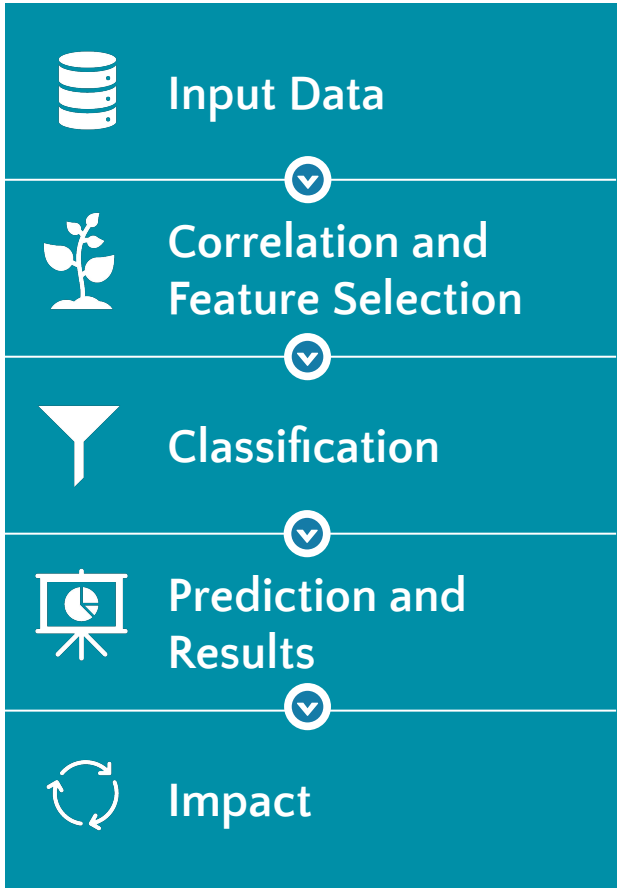




These folders are created with both left and right eye Which makes up only detecting the eye and area around the were Black-circles are made.

These images are run by CNN TensorFlow model that will run all different eye images to do Transfer learning to detect the intensity of dark circle in the eye.

Use of Artificial Intelligence



In this dataset we are provided with images that belong to 2 classes: left eye and right with image size of 224x224.

The objective of this study is to create a CNN model to help us predict whether these images of the eye have how much amount of intensity of dark circles.

Classifying data avoids problems faced while programming with Keras, leaving more space in the memory to use augmentation and/or loading pre-trained models.

We have trained with various models, but these three models showed the best results
1) TensorFlow model is used

This will drastically reduce the eye stress and help to people loss eyesight, because lot of time we have smart application that detect out body but this we application can reduce the dark circles and take early measure to keep eye healthy

References

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Thank you!

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