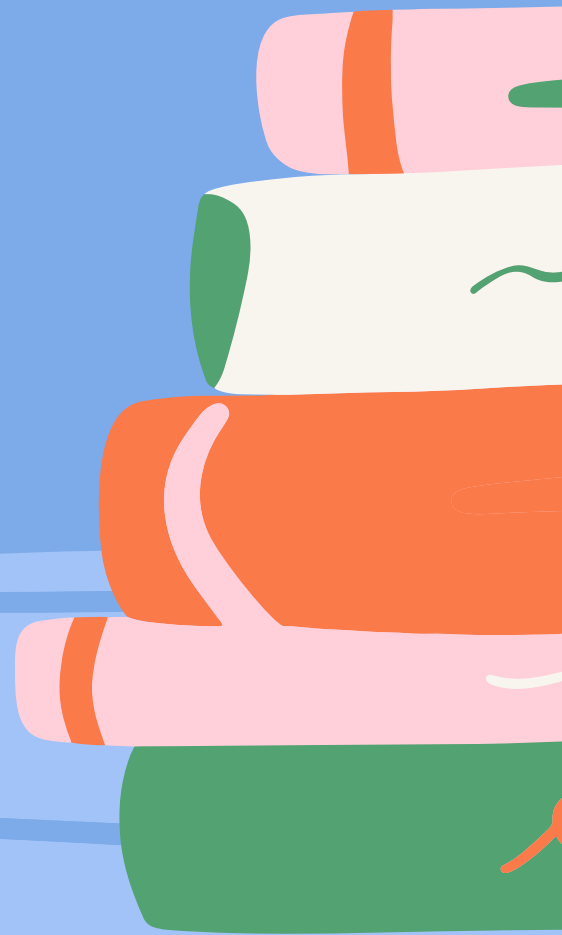


RACKATHON

# Education Technology

- Zerone Girls



# PROBLEM DESCRIPTION

- Students learning online are exposed to more distractions than face-face classes. While learning online, students tend to send text messages, chat on facebook, play video games, listen to music, etc.
- Managing technological distractions can be challenging when students need to use their phone or computer to study/attend lectures and complete the coursework. Such a situation, calls for a mechanism to monitor students and help them overcome distractions.
- Also, the course instructor finds it difficult to evaluate the temperament of the class wondering if the student was attending the class or not.
- The course instructor is remotely located somewhere it is hard to monitor all the students while taking classes. Moreover the course instructor cannot see the video feed of all the students while taking classes.



# SOLUTION



**Our idea is to develop a real-time distraction detection web application that monitors the attentiveness of the students in a video sequence to help the students and the instructor.**

**This can be achieved by detecting changes in their facial movements and then their attention level is calculated using the deviations.**

# IMPLEMENTATION

1

## Input

Video sequence of the student attending online class.

2

## Feature Extraction

Features like head pose, eye direction, lip movement, eye movements, etc can be related to different distractive behaviour such as talking, yawning, sleeping etc.

3

## Feature Selection

Find the best facial attributes that defines attention and distraction.

4

## Build Model

Identify the threshold model that indicates the change in the major attributes selected

5

## Use model to detect distractions

Find the attention level for the test input using the threshold model.

6

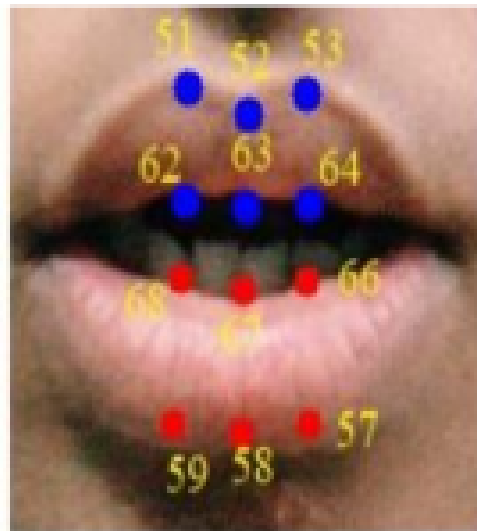
## Report of the attention level of students

A detailed report of the attentiveness of the students during class will be sent to the course instructors.

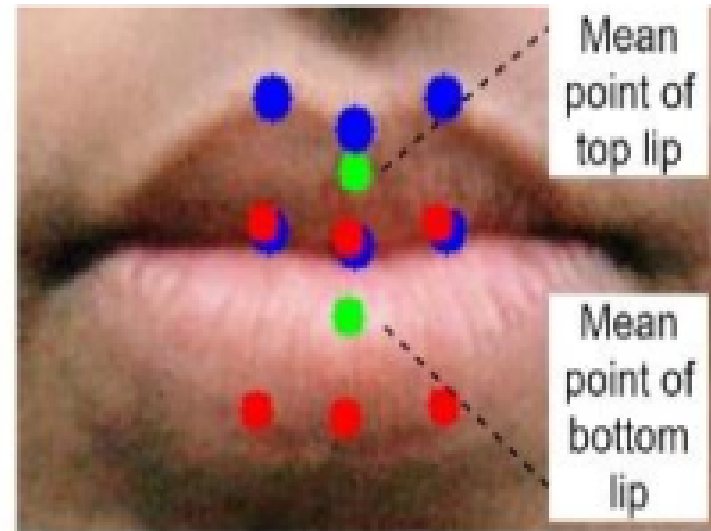


# FACIAL ATTRIBUTES

Metrics	Threshold Value	Active Behavior
Head Posture alignment / Yaw Angle	-20 degree to +20 degree	Head at center or Heading straight
Eye Aspect Ratio	$>0.25$	Eyes Open
Eye Direction	Asymmetric average white region over time	Looking straight
Lip distance	$\leq 20$	not talking or yawning



(a) Used landmark points of top and bottom lips



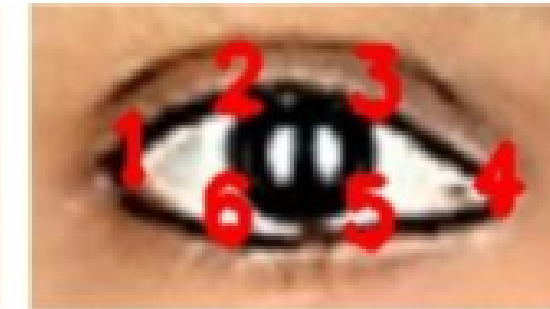
(b) Mean point detected from used landmark points of top and bottom lips



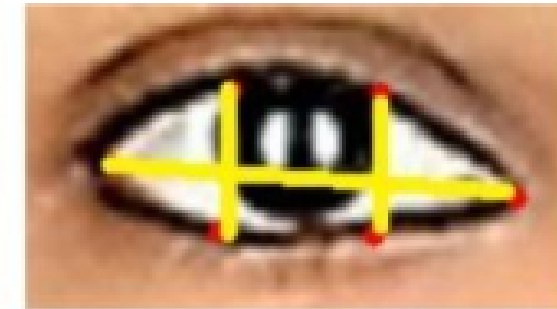
(c) Vertical distance detection of top and bottom mean point



(a) Landmark Points of left eye with actual labels.



(b) Landmark Points of left eye referred as point (p1-p6)

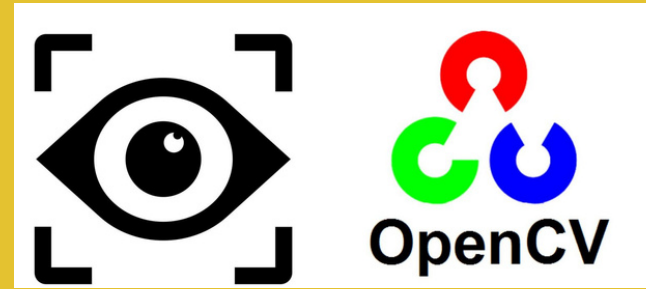


(c) Distnce between vertical and horizontal points





Python to develop the necessary algorithms



Open CV for video processing



DLib - A pre-trained landmark detection model used to estimate facial attributes.

## Technology Stack



Front-end



Backend



Client/server  
and routing



Hosting  
Application

# WORK FLOW OF THE APPLICATION

## LIVE CLASS

The student camera access is taken by the application even if the course instructor does not use.

## DETECTION OF DEVICE

We need to detect if the student has used mobile phone to join as the face may not be visible.

## PROCESSING BY THE APPLICATION

The application processes the data and the report is generated and mailed to the instructor after the lecture without individual student details to maintain anonymity.

## REPORT TO FACULTY

- The % of students present in the class.
- The average duration a student pays attention.
- The time of the lecture which had maximum and minimum attention.
- % of students who are not attentive for more than half the lecture duration.

## REPORT TO STUDENT

- The average time the student paid attention.
- The % of duration the student was not in the class(no face detected).
- The time of the lecture which had maximum distractions for the student.
- Comparison of the student behavior with others attending the class.

# IMPACT :



- Teachers can use the output of the application effectively to assess students' learning process and help students obtain a better learning experience.
- This can also help them decide whether their teaching procedure is effective or do they need to concentrate more at keeping their students focused.
- The report can also be sent to students for their self introspection on their distractions.







## CHALLENGES

- The students must keep their cameras ON during the entire class hours so that it can be processed by this application.
- The students require good internet bandwidth and connectivity to be able to switch on their web cameras throughout the lectures.