AI Based Sleep Detection System for Enhanced Road Safety

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Abstract — Main causes of traffic accidents include driver fatigue and drowsiness. Across the globe, increasing the number of accidents and injuries each year is due to one of the causes known as driver's drowsiness. The Advanced Driving Assistance System (ADAS) module described in this study deals with automatic driver sleepiness detection based on optical data and artificial intelligence. This approach seeks to improve transportation safety by reducing the number of accidents brought on by fatigued drivers. We suggest an algorithm to find, follow, and examine the driver's face and eyes in order to evaluate PERCLOS, a sleepiness indicator linked to sluggish eye closure that has scientific validity. One of the main tool used here in the project is Open Computer Vision with the help of python which provides a basic platform for the work to be done.

Keywords — Artificial Intelligence, DrowsinessDetection, Machine Learning, Open Computer Vision.

I. INTRODUCTION

The Driving Drowsiness Detection System is a driver drowsiness detector developed in Python.

On the basis of a few calculations and conditions, it can recognize eye movement. The main factor in many highway accidents is driver drowsiness.

Tiredness or drowsiness affects a driver's ability to focus on the road, which reduces their ability to make decisions while in control of the vehicle. According to polls and surveys, a driver becomes exhausted after two to three hours of continuous driving, which affects their ability to steer. Compared to other times of the day, the afternoon and nighttime hours have the highest rates of driver sleepiness.

The other research done in the topic of drowsiness detection involves detecting the drowsiness with the help of different methods which involve PERCLOS technique, Yawning based technique, Artificial neural network based technique, Electroencephalogram based technique, Steering wheel movement.

In this project, we conducted a poll using social media like Instagram in which people voted for time which cause drowsiness that is driving time for drowsy feeling is A two to three hours or B more than four hours. In this pole sixty nine people voted in total from which twenty three people voted for A and forty six voted for B.

II. METHODOLOGY

A. Components

Software Components
1.Python: Main interface for OpenCV
2.Open CV: Face and Eye Detection
3.Winsound: To play alarm sound.

Hardware Components
1.Webcam(laptop)
Used for recording the videoand capturing the image of driver to detect the drowsiness.

2.Speaker(laptop)
Used to generate the beep sound for giving warning message to driver if thedriver's eyes are closed > 2- 3 seconds.

B. Algorithm

- Import the necessary libraries and loadthe face and eye cascade classifiers.

- Set up the webcam for capturing video.

- Create a boolean variable called "is_sleeping" to keep track of whether ornot the driver is sleeping.

- Start an infinite loop that reads a framefrom the webcam.

- Convert the frame to grayscale.

- Use the face cascade classifier to detectfaces in the grayscale image.

- For each detected face, draw a rectangle around it

and get the region of interest forthe eyes.

- Use the eye cascade classifier to detecteyes in the region of interest.
- If no eyes are detected, print "Sleeping"on the frame and play a beep sound to alert the driver. Set the "is_sleeping" variable to True
- If eyes are detected, print "Awake" on theframe and set the "is_sleeping" variable to False.
- Display the frame on the screen.
- Exit the infinite loop if the 'q' key ispressed.

B.Release the webcam andclose the window.

C.Pseudo Code

- Import OpenCV library
- Import winsound library
- Load the cascades from openCV library
- Set up the webcam
- Read a frame from the webcam
- Convert the frame to grayscale
- Detect faces in the frame
- Iterate over each face
- Draw a rectangle around the face Get the region of interest for the eyes
- Detect eyes in the face
- Check if the person is sleeping if he is then alert him with a beeping sound
- Exit if the 'q' key is pressed release the webcam and close the window

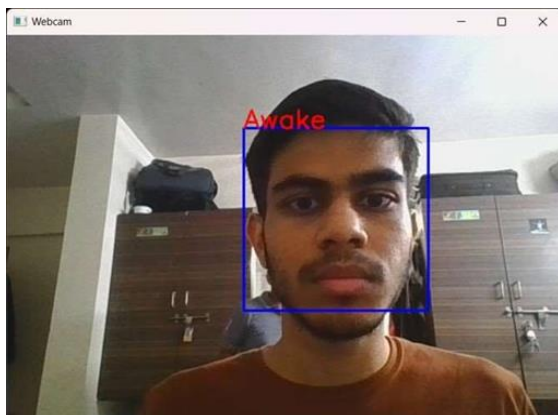### III.RESULTS AND DISCUSSIONS

Fig.1: Awakeness of a person

Figure (1) represents that the person is awake in which the eyes of the person are open and are detected as open.

By using OpenCV, we determined the awakeness and sleepiness of an individual. A square frame which comes around the face is used to detect thecondition as it uses eye closure measure to detect.But its only limitation is it cannot detect the results when goggles or glasses are weared by an individual.
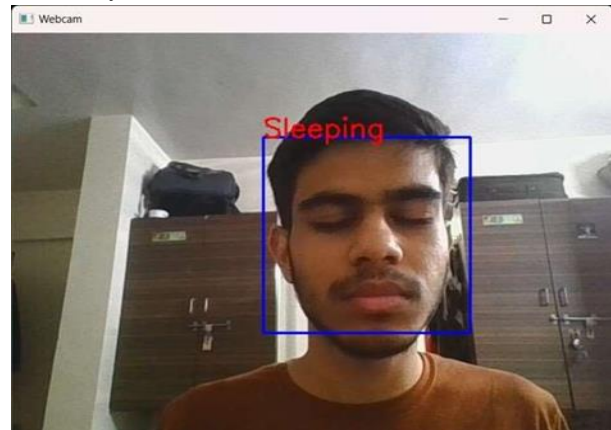

Fig.2: Sleepiness of a person

Figure (2) represents that the person is sleeping in which the eyes of the person are closed and are detected as sleeping.

Fig.3: Poll Conduction

Figure (3) represents the poll conduction in which data collection is done on basis of public's perspective.

Fig.4: Poll Conduction Results

Figure (4) represents results of the poll in which people vote for more than 4 hours in majority.

IV.CONCLUSION

This system for detecting drowsiness will increase safety on roads and highways. A drowsiness detector willoffer the essential precaution and may prompt you to stop driving and take a break. Exhaustion is a key contributing factor in accidents as it impairs our ability to think. By addingother elements into this system, we can expand on this idea and produce smart, effective automobiles in the future.

V. ACKNOWLEDGMENT

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