

Driver Drowsiness Detection and Driver Safety

- Objective

On highways, many accidents occur due to the vehicle driver losing focus on driving because he is drowsy or distracted. We have written a code in Python which will enable us to detect whether the driver is drowsy or distracted, which is likely to be the cause of such accidents.

- Detecting facial features using facial landmarks

We take frames from the video as input and pass each of them through a while loop. The frame rate of the camera is 30 fps.

The 68 facial landmarks from Python's dlib library helps us detect the face and identify different facial features for each frame.

We use the facial landmarks corresponding to the eyes of the person and calculate the aspect ratio of both eyes and find the average of it. We also calculate the aspect ratio of the mouth.

- Drowsiness Detection through eye aspect ratio

If the person is feeling sleepy, he/she will close his/her eyes for some time, which is likely to make them lose focus and cause an accident.

We need to ring an alarm to bring back the focus of the person.

So, for that, we will check the aspect ratio of the eyes. If the average aspect ratio falls below a certain threshold for a certain amount of time (here, the time is calculated by counting the number of frames, i.e., 30 frames are received per second. The sleep_score variable increases by 1 for every frame having the eye aspect ratio below the threshold), then the alarm goes off and an alert message is shown on the screen.

- Yawning

If a person is yawning frequently, it is a sign that he/she is feeling sleepy. To detect drowsiness through yawning, we use the same approach as we used for eyes, that is calculating the aspect ratio of the mouth.

So, if the aspect ratio of the mouth remains more than a certain threshold for a certain number of frames (out of a total number of frames), then the alarm will go off and an alert message will be shown on the screen.

- Head pose detection

If the driver is not looking on the road and is looking sideways, then there is a high chance of accident, because of him/her not focusing on the road.

To overcome this and ensure that the driver regains his focus within a

short amount of time, we use head pose detection.

By analysing the location of the facial landmark numbered 34, which is the landmark of the nose tip, relative to its initial position, we can accurately predict if the driver is facing sideways or not.

If he is looking sideways for a certain amount of time (i.e, for a certain number of frames), then the alarm will go off and an alert message will be displayed on the screen.