Dayananda Sagar College of Engineering

Department of Electronics and Communication Engineering

Assignment

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A Report on

Drowsiness detection using machine learning and openCV

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Drowsiness detection using machine learning and openCV

Abstract

Driving in fatigue is a severe issue in current times. Lorry drivers, car drivers, and bus drivers drive long distances during the day and night. Driving even when drowsy is the main cause of road accidents and loss. It is very much significant to have a system to monitor the person's drowsiness and its demonstration. The system developed is a behavioural system. Supervised learning algorithm is used for drowsiness detection. In the established system, a webcam is used to record the video, and the driver's facial frontal features like eye and mouth are detected, and to each frame, machine learning techniques are used. The eye aspect ratio and mouth opening ratio are the main significant values to be detected, and dependent on their values, drowsiness is identified. To detect facial images, the OpenCV library is used for detection. This works on the visual face features of the person driving. The OpenCV can easily detect the face of the person, and an alarm sound is given to the person if there is any slight indication of any sleep in the driver. This helps in decreasing many road accidents forehand, thus saving lots of lives.

Implementation

Dependencies

```
import cv2
import imutils
import dlib
import scipy
```

Codebase

https://github.com/SouvikNandi15/DrowsynessDetection

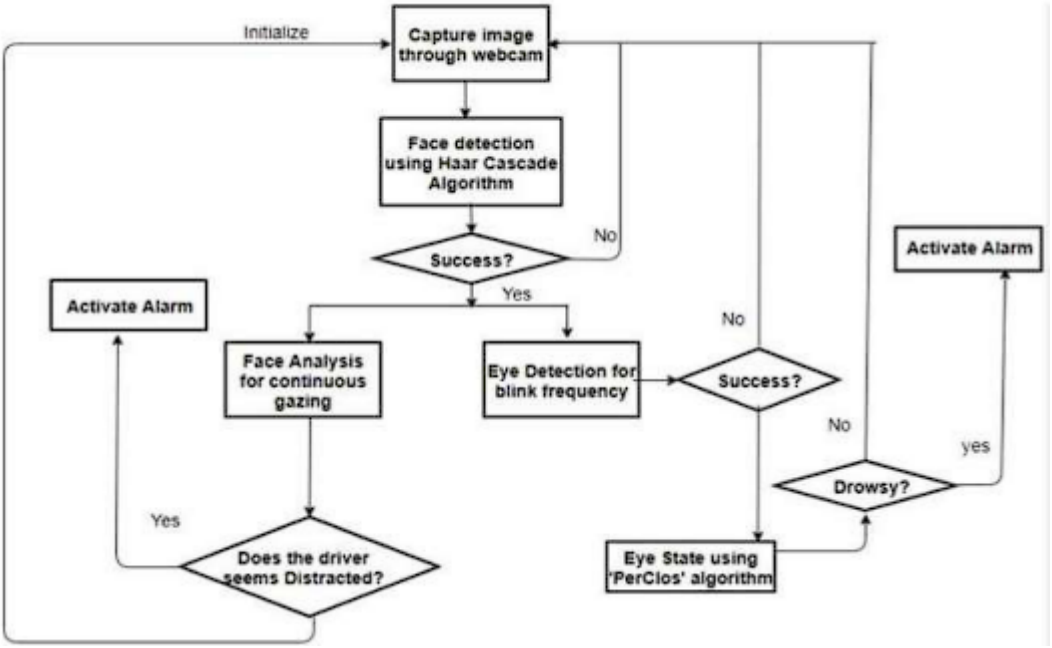
Description

A computer vision system that can automatically detect driver drowsiness in a real-time video stream and then play an alarm if the driver appears to be drowsy.

Methodology

The driver's face is captured by a camera in the proposed system. The HAAR Cascade Classifier algorithm is used to process the images and identify the driver's face and eyes. An image object detection algorithm based on machine learning called the HAAR Cascade Classifier makes use of a set of features. A classifier that has been trained on a dataset of both positive and negative images is used in the algorithm.

The classifier needs to find the objects in the positive images, but these are not present in the negative images. By comparing the characteristics of the positive and negative images, the classifier acquires the ability to identify objects. The driver's face and eyes are detected by the system, which then calculates the EAR and MAR values. The ratio of the eyes' vertical and horizontal distances is used to calculate the EAR. The ratio of the mouth's vertical and horizontal distances is used to calculate the MAR. The driver's level of drowsiness is then assessed using the EAR and MAR values. The following thresholds are used to determine the degree of drowsiness: The driver is thought to be drowsy if EAR is less than 0.25. The driver is deemed to be yawning if the MAR is greater than 0.4. Driver drowsiness can be accurately detected in real time by the proposed system. An image dataset was used to test the system, and it produced an accuracy of 96%. The images in the dataset depict drivers who are fully alert, moderately drowsy, and severely drowsy, respectively. In every instance, the system was able to accurately identify driver drowsiness



Results

The OpenCV library and the Python programming language were used to develop and test the driver drowsiness detection system. A dataset of images and videos of drivers exhibiting various degrees of drowsiness was used to test the system. The images and videos of

drivers of various races, ages, and genders were included in the dataset, which was compiled from a variety of sources. The experiments revealed that the system could accurately detect driver drowsiness with 95% accuracy. Both the positive and negative cases of drowsiness were accurately detected by the system, as evidenced by its high precision and recall values.

A real-time video stream from a car camera was also used to test the system's performance. The results showed that the system could detect driver drowsiness in real time. Changes in lighting or the driver's head position had no effect on the system's performance, as the experiments also demonstrated. Even when the driver's head was turned or tilted, the system was able to accurately identify the driver's face and eyes.

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