DRIVER DROWSINESS MONITORING SYSTEM USING MACHINE LEARNING TECHNIQUE

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ABSTRACT

Driver Drowsiness is the main reason for a large number of a road accidents. A drowsy driver has reduced attentiveness, increased reaction time, and impaired decision-making ability, all of which have a significant impact on driving performance. A driver monitoring system that alerts the motorist if he or she is in a critical sleepiness stage is an important addition to traffic safety. A drowsy driver exhibits various obvious characteristics, including as eye blinking and yawning, which can be recorded with a camera. The potential of eye closure and mouth opening signals provided by a driver camera to characterize the driver's sleepiness state is investigated in this study using Haar Cascade and CNN. Proposed system uses the behavior of parameter. The behavior of parameter includes eye closure and yawning. However, in order to undertake this study, a valid and independent reference for sleepiness is required. To that end, we developed a system that captures real time video of driver and that video is further divided into frames. In addition, we discuss our method for extracting eye blink and yawning data. Finally, we create a model which classifies and detect drowsiness of the driver using machine learning technique.

Keywords—Machine Learning, CNN, Haar Cascade, Camera, Open CV, Tensor Flow.

INTRODUCTION

According to a recent Times of India study, more than 151, 000 persons are killed in road accidents in India each year, significantly higher than in other affluent countries. The majority of these accidents occurred as a result of drowsy driving. Drivers who are always on the road and do not get enough sleep are more likely to be involved in a car accident. It has been established that driver drowsiness is the primary cause of the accident, which has piqued the curiosity of both studies and industry. At the moment, several significant multinational automotive brand businesses such as Toyota, Volkswagen, and Nissan are continuously working in the sector to develop such technologies that may detect the driver's yawning and give an alert urgent signal to the driver. Sleepiness is associated with a number of characteristics, including the closing of the eyes and the downward position of the head. Drowsiness, also known as a transitory state, is a biological condition in which the body transitions from an alert to a drowsy state. A motorist will lose focus at this point and will be unable to perform actions such as avoiding head-on crashes or braking in a timely manner. 1. Leaning forward with the head 2. The appearance of your face changes due to blood flow 3. Yawning Repeatedly 4. Inability to keep eyes open Yawning detection is critical for driver safety since it alerts the driver if he or she is becoming tired and should avoid driving because driving at that time may be unsafe.

Several automatic yawning detection approaches for driver sleepiness monitoring systems have been developed. Because of the vast number of real-world applications, computer vision is now one of the hottest and most popular AI technologies. It has numerous applications such as object recognition, automation in self-driving cars, smart surveillance, human activity recognition, face detection, smart traffic surveillance system, and many more. Numerous studies have proven that information from the driver's eyes can indicate the driver whether or not the driving will be safe at the time.

PROPOSED METHOD

Proposed system enables to overcome, some of the addressed drawbacks of existing system. System provides nonintrusive method, less false positive detection with high accuracy. Proposed system uses the behavior of parameter. The behavior parameter includes eye blinking, yawning, eye openness etc. This system consist of four parts: Video Capturing, Preprocessing, Extracting Eye and Mouth region using Haar Algorithm, Detecting the state of Driver using CNN Algorithm.

A. Video Capturing

Driver's attention focus is captured a via simple webcam in terms frontal face. The video of the driver is captured with the specific interval of time. Frame by frame extraction is carried out from that video.

B. Pre-processing

All the frames are undergoing pre-processing which take the all cleared images of face and exclude or delete all blurred images from that frames. The pre-processing is done with the help of Haar Cascade algorithm which used to detect the face from that captured frames and delete all the noisy images and delivered all the cleared images of face for the extraction.

C. Extracting Mouth and Eye region

Extracting the cleared images of the faces into two parts, one is to extracting eyes images and also extracting mouth images by using Haar Cascade Algorithm. So Haar Cascade Algorithm is used to extract mouth and eyes images from face images.

D. Detecting Driver Drowsiness

Extracted images of Eyes and Mouth regions are compared with the trained dataset using CNN (Convolutional Neural Network) algorithm. CNN algorithm compares the extracted images with trained dataset and divided that images into four parts, which are open eyes, closed eyes, open mouth and closed mouth. If the eyes are closed or the mouth is open then it will detect that the driver is in drowsy state.

THE PROPOSED ALGORITHM

In this section, the proposed scheme to determine driver drowsiness is introduced. There are four steps to decide about the driver's drowsiness, as shown in figure 1. First, face region should

be extracted from the captured image. Second, eye area is found in the face. Third, mouth should be detected in the face area. These two tasks collaborate with each other to improve the face detection results. Then yawn and eye closure detection tasks are applied to the extracted mouth and eye.

Next, the results are fused and decision is made on the drowsiness of the driver. Finally, if a drowsiness state is determined, an alert is sent to the driver. Subsequently the face is tracked in the next captured frames and the procedure is repeated.

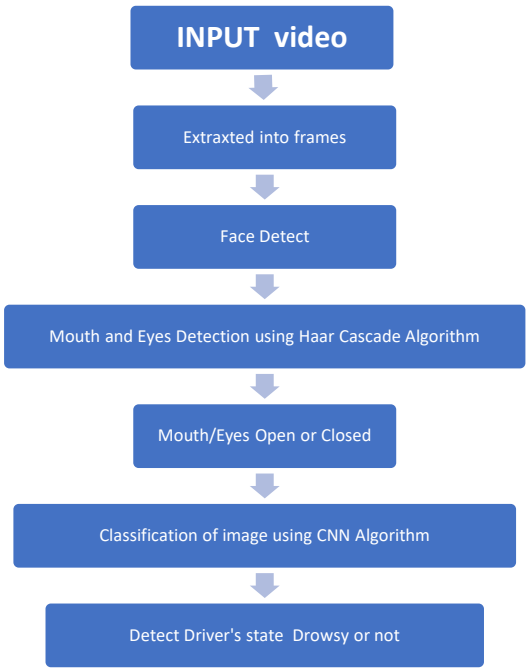

Figure 1 Flow Diagram

E. Haar Cascade Algorithm

Haar Cascade is an object detection algorithm used to identify faces in an image or a real time video. The algorithm uses edge or line. Regarding detecting the face, mouth and eye image, the Haar algorithm will be used. Haar algorithm is a well-known robust feature-based algorithm that can detect the face image efficiently.

In our system, Haar Cascade algorithm is used to extract the cleared images (delete all noisy images) from frames and it is also used to extract mouth and eyes images from that cleared images.

F. CNN(Convolutional Neural Network)

A Convolutional Neural Network (CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/ objects in the image and be able to differentiate one from the other. A convolutional neural network is proposed to detect the states of the eyes and mouth from the ROI images.

In our system, CNN is used to compared the eyes and mouth images with the given datasets and classify images into four parts which are open eyes, open mouth, closed eyes, and closed mouth. According to the state of eyes and mouth it will detect the state of driver i.e. drowsy or normal.

RESULTS

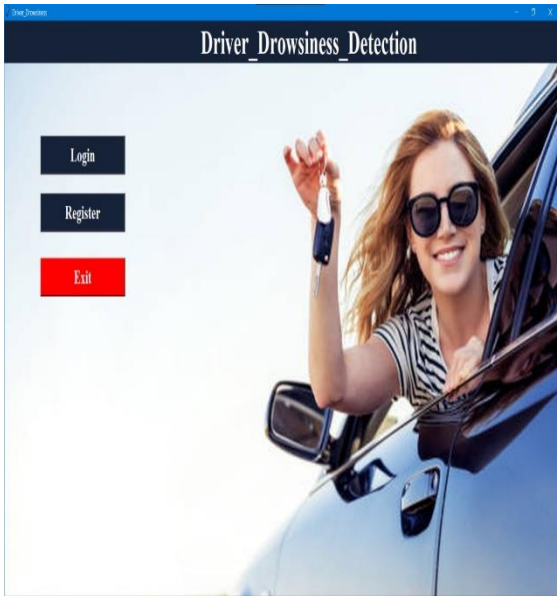

Figure 2. Main GUI

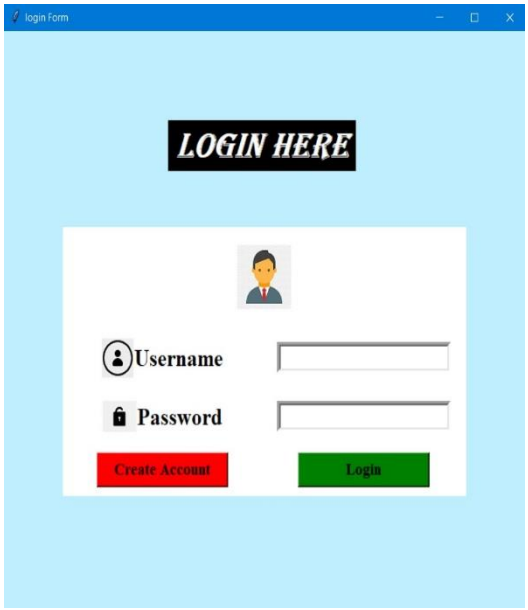

Figure 3. Login Window

Figure 4. Registration Window

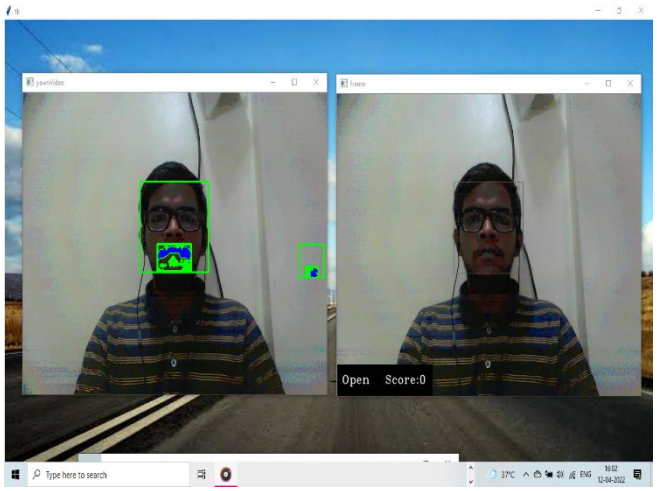

Figure 5. Output with Open Eyes

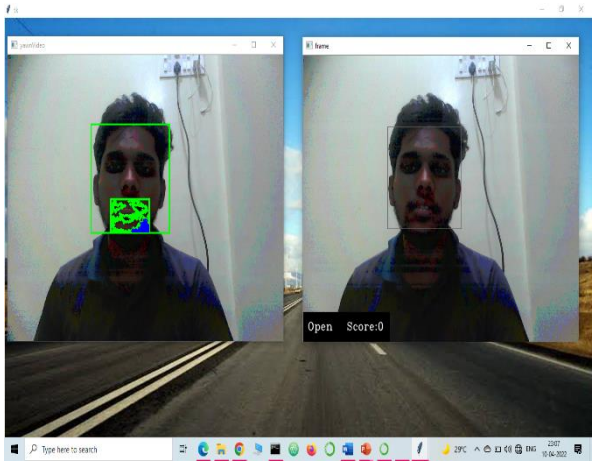

Figure 6 Output with Open Eyes

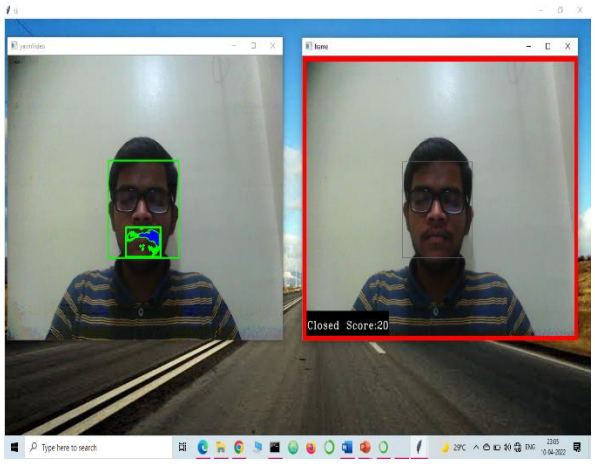

Figure 7. Output with Closed Eyes

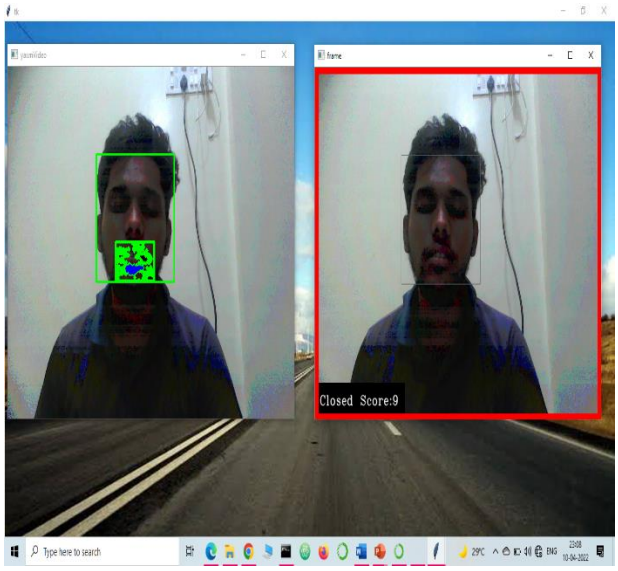

Figure 8. Output with Closed Eyes

CONCLUSION

- The expanding number of vehicle crashes because of a decreased driver's carefulness level has turned into a significant issue for society. Insights demonstrate that 20% of all the car crashes are because of drivers with a reduced cautiousness level.
- Through Our system we avoid carelessness of the driver and most of vehicles accident.
- In proposed system we warn / alert driver using alarm to avoid road accident.

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