ISSN 2395-1621

Realtime drowsiness detection and alert system

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ABSTRACT

Drowsiness during driving often leads to accidents. Tired driver can't pay attention to the road and his decision-making abilities are severely stunted. Therefore, we propose a system that can detect drowsiness in vehicle operator and alert them. The system monitors the driver to detect symptoms of sleepiness using MTCNN (Multi-task cascade convolutional Neural Network). It simultaneously analyses eyes and mouth for predicting state of drowsiness. It then alerts by using alarm. This force the driver to take appropriate action to reduce the cause of drowsiness.

Keywords: MTCNN (Multi-Task Neural Network), Drowsiness Detection.

ARTICLE INFO

Article History

Received: 11th December 2019

Received in revised form :

11th December 2019

Accepted: 13th December 2019

Published online :

13th December 2019

I. INTRODUCTION

Driver drowsiness is one of the serious safety issues facing the transport industry today. It is become one of the reasons for accidents. Sometimes due to lack of sleep, tiredness, long roads may make the driver drowsy. Feeling drowsy leads to sleep, it reduces the vigilance, the quality of decision-making, concentration, alertness, it also reduces the reaction time of critical elements of safety driving.Global status report published by the National Highway Traffic Safety Administration in year 2015, 2.3 percent of all the fatalities were due to drowsy driver.

There are three types for drowsiness detection: physiological parameters, facial feature analysis, vehicle behaviours. We are using the facial feature analysis, a detection method based on driver facial feature analysis analyses the driver's face, compares the driver's performance in a fatigue state and a normal face, and analyses some typical drowsiness level characteristics, such as the driver's head position, eye blinking frequency and yawning detection.

The proposed method to detect sleepiness involves computer vision-based techniques. The convolutional network algorithm to detect driver facial features. The convolutional network can be used for face detection and landmark mapping of key points, including: the left and right mouth corners, the centre of the nose, and the centres of the left and right eyes. Mainly locating the eye and mouth by key points, and is the main reason we use the MTCNN network.

Problem Statement:
To prevent accidents due to sleepiness we propose a system which alerts the driver if the driver gets distracted or feels drowsy. Facial detection is used with help of image processing of images of the face captured using the camera.

II. LITERATURE SURVEY

In order to deal with a complex environment such as head tilt and detection, the face is corrected according to the eye centre points, and an image is intercepted to analyse the eye state. We construct a state recognition network for the acquired eye and mouth images to extract fatigue characteristics, and combine the two characteristics of eye state and mouth state to establish a fatigue judgment model to further analyse the driver fatigue state. In this study, the performance of the proposed algorithm is evaluated on several published databases, and the experimental results show that the proposed algorithm is simple to implement and has higher detection accuracy. Our future work is to

transplant the algorithm to a hardware device. When the driver is in a state of fatigue, a warning signal can be issued to remind the driver to pay attention to driving or parking.

CEW data set. This data set is a database collected for the detection of eye status in the wild. This database contains approx. 2500 pictures, of which some are closed-eye images from a network collection. The remaining images are open-eye images from the labelled faces in the wild face database.

The YawDD data set is a video data set collected by containing two driver video data sets with various facial features, and a total of 300 video sequences for designing yawn detection algorithms and test models

III. PROPOSED SYSTEM

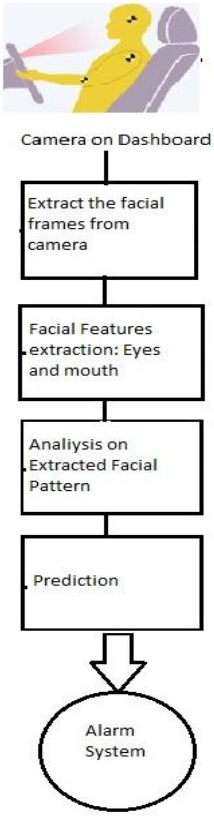

Fig 1. System architecture

1) Face detection:

First the face gets captured using the dashcam by mapping facial landmarks on face using facial landmark detector following which the landmarks of mouth and eyes are captured and given input the multi-task cascade convolutional network.

a) Eye detection: As the position of head may vary due to driver looking at different direction or in some cases one eye is able to detect, proper eye landmark are not captured so the detector plots a boundary of four points around the eyes and makes sure there is a horizontal line between left and right eyes. Even if there is tilt in head the boundary around eyes is taken into consideration making system more accurate.

b) Mouth detection: Similar to the eye's boundary is plotted at four points around mouth region from where the distance between two edges of mouth varies like if yawning, opening wide mouth.

2) Analysis on facial pattern:

After obtaining eyes and mouth landmark in boundary line the eye region is forwarded into a deep convolutional network where there are many layers which adjust the size of the captured eyes to certain value for processing through the layers in the network. The variation is calculated in the threshold change of eyes and mouth values using percentage eye closure criterion. Conditions are made which classify the output values like normal where the eyes, mouth frequency difference is normal and alert where a alarm sounds.

IV. CONCLUSION

The proposed method to determine various aspects of detecting drowsiness is efficient in making driver become drowsy. We start with detecting eye and mouth closing threshold value, then if the threshold frequency is below the given value of eye and yawning is found then it predicts if the driver is getting to sleep, alerting driver facilitates to make drive safer. The system can be further enhanced by capturing more video clips to train and test the proposed method. This further ensures that driving becomes more safer and accidents getting reduced due to drowsiness. System can be implemented with more upgrades making the detection possible at night time.

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