International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 2147-2150 www.ijaem.net ISSN: 2395-5252

Driver Drowsiness Surveillance

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Submitted: 01-07-2021 Revised: 13-07-2021 Accepted: 16-07-2021

ABSTRACT—
Somnolence is one among the most reason for road accidents. Driver somnolence detection may be a key technology that may forestall fatal automotive accidents caused by drowsy driving. the current work proposes a driver somnolence detection rule supported pulse variability (HRV) analysis and validates the planned methodology by scrutiny with electroencephalography (EEG)-based sleep marking.
Recently, somnolence detection of driver supported bio signal like EKG is being studied. Alterations throughout somnolence, fatigue, and stress of the motive force are often obtained from pulse variability (HRV). HRV springs from interval of RR in EKG. during this article, we have a tendency to gift somnolence detection victimisation HRV analysis supported microcontroller unit.

Keywords—
1 Python is employed as a language to implement the concept.
2 1. Python3 Interpreter.
3 2. OpenCV and Dlib libraries.

I. INTRODUCTION

The risk of traffic accidents in drowsy drivers is calculable to be four to 6 times over in awake drivers. So, as to avoid accidents caused by drowsiness of driver, a driver-assistance system that detects drowsy driving and provides a warning alaram which would be effective. In sleep drugs, electroencephalography (EEG) recording is important for sleep marking as a result of sleep onsets and sleep stages square measure outlined supported encephalogram. though EEG-based somnolence detection strategies are developed, it's troublesome to record encephalogram accurately throughout driving since encephalogram recording is intolerant to motion artifacts and place vital restrictions on the body. Driver face image analysis and vehicle travel knowledge analysis square measure used for police investigation driver drowsiness; but, these strategies need putting in special devices in an exceedingly vehicle, like a camera for face image acquisition or {a knowledge|aknowledge|an information} work device for accessing vehicle travel data. rather than putting in device in an exceedingly vehicle, physiological info aside from encephalogram are often used for somnolence detection if drivers conform to wear a device that measures their physiological signals. Changes in sleep routine have an effect on the involuntary systemanervosum (ANS) similarly as viscus action, and viscus signals are often used for somnolence detection. pulse variability, that is that the RR interval (RRI) fluctuation in associate degree electrocardiogram, may be a well-known physiological circumstance that reflects activities of ANS. within the gift work, a brand new HRV-based driver somnolence detection rule is planned by utilizing the structure of HRV-based convulsion prediction.

1.1 DROWINESS DETECTION CHARACTERISTICS

Most studies of sleepy-eyed driving are allotted in driving simulators. some studies of real driving square measure offered, however these have used solely some drowsiness indicators. the aim of this study was to characterize drowsiness in many indicators throughout real driving at the hours of darkness, compared with daytime driving.

driver drowsiness joined of the foremost necessary factors contributive to road crashes.1 the chance of road crashes because of drowsiness is higher at the hours of darkness, when reduced previous sleep, and with raised period of driving. the consequences of the latter, however, square measure perplexed with different factors, like time of day, time awake, and previous sleep, which frequently covary with the period of driving.

1.2 DROWINESS DETECTION SYSTEM

1-Take pictures from a camera as input

We will use a camera to take photographs as an input. So we have made an infinite loop to access the webcam that will catch each frame. To catch the object we access the camera, by using the method given by OpenCV, cv2.VideoCapture(0) to

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(cap). Each frame is read by cap.read(), and we store the picture in a frame variable.

2 –Create the Region of interest (ROI) at detected driver's face

To detect the face, as the OpenCV object detection algorithm takes gray images into the input, first we need to convert the captured image into grayscale. We don't need details about color to detect objects. We're going to use a hair cascade classifier for facial detection. This command is to set the face of our classifier = cv2.CascadeClassifier(' path to xml file for haar cascade'). Using faces = face.detectMultiScale we then perform the detection (gray). This returns an array of detections with the co-ordinates x, y and height of the object's boundary box width. We can now iterate through the faces, drawing boundary boxes for each face.

3 – Detect from ROI the eyes and feed them to the classifier

To detect the eyes, the same technique is used to detect faces. First, for lefteye and righteye we will set the cascade classifier, then detect the eyes using left-eye = leye.detectMultiScale (gray). Now we just have to take out the eye data from the captured image. By removing the boundary box of the eye, this can be done and then with this code we can take out the eye picture from the photo. The l eye only contains the eye's image info. This is fed into our CNN classifier that predicts whether the eyes are closed or open. Similarly, we're going to remove the right eye from r eye.

4 –The classifier will classify whether the eyes are open or close

To forecast eye status, we use the Convolutional Neural Network (CNN) classifier. We need to do such operations to feed our image into the model, since the model needs the correct measurements to begin with. First, using r eye = cv2.cvtColor(r eye, cv2.COLOR BGR2GRAY), we transform the color picture into grayscale. Expand the dimensions for our classifier to feed into. Use model = load model('model/cnn.h5 ') . We have loaded our model. With our model, we are now predicting each eye
Lpred = model.predict(l eye)classes. If the value of
lpred[0] = 1
specifies the eyes are open, then if the value of
lpred[0] = 0
specifies the eyes are closed.

5 – Calculate Score to determine that person is sleepy

The score is a count that will be used to examine how long and how many times the person has closed his eyes. So, if both eyes are shut, we will be increasing score and when eyes are not shut, we will reduce the score. The result will be drawn on the output screen using cv2.putText() function that will show the real time status of that person.

A threshold is defined for example if score becomes greater than 15 that means the person's eyes are closed for a long period of time. Then the alarm will play beep sound using sound.play().

II. MATERIALS AND METHODS

OpenCV - OpenCV is a library that provides various functions and operation on image and videos. We can even capture from camera using this library.
OS module : It provides functions for operating system interaction.
Keras model : It is an easy to use open source python library for Deep Learning Models.
Pygame : pygame is open source library for development of multimedia functions.
Numpy : It is a python library for adding support to two dimensional matrix, multi-dimension matrix operations, various mathematical functions
Time : This module provides different ways for representing time

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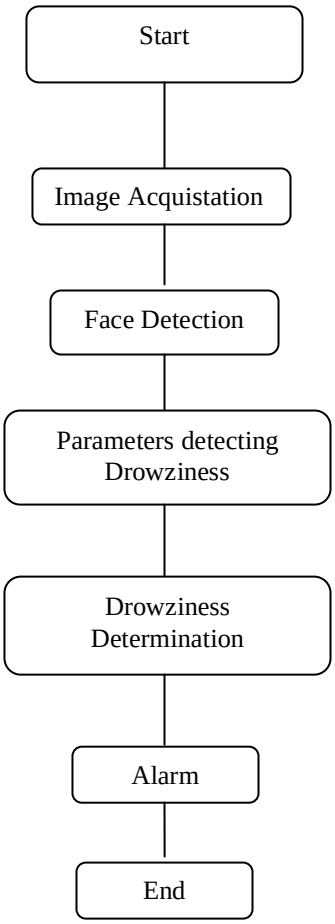

Fig 1- Drowziness Detection Methods

III. EXISTING SYSTEM

The somnolence of the driver sensed device is focused on computer vision. A camera mounted before the driver would support many existing systems. It is aimed directly at the driver's face, and it monitors the driver's eyes for signs of indolence. This arrangement is inefficient for large vehicles such as trucks and buses. The bus has a big front glass window that allows for a clear view when driving. The camera would be unable to properly detain the interior read of the driver's face if it is mounted on a frame that merely occupies the window. The open CV detector detects the entire 400th of a driver's face in an ancient driving position in a 10-minute video. The Open CV eye detector (CV-ED) often fails to track the try of eyes during the oblique read. The machine assumes that the thrust is declining slumbering and issues a warning if the eyes device closes for five serial frames. As a result, the current system is ineffective for large vehicles. To resolve the problem with the current system, a new detection system is being built during this project.

•The xml files used to spot objects are stored in the "haar cascade folder." We need to detect the person's face and eyes for our purposes.
•Convolutional neural networks were used to train the model file "cnnCat2.h5" in the models folder.
•When the individual feels drowsy, we have a sound clip called "alarm.wav" that will be played.
•The file "Model.py" contains the software that we use to construct the classification model by practising on our dataset. This file depicts the implementation of a convolutional neural network.
•The master file for our Drowsiness Detection project is “Drowsiness detection.py.” We'll run this file to start the detection process.

IV. CHALLENGES AND DROWBACK

Based on the utility studies, there is a high frequency of accidents to occur in Asian country because of carelessness of existing driving system. The driving force temporary state detection system reduces the quantity of accidents, loss of property and loss of human lives. temporary state whereas

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driving has been a necessary issue among the context of transportation safety. The mechanisms in investigation fatigue and state whereas driving has been classified into three broad approaches, at the side of vehicle-based, physiological-based, and behavior-based approaches. This paper will also cover problems with capturing natural expressions, driver responses, behaviour, and the task setting. A number of technical considerations must be seriously considered in addition to accurately capturing face and eye characteristics from needless movements, unsuitable job situations, technological limitations, and human variation.

V. RESULT

Following use cases square measure coated during this project:

1. the If eyes of drivers square measure closed for a threshold amount of your time then it's thought-about that driver is feeling sleepy-eyed and corresponding audio alarm is employed to form the motive force aware.
2. If the mouth of driver remains open for the bound amount of your time then it's thought-about that driver is yawning and corresponding suggestion square measure provided to the motive force to beat somnolence.
3. It driver don't keep eyes on the road then it's determined victimisation facial landmarks and also the corresponding alarm is employed to form the motive force aware. Performance of somnolence classification is decided by shrewd the accuracy. Accuracy is that the quantitative relation between variety|theamount|the quantity} of properly classified and also the total number classified. This project are often utilized in each vehicle presently on road to confirm the protection associate degreed scale back the possibilities of an accident thanks to somnolence or distraction of driver. This project are often enforced within the variety of mobile application to scale back the price of hardware.

VI. CONCLUSION

The drowsiness detection developed is capable of determining drowsiness in a swift manner. This system can distinguish normal eye blink and drowsiness which can prevent the driver from entering the state of drowsiness while driving. By doing this, a large number of accidents will get reduced which will provide safe life to the driver and vehicle safety. A driver safety system is present only in the luxurious and costly cars. Using this system, driver safety can be executed in normal cars also.

ACKNOWLEDGMENT

We would prefer to show our due to adult male. , Project Mentor, Galgotias University, WHO introduced United States to the methodology of labor and whose enthusiasm for the "underlying structures" had an enduring impact throughout multiple consultations and for providing United States with smart steerage for assignment. In inscribing this article, we'd conjointly prefer to extend our sincere feeling to all or any people who have directly and indirectly guided United States.
We give thanks all the people for his or her direct and indirect help in finishing our assignment.

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