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DRIVER DROWSINESS DETECTION SYSTEM

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Abstract- **To detect the fatigue of driver using the machine learning and gradient statistics-based. Driver drowsiness detection is developed for the real-time application. The number of accidents can be reduced by driver fatigue and thus improve road safety. In recent years, drowsiness and fatigue have become the supreme reasons for causing severe road accidents in India and worldwide as well. The significant increment in the percentage of road accidents due to drowsiness. The work is based on behaviour analysis, high end installation and Machine Learning algorithm to detect the possible coordinate to identify eyes and mouth. Existing state of art methods are computationally complex as compare to this type of method. Based on real time data capturing and analysis eye blinking and yawn detection are considered important parameters to detect drowsiness and fatigue of the driver and ring the alarm accordingly.**

Keywords **- Drowsiness detection, Real-Time Detection, Computer Vision, OpenCV, Haar cascade module**

I. INTRODUCTION

Drowsy driving is one of the main causes behind the deaths occurring in road accidents. The drivers who drive for continuous long distance especially at night, bus drivers of long instance route or overnight buses are more adaptable to this problem. In every country, driver drowsiness is an overcast nightmare to passengers. Every year, a large number of accidents and deaths occur due to fatigue in drivers related road accidents. Hence, detection of driver's drowsiness and creating alertness to improve it is an active area of research due to its great practical usability in day-to-day life.

Driver sleepiness or drowsiness is the main reason for a large number of a road accidents. Developing various technologies for monitoring and preventing drowsiness while driving is a major trend and challenge in the domain of accidence avoidance systems The detection can be done in many different ways and by using the different parameters. Proposed system uses the behaviour of parameter. The behaviour parameter includes eye blinking, yawning, eye open- ness, jaw position etc. The live video is captured by a camera that is setup in bus. The live video is divided into the frames and then select the images fromthe frames. By taking individual image, noise from the captured image is cleared. The behavior parameter includes yawning, eye open-ness, jaw position etc. The live video is captured by a camera that is fixed inside the vehicle.

II. LITERATURE SURVEY

The pro-posed algorithm uses an AdaBoost classifier based on the Modified Census Trans- form features to detect face. Regressing Local Binary Features for face landmark detection are used by the proposed algorithm. Eye states (closed, open) is determined by the value of Eye Aspect Rate which is fluently calculated by the landmarks in eye region. The algorithm provides real time performance that can be execute on the embedded device. Then the dataset is carried using video records from the infrared camera which is used the real-world[1]. This system will cover the driver's eyes using camera and by developing a algorithm we can detect symptoms of driver fatigue early enough to avoid unanticipated incidents. So need to detect driver fatigue in advance will be helpful and will give an alert warning which will be in form of sound and seat belt vibration who has frequency which variable between 100 to 300 HZs. The warning can not be deactivated automatically it can be done by manually [2]. To deactivate warning a deactivation switch will be used for this purpose. In once many times, there has been substantial increase in road accidents in India and worldwide as well. The most significant reasons for the same are dizziness(drowsiness) and fatigue. Therefore, driver drowsiness and fatigue detection is major possible area to help a large number of sleep convinced road accidents. Considering this problem, this composition proposes a Real-Time Drowsiness Detection System(RT-DDS) applicable in motor vehicles with the help of conventional Computer Vision implementation. The system employed different Computer Vision operations using blink rate, eye close or open, yawning to effectively and quickly identify the drowsiness of a driver during driving the vehicle and alert the driver consequently[3]. The proposed system includes four parameters, which are the face detection, the eye-glasses bridge detection, the eye detection, and the eye closure detection. The system uses grayscale images without any colour information, and it works effectively in daytime and night time. The system uses the machine learning to detect face position and facesize for the detection of face and to reduce the searching range of eyes the face geometrical position is used.Next, to judge whether the driver wears spectacles or not the proposed eye detection algorithm for the eye position is separated into two different modes .Finally, the system will detects driver's eye state in the eye region. However, doesn't concentrate on driving, or nods his head, If the driver closes their eyes during an enough time, the system generates an alarm to notify the driver.

III. METHODOLOGY

There are facial features and gesture detection. The first step going to be the camera initialization and further on frame acquisition, face detection, eye detection, eye closed, yawn detection and lastly giving an alarm and warning display to the user likewise.

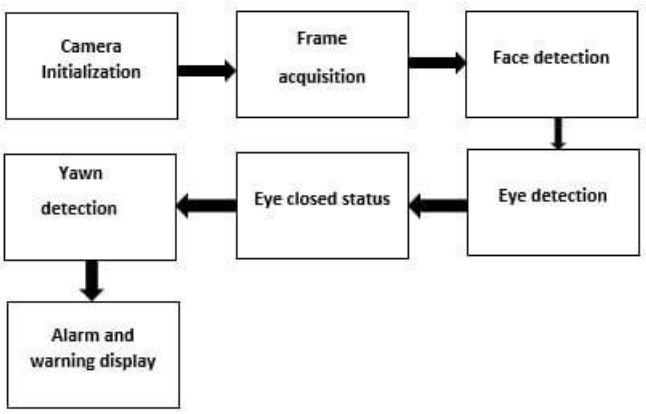
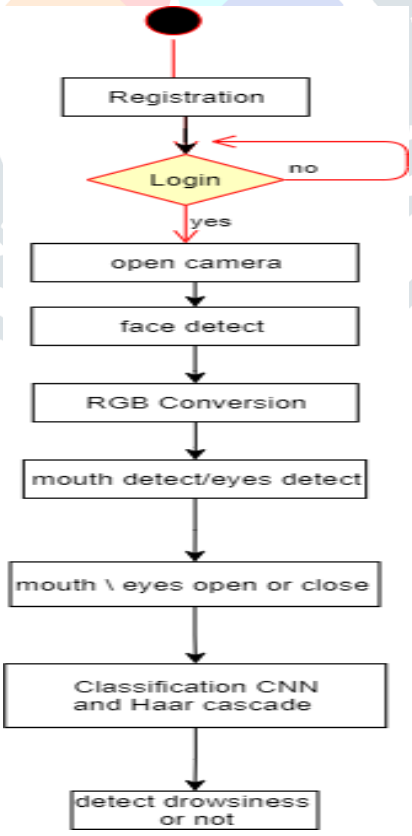


Fig.1 Block Diagram

A. Frame Acquisition: A High-end digital camera with nigh mode mounted in the car such that full view of the driver without disturbing the latter's view can be captured. Real time video has been captured, frames are extracted and analyzed in run time to identify the current state of the driver.

B. Face Detection: In order to get higher accuracy of face detection, we adopted feature-based method rather than other methods. all the features from haarcascade is considered to be simple and effective for face detection. There are several simple haar-like characteristics that we can use.

C. Eye Detection and Yawn Detection: The pre-trained shape predictor in dlib library is used to obtain coordinates of facial landmarks of a face. regression trees are used to determine facial landmarks using pixel intensities. The probability of distance between pixelpairs is used to detect eyes and mouth in a face region.



Fig, 2 Flow Diagram

1. Facial landmark prediction (FLP) algorithm:

Every Human Face has 68 distinct(pixels) points on his face. The position on each of facial points is stored in the form of matrix. So, by using this algorithm, the positions of both right eye and left eye can be obtained. During this max pooling is done due to that more points are located at Region Of Interest (ROI) that we actually needed to detect. 6 co-ordinates can be used to reprsent the eye as in figure 3. An equation called Eye Aspect Ratio (EAR)which reflects the relation between width and height of coordinators can be derived.

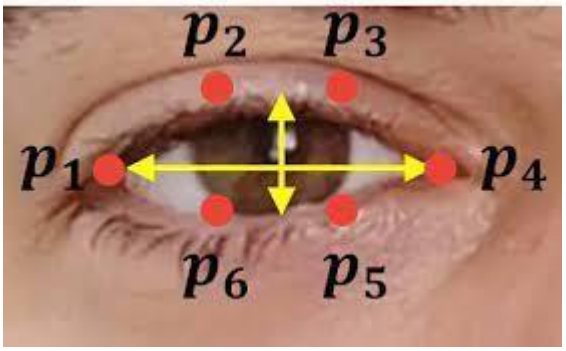


Fig. 3 Landmarks associated with eyes

The distance between vertical eye landmarks is computed in numerator and those of horizontal eye landmarks are computed in numerator and those of horizontal eye landmarks are computed in denominator.

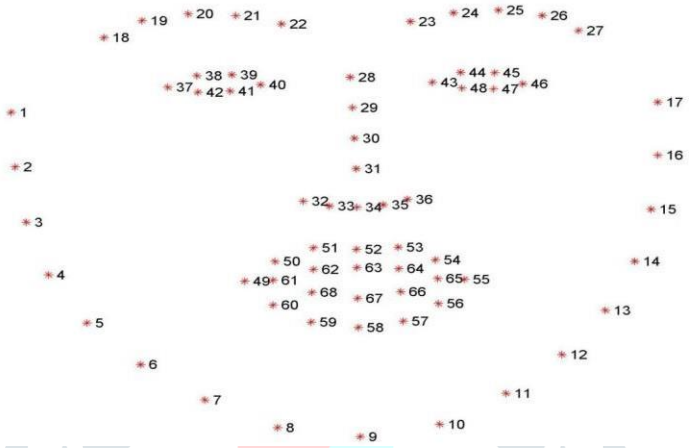


Fig.4 Facial Landmarks

Consider the figure 5. The eye aspect ratio would be large and relatively constant over the time for fully open eye and it decreases approaching to zero when the person closes the eye. The graph shows that eye aspect ratio is constant for certain time and then decreases to zero representing an eye blink. If the state of the eye remains closed for a certain period of time (5 seconds) an alert alarm will be given

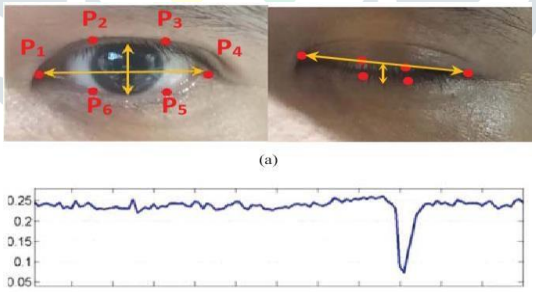


Fig.5 Eye Aspect Ratio

Yawning is characterized by wide opening of mouth. To detect the open mouth facial landmarks can be used. Mouth is represented by 20 coordinates as shown in figure 6.

Fig. 6 Co-ordinates of mouth region

Using this coordinate, the lip distance can be calculated by the difference between top lip and bottom lip and this distance is used to see the driver's mouth is open. If the lip distance is greater than a threshold distance then the yawn will be determined and alert is given accordingly. At every time, yawn will be counted and subject is determined as yawning and that count will be also mentioned in alert.

2. HaarCascade Algorithm:

HaarCascade is an object / face detection algorithm is generally used to detect facial real time images. It uses edge and line features which is proposed by Viola and Jones in their paper. It is machine learning model where a high dataset of positive and negative images is fed to the classifier for it to be trained. Positive images are the object of interest while classifier is trained to detect the negative images which are not object of interest. HaarCascade classifier require significant amount of time to process input image and give desired output as comparison to other object detect technique. The processing time taken by HaarCascade Algorithm is more than or as compared to another algorithm like LBP and CNN. For object detection technique the HaarCascade classifier is widely preferred because its output is very accurate. To train the HaarCascade model it required less time as compared to CNN.
In the detection of objects from a picture, a video, or from a live stream HaarCasacades algorithm is useful. An inbuilt class in OpenCV library helps to use HaarCascade features. In the face detection the use of this feature is very wide and if properly qualified it can be also used for object detection.

IV. FUTURE SCOPE

In future by using other parameters like blink rate, state of the car, etc the model can be improved incrementally. Because use of this parameters the accuracy can be improve by a lot. Anyone plans to further work on this subject by adding a sensor to track the heart rate in order to prevent accidents caused due to sudden heart attack to drivers. Further, Netflix and other streaming services can detect when the user is asleep and stop the video accordingly by using same model and techniques. model can be used by other application that prevents user from falling asleep.

V. RESULT AND DISCUSSIONS

To test the effectiveness of the model feeding real-world images into the proposed model is important. Because of the Correct predictions the model is reliably integrated with designing a real-world application for classifying facial recognition and drowsiness detection.

this technique, gives a performance accuracy of around 90-95% is achieved by using the Machine Learning as well as image processing techniques, and by using Eye Aspect Ratio (EAR). This experiment is highly effective and provides accurate results as shown.

Fig. 7 CASE I

Fig.8 CASE II

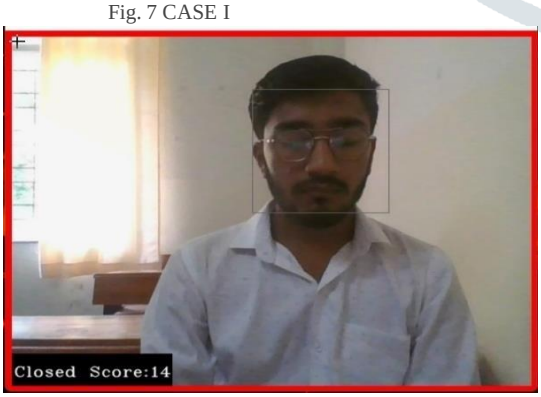


Fig.9 CASE III

Fig.10 CASE IV

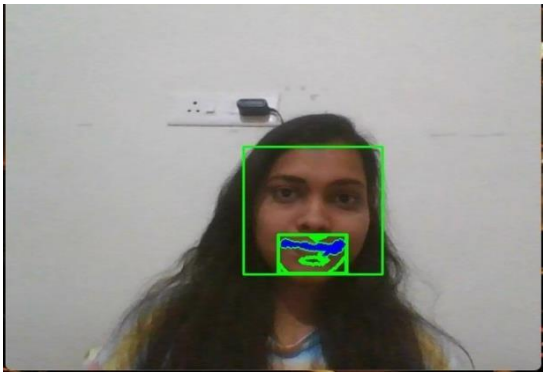


Fig.11 CASE V

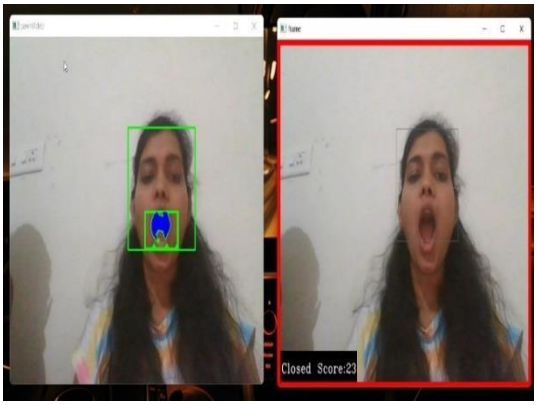


Fig.12 CASE VI

TABLE I CASEWISE RESULT

Sr No	Cases	Status	Observation
1	Case I	Eye Close	Score > 0
2	Case II	Eye Open	Score = 0
3	Case III	Eye Close With Spects	Score > 0
4	Case IV	Eye Open With Spects	Score = 0
5	Case V	Mouth Close	Yawn Not Detected
6	Case VI	Mouth Open	Yawn Detected

In this system SMS alert process is also included. the person receives a text message about Yawn detected or not. if yawndetects user will receive a message of yawn detected text. As shown in fig below:

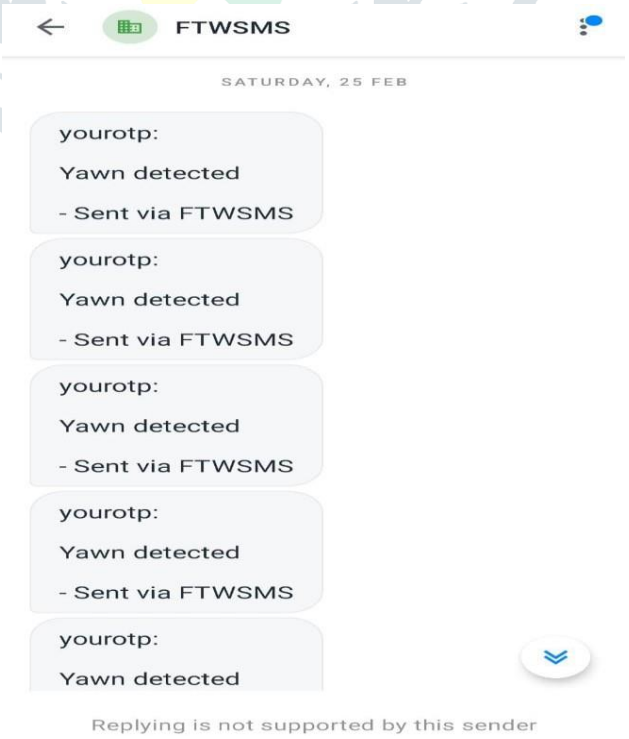


Fig.13 SMS Alert

In this system, The following graph shows the model accuracy .

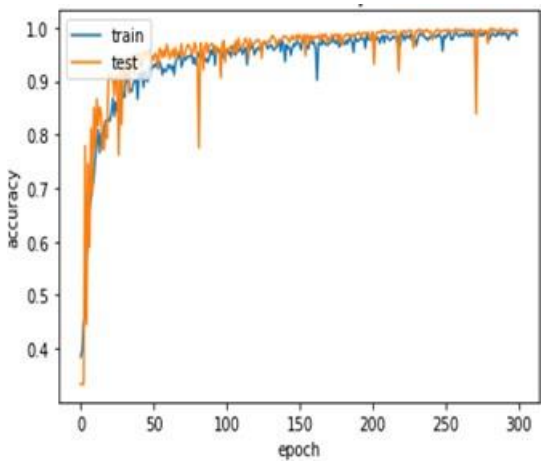


Fig .14 Model Accuracy

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