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Driver Distraction Detection

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Abstract —

Number of road accidents is continuously increasing in the last few years worldwide. As per the survey of the National Highway Traffic Safety Administrator, nearly one in five motor vehicle crashes are caused by distracted drivers. Three key types of distraction have mainly studied: visual, manual, and cognitive. These distractions deflect drivers' visual and cognitive resources away from the driving control task. These distractions can degrade driving performance and even can cause fatal accidents.We attempt to develop an accurate and robust system for detecting distracted drivers and warn him/her against it.Driver's distraction has been listed as the leading contributing factor to traffic accidents for the past decades. Therefore, the vehicle industry is striving to make a driving environment where input-output devices are smartly scheduled, allowing sufficient time for the driver to focus attention on the encircling traffic. To enable a wise human-machine interface (HMI), the driver's momentary state must be measured. This project focuses on developing an approach to detect distraction real time by analyzing driver's visual features from the face region. The proposed approach uses visual features like movement of eye and head to extract critical information to detect driver attention states and to classify it as either attentive or distracted. Deviation of eye center, mouth and head from their standard position for a period of your time is taken into account to be useful cues for detecting lack of attention during this approach. Initially face detection is performed after which region of interest (ROI) - eye, mouth and head region, are extracted using facial landmarks and lastly, head and eye movements are detected to classify attention state.

I. INTRODUCTION

As per the report of National Crime Research Bureau (NCRB), Govt. of India, Indian roads account for the absolute best fatalities within the planet . There has been an endless increase in road crash deaths in India since 2006.The report also states that the entire number of deaths have risen to 1.46 lakhs in 2015 and driver error is the most typical cause behind these traffic accidents.

Distraction thanks to inattention, sleepiness, fatigue or drowsiness falls into visual distraction class where "driver's eyes are off the road". Manual distractions are concerned with various activities where "driver's hands are off the wheel". Such distractions include talking or texting using mobile phones, eating and drinking, lecture passengers within the vehicle, adjusting the radio, makeup etc

The System believes that distracted driver detection is utmost important for further preventive measures. If Conference on Computer Vision and Pattern Recognition the vehicle could detect such distractions then warn the driver against it, the quantity of road crashes are often reduced,we specialise in detecting manual distractions where the driving force is engaged in other activities than safe driving and also identify the explanation for distraction.

II. LITERATURE REVIEW

The driving state detection method comprises the steps of making head posture detection and eye state detection on a driver image to acquire head posture information and eye state information using Machine Learning ; and determining detection results of the fatigue state and the distraction state of the driver according to the head posture information and the eye

state information [1], Additionally it also detect the yawning that results to the sleepiness behaviour of the driver.[9].

The driver distraction detection program judges and classifies the distraction of the driver by using a deep learning model, and warns the driver when the distraction type of the driver is successfully judged. Meanwhile,the driver distraction detection warning system comprises a driver distraction detection sensor assembly, an in-vehicle computer processor and a driver distraction warning assembly, wherein the driver distraction detection sensor assembly detects and collects behavior and action information of the driver and sends the behavior and action information to the in-vehicle computer processor[2]

A computer is configured for deployment in the cab and coupled to the motion sensor system. A driver behavior detector is coupled to the computer and configured to detect a driver distraction event using the driver movement mapping. A communication device at the vehicle is configured to communicate an alert message to one or both of a user interface device in the cab and a remote system in response to the detected driver distraction event[5].

A method for determining distraction of a driver of a vehicle, including sampling sensor measurements at an onboard system of the vehicle; generating an output

indicative of a distracted state; determining that the driver of the vehicle is characterized by the distracted state, based on the output; generating, at a second distraction detection module of a remote computing system, a second output indicative that the driver is characterized by the distracted state, based on the sensor measurements[4],[8] computing a distraction score, at a scoring module of the remote computing system, in response to generating the second output and based on the sensor measurements and the distracted state,[10].

The driver distraction alerting device comprises a non-contact eye tracker, a microprocessor and a sound alarm, wherein the non-contact eye tracker is used for acquiring motion data of eyes and the head of a driver, the microprocessor is used for processing the motion data transmitted by the eye tracker, and the sound alarm is used for alarming according to a driver distraction command transmitted from the microprocessor. An output end of the non-contact eye tracker is electrically connected with an input end of the microprocessor, and an output end of the microprocessor is electrically connected with an input end of the sound alarm.[3] Additionally , it also detects the change in head movement of the driver and alerts the using sound alarm[7].

The driver distraction using a single Convolutional Neural Network model such as Inception ResNet and MobileNet. Both the Models are trained with a small amount

of dataset and checkpoints which were pre-trained with ILSVRC2012 dataset. Furthermore, although our training dataset consists of images of two subjects[6].

III. PROPOSED SYSTEM

The main purpose of the project is to identify alertness in driving. If the driver is found to be yawning or sleeping or distracted from driving, then the continuous sound is played to alert him

A. System Block Diagram

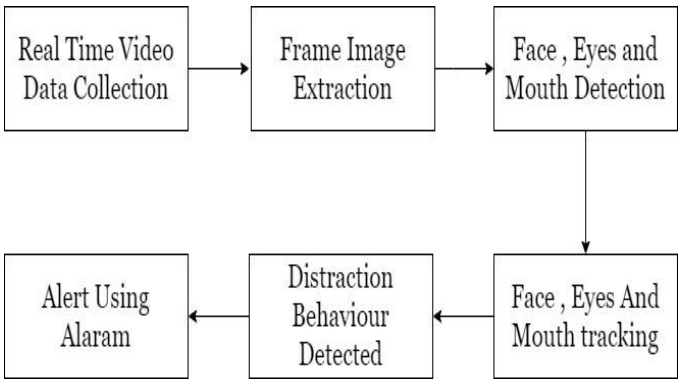

Figure 1 Block diagram

The figure 1 shows the block diagram of the designed system.initially image from video is captured, then the image is processed to detect Eyes, Face and Mouth of the driver and accordingly tracking is made i.e if any change is observed which lead to distraction

is been observed , as the distraction is observed alert is made using alarm.

B. Modular diagram representation of the proposed system

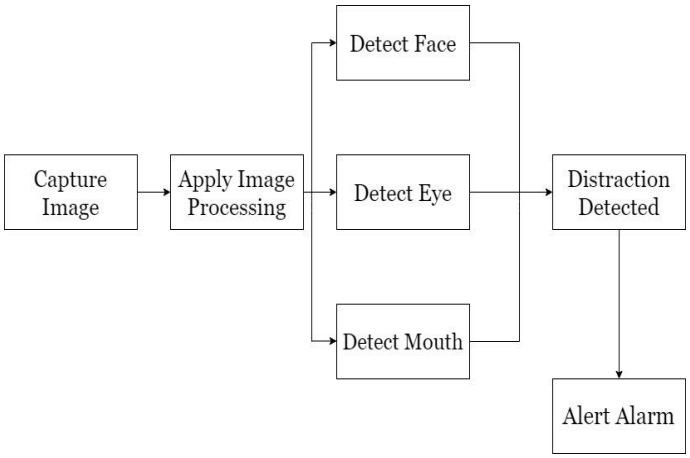

Figure 2 Modular Diagram

In figure 2 , it is shown that initially the image is captured from the video and face, eyes and mouth are detected using the dimensions in the database. When any change in the following factors is recognized which will lead to distraction of the driver , it will immediately alert using the alert alarm

C. Design of the proposed system

Data Flow Diagram

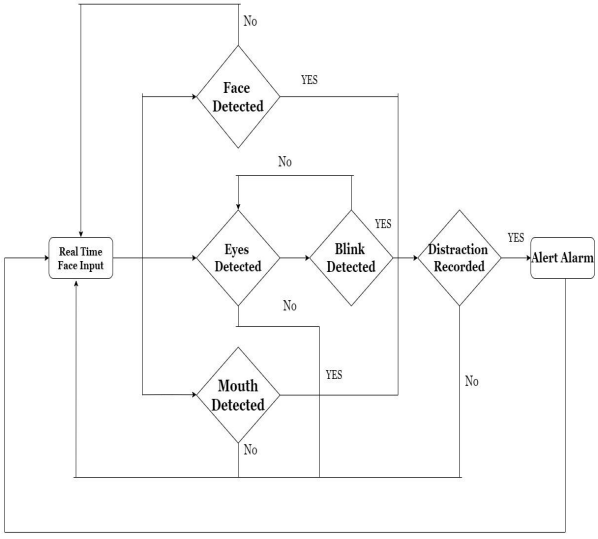

Figure 3 Data Flow Diagram

In this system the first step is taking real time face input of the driver by analysing face, eyes, mouth parameters. Head motion, drowsiness and mouth parameters like talking on the phone. By detecting the change alert is made to the driver to pay attention to driving.

IV. Result

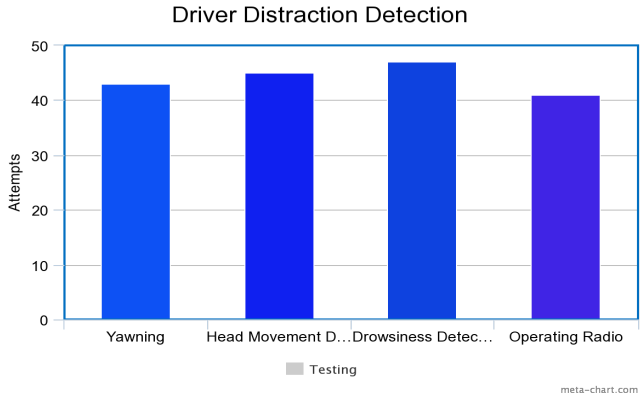

Figure 4 Result

Accuracy:

Yawning : 86%

Head Movement Detection : 90%

Drowsiness Detection :94%

Operating Radio : 82%

V. CONCLUSION

The distraction of the driver plays a vital role in safe driving and therefore, the proposed system can prevent the accidents due to the distraction while driving. The system works well even in case of drivers wearing spectacles and even under low light conditions if the camera delivers better output. Information about the head and eyes position is obtained through various self-developed image processing algorithms. During the monitoring, the system is able to decide if the eyes are opened or closed. When the eyes have been closed for too long or some change is observed that resembles to driver distraction, an alert by an alarm processing judges the driver's alertness level.

VI. REFERENCE

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