Driver Drowsiness Detection System with Many Alerts Sounds in ML

Sagar Kawale[1], Divya Surve[2], Saurabh Bandal[3], Aishwarya Bhosale[4]
[1,2,3,4]*Student, Computer Department, SPCOET college Someshwarnagar, Baramati, India*

Abstract **- Drivers who do not take regular breaks when driving long distances run a high risk of becoming drowsy, a state which they often fail to recognize early enough according to the experts. According to research it is proven that more than one quarter of the road accidents happen due to the drowsiness of the driver which means that more accidents are caused due to tired drivers rather than the drivers who are drunk. In state of extended speed range, a system can notify drivers about their inattentiveness and state of fatigue with the help of an alarm. There are many such alarm systems which are focusing on alerting the driver because accidents caused due to human error are increasing day by day and causing many deaths and injuries worldwide. The main reasons that cause fatal crashes and highway accidents these days are the drowsiness and sleeping of the driver. Driver drowsiness detection system is a safety technology that can prevent accidents that are caused by drivers who fell asleep while driving. This system will alert the driver when the drowsiness is detected and hence prevent the accidents from taking place.**

Index Terms **- Haar Classifier, Face Detection, Eye Tracking, Eye Detection, blink pattern, Driver Drowsiness Detection.**

I.INTRODUCTION

According to the latest statement from the World Health Organization (WHO) report in
2016, it is estimated that in 2013, 1.25 million people were killed on the roads worldwide. In addition to road deaths, there are up to 50 million people suffering from Non-fatal injuries each year as a result of traffic accidents, while additional indirect health consequences associated with this growing epidemic. The number of road traffic injuries is currently estimated is the ninth leading cause of death in all age groups worldwide, and is expected to become the seventh leading cause of death by 2030. In NHAI's study that during the mid-night 90% of accidents are due to the driver's drowsiness and fatigue. With this view, the creation of intelligent vehicles has been exponentially increased. The goal of this research is the detection of the indication of this fatigue of the driver. The acquisition system, processing system and warning system are the three blocks that are present in the detection system. The video of the driver's front face is captured by the acquisition system and it is transferred to the next stage i.e., processing block. The detection is processed online and if drowsiness of driver is detected, then the warning system gives a warning.

II. PROBLEM STATEMENT:

Driver's inattention might be the result of a lack of alertness when driving due to driver drowsiness and distraction. Driver distraction occurs when an object or event draws a person's attention away from the driving task.

III. LITERATURE SURVEY:

1. Paper Name: Driver Drowsiness Detection System
Author: Prof. Sonalii Suryawanshi1, Viren Patel2, Farman Khan3, Aatif Qureshi4
Firstly, we would like to express our sincere gratitude to our project supervisorProf. Sonalii Suryawanshi continuous support of this project and his patient guidance, enthusiastic encouragement and useful critiques, motivation, and immense knowledge. We would like to thank the rest of our thesis committee,Prof. Sonalii Suryawanshi for their guidance helped, insightful comments and encouragement, also for the hard question which incited me to widen my research from various perspectives. Our sincere thanks also go to all the staff members of the department for the valuable information provided by them in their respective

fields. We are grateful for their cooperation during the period of our project. Finally, we would like to thank our family for supporting us spiritually during working on the project and our friends who gave us moral support and encouragement throughout the project study.

2. Paper Name: Visual Analysis of Eye State and Head Pose for Driver Alertness Monitoring
Author: Ralph Oyini Mbouna1, Seong G. Kong2, Myung-Geun Chun
This paper has presented visual analysis of eye state and HP using a single camera for continuous monitoring of alertness of a vehicle driver. The proposed scheme extracts visual features from the eyes and head movements of a driver innreal outdoor driving conditions. EI measures eye closures, PA finds dynamic motion of the eye, and HP calculates all directional head movements. The three visual features, namely, EI, PA, and HP, are extracted in every video frame and averaged for a video segment of 120 frames or 4 s, following the "four seconds rule" according to the Pennsylvania Driver's Manual. Four experts and the driver rated the video segments and attributed a label to the alertness level. Then, the final class label was obtained using majority voting. An SVM classifier was then used to identify the alertness level of each driver for every video segment of 4s.

3. Paper Name: Driver Drowsiness Detection System Using Machine Learning
Author: Rahul Thakur1, Shivam2, Shubham Raj3, Subhanshu Pandey4
we have presented a novel approach to determine the tiredness or drowsiness of the driver with the help of their eye states. This determines whether the driver's eye is fatigued, and if it is, an alarm is started. To identify the eye and face region we have used the Viola Jones detection method. And for the training stage we have used stacked deep convolution neural network. And also if the vehicle is running above a threshold speed automatic breaking system will also be applied to slow the speed of the vehicle.

IV. PROPOSED SYSTEM

The block diagram of the proposed driver drowsiness detection system has been depicted At first, the real-time video is recorded using a webcam. The camera will be positioned in front of the driver to capture the frontal face image. The frames are extracted from video to obtain 2-D images. Face is detected in the frames using Haar-Adaboost face detection method. After detecting the face, facial landmarks like positions of eye, nose and mouth are marked on the images. From the facial landmarks, position of eyes and mouth are quantified. Using these extracted features and machine learning methods, a decision is obtained about the drowsiness of the driver. Convolution neural network is applied for classification of eyes, which detects drowsiness of driver by considering blinking of eyes. As an additional attribute to the system, feature extraction method is used for calculating mouth opening ratio, which also helps to decide if the driver is easy. If drowsiness is detected, an alarm will be sent to the driver to alert him/her. The details of each block are discussed in further sections. For the purpose of training the model to detect the open or closed eyes , a dataset of eyes from Media Research Lab is used. The dataset contains images of eyes of males and females, eyes closed and open, with and without glasses, with low reflection, high reflection and no reflection.

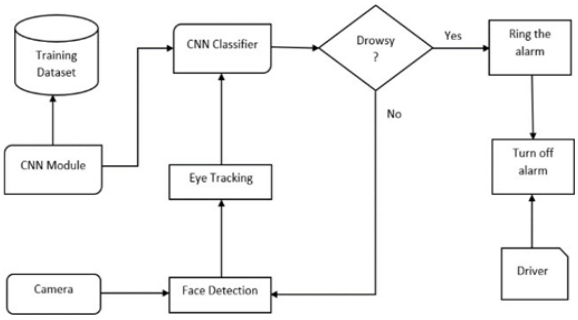

Fig. Proposed Sysetm

V. METHODOLOGY

Firstly, the face is localized in the image using facial landmark detection. Then, shape prediction methods are used to detect important features on the face. Face detection is done by OpenCV built in HAAR cascades, which are pre-trained. In the next step, to estimate the location of 68 coordinates that map to facial structures, a facial landmark detector which is pre-trained and included in the dlib library is used. The EAR is computed using the ratio of distances between the horizontal and vertical eye landmarks for drowsiness detection. For the purpose of yawn detection, a YAWN value will be calculated using the distance

between the upper and the lower lip, and the distance will be compared against a threshold value. sound used for giving appropriate voice alerts when the driver is feeling drowsy or is yawning.

VI. CONCLUSION

This study proposes an accident damaging (consequence) system for the modern period as well as a dependable method to identify operator fatigue. This technique often combines two independent elements into a single comprehensive solution. Conventional innovations, however, depends on sociology or infrastructure ways to identify driver drowsiness, and the severity of the collision is also estimated separately. This method of estimation is quite aggressive and fully reliant on the surrounding environment. The recommended method is therefore employed to create a discrete tool for determining the driver's level of tiredness in connection to the severity of an accident brought on by braking or making a mistake.

REFERENCE

[1] Visual Analysis of Eye State and Head Pose for Driver Alertness Monitoring Ralph Oyini Mbouna, Seong G. Kong, Senior Member, IEEE, and Myung-Geun Chun 2017

[2] Real-Time Driver Awareness Detection System To cite this article: A Z Mohammed et al 2020 IOP Conf. Ser.: Mater. Sci. Eng. 745 01205

[3] Drowsiness Detection System Based on Machine Learning Using Eye State Emine Merve Ozt¨urk, Ayhan K¨u¸c¨ukmanisa and O˘guzhan Urhan, 2013 ¨

[4] Driver Drowsiness Detection Using Machine Learning, 2010.

[5] Ralph Oyini Mobina, Seong G. Kong, Senior Member, IEEE, (2013), Visual Analysis of Eye State and Head Pose for Driver Alertness Monitoring, (IEEE), pp.1462-1469, vol.14, USA

[6] Ming-Hsuan Yang, David J. Kriegman and NarendraAhuja, "Detecting Faces in Images: A Survey," IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, VOL. 24, NO. 1, JANUARY 2002.

[7] Rau P. "Driver Drowsiness Detection and Warning System for Commercial Vehicle" "Driver's Field Operational Test Design, Analysis, and Progress".

[8] "Detecting Driver Drowsiness Based on Sensors A Review",pp.16937-16953, ISSN 1424-8220, Malaysia 2012

[9] Mohammed Shoeb, Mohammed Akram Ali, Mohammed Shadeel, Dr. Mohammed Abdul Bari, "Self-Driving Car: Using Opencv2 and Machine Learning", The International journal of analytical and experimental modal analysis (IJAEMA), ISSN NO: 0886-9367, Volume XIV, Issue V, May/2022

[10] R. N. Khushaba, S. Kodagoda, S. Lal, and G. Dissanayake, "Driver drowsiness classification using fuzzy wavelet-packet-based feature extraction algorithm," IEEE Trans. Biomed. Eng., vol. 58, no. 1, pp. 121–131, Jan. 2011.

[11] Y. Liang, M. L. Reyes, and J. D. Lee, "Real-time detection of driver cognitive distraction using support vector machines," IEEE Trans. Transp.Syst., vol. 8, no. 2, pp. 340–350, Jun. 2007

[12] R. I. Hammoud, G. Witt, R. Dufour, A. Wilhelm, and T. Newman, "On driver eye closure recognition for commercial vehicles," SAE Int. J. Commercial Veh., vol. 1, no. 1, pp. 454–463, Apr. 2009.

[13] Y. Dong, Z. Hu, K. Uchimura, and N. Murayama, "Driver inattention monitoring system for intelligent vehicles: A review," IEEE Trans.Transp. Syst., vol. 12, no. 2, pp. 596–614, Jun. 2011

[14] T. Wakita, K. Ozawa, C. Miyajima, K. Igarashi, K. Itou, K. Takeda, and F. Itakura, "Driver identification using driving behavior signals," IEICE - Trans. Inf. Syst., vol. E89- D, no. 3, pp. 1188–1194, 2006

[15] [G. J. AL-Anizy, M. J. Nordin, and M. M. Razooq, "Automatic Driver Drowsiness Detection Using Haar Algorithm and Support Vector Machine Techniques", Asian Journal of Applied , vol. 8, no. 2. pp. 149–157, 2015

[16] Ralph Oyini Mbouna, Seong G. Kong, Senior Member, IEEE, (2013), Visual Analysis of Eye State and Head Pose for Driver Alertness Monitoring, (IEEE), pp.1462-1469, vol.14, USA

[17] Xiao F., Bao C.Y., Yan F.S. published "Yawning detection based on gabor wavelets and LDA." J. Beijing Univ. Technol. 2009; 35:409–413. [Google Scholar]

[18] Rau P. "Driver Drowsiness Detection and Warning System for Commercial Vehicle" "Driver's Field Operational Test Design, Analysis, and Progress".

[19] "National Highway's Traffic Safety Administration; Washington, DC, USA: 2005" [Google Scholar]
[20] Boon-Giin Lee and Wan-Young Chung published "Driver Alertness Monitoring Using Fusion of Facial Features and Bio-Signals", (IEEE) Sensors journal, vol. 12, no. 7,2012
[21] "Detecting Driver Drowsiness Based on Sensors A Review",pp.16937-16953, ISSN 1424-8220, Malaysia 2012