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DRIVER DROWSINESS DETECTION USING DEEP LEARNING

Dr. Jim Mathew Philip[1],Raghul T[2],Sanjay K [3],Sruthi S[4]

[1]*Associate Professor , Department of Computer Science and Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamil Nadu, India.*

[2]*Final Year Student, Computer Science and Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamil Nadu, India.*

[3]*Final Year Student, Computer Science and Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamil Nadu, India.*

[4]*Final Year Student, Computer Science and Engineering, Sri Ramakrishna Institute of Technology, Coimbatore, Tamil Nadu, India.*

Abstract - In recent years, driver drowsiness has risen to the top of the list of factors contributing to car accidents, which can result in fatalities, severe bodily injuries, and significant monetary losses. A reliable driver drowsiness detection system is required, per statistics, to alert the driver before to an accident. Researchers employ behavioural, physiological, and vehicle based variables to evaluate driver sleepiness. The current systems, their issues, and the adjustments that must be done in order to develop a dependable system will be revealed by a detailed analysis of these measures. By using additional measurements, it will be possible to identify current systems' shortcomings and the necessary adjustments to create a reliable system.

***Key Words*:** driver exhaustion, driver drowsiness, vehicles, accidents,

I. INTRODUCTION

Approximately 1.3 million people die on the roads each year, and 50 million people have non-fatal injuries as a result of traffic accidents, according to the data that is currently available. When a motorist falls asleep at the wheel, the vehicle loses control and collides with other vehicles or immovable objects. The amount of driver drowsiness must be monitored in order to stop these fatal accidents. The following tools have been widely used to track sleepiness: 1) Vehicle-based measurements Lane deviations, steering wheel rotation, pedal pressure, and other factors are continuously tracked, and any change that exceeds a predetermined level signals that the driver is dozing off. 2) Behavioral indicators The driver's motions, such as eye closure, eye twitching, head posture, and more are captured on camera. The driver is warned if any of these signs of tiredness are observed. 3. Physiological evaluations The relationship between physiological signals (ECG, EMG, EoG, and EEG) and intoxication while driving has been studied in many studies. Recognition of sleepy driving is a critical safety component that can assist avoid accidents caused by tired drivers. Another major issue with the current machine vision models is that the majority of these algorithms are large and need specialized hardware to run the developed models. They do not work properly on machines with poor computing power. The person is identified and warned when their eyes are closed for a predetermined period of time using this study's rapid and efficient CNN model. This device will alert the driver about their tiredness if it detects any.

II. LITERATURE SURVEY

1. Machine learning-based physiological signal-based sleepiness detection: [1] approaches to singular and mixed signals Christopher N. Watling, Grégoire S. Larue, and Md. Mahmudul Hasan, a, b. The findings of the study demonstrate that particular physiological signal features can be identified and linked to KSS scores. By combining the selected elements from isolated physiological data, a distinct pattern in the sensitivity and specificity profile is also demonstrated. On the other hand, the hybrid approaches showed a significantly smaller gap between sensitivity and specificity when compared to the unique approaches. These findings demonstrate the importance of solitary bio signals in improving the performance metrics of a hybrid bio signal-based sleepiness detection system. Future research is necessary to address inter-individual differences, driving in the actual world, and the model's usefulness over time. In conclusion, the physiological signal-based detection system performs better in terms of precision and dependability than the current methods. Therefore, additional study should be done on real-time detection systems and the best commercial solutions with the proper integration of the bio signals, all while taking into account intrusiveness, ergonomics, cost-effectiveness, and user-friendliness.

2. Drowsiness Detection for Drivers Using Deep Learning Chen Bo and Chiagoziem C. Ukwuoma. In particular, convolutional neural network (CNN) techniques [2] have recently grown in favour for solving challenging classification problems. The bulk of them offer a breakthrough for a number of Computer Vision applications, including scene segmentation, emotion recognition, object detection, and image classification. We conclude by saying that the technology. The bulk of human-computer interfaces will soon be improved by drowsiness detection, which has tremendous business potential. Performance and accuracy can be enhanced with the help of cutting-edge learning technologies, in particular CNN. This method can be used for a variety of activities, such as assessing driver awareness, spotting activity, assessing attention, figuring out attentiveness, etc. this job must provide a high resolution and be finished on

schedule. Customers are only permitted to do that during the specified hours.

3. Deep CNN: Based on eye state, a Machine Learning Approach for Driver Drowsiness Detection Srinivasulu Reddy Uyyala, Venkata Rami Reddy Chirra, and Venkata Krishna Kishore Kolli. [3] This proposed study proposes a novel method for determining driver fatigue based on the state of the eyes. This determines if the eye is alert or drowsy, and when the eye is alert, an alarm sounds. The face and ocular areas are distinguished using the Viola-Jones detection method. Throughout the learning process, layered deep convolution neural networks are used to extract features. To classify the driver as awake or asleep, the CNN algorithm uses a SoftMax layer. The accuracy rate of the suggested system was 96.42%. The suggested system effectively identifies the driver's alertness and issues a warning when the model predicts that the output state will be drowsy. Transfer learning will be employed in the future to improve system performance.

4. A Deep Network-based system for detecting driver drowsiness based on feature representation learning Chang D. Yoo, Fei Pan, Sunghun Kang, and Sanghyuk Park(B). In this study, the deep drowsiness detection (DDD) network is presented to gather valuable features and detect tiredness from an input image of a driver. Previous techniques for assessing driver tiredness were limited to drawing inferences from painstakingly hand-made elements like head movements and eye blinks. Deep network-based feature representation learning algorithms have made it possible to automatically and effectively classify the driver as being tired or not. Due to the complementarity of the models, model ensemble and fusion procedures in particular improve performance. The results of the experiment show that the detection accuracy for drowsy driving using DDD is 73.06%.

III. PROBLEM STATEMENT

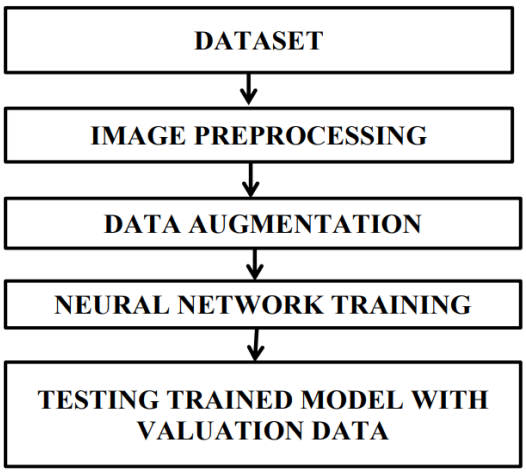
- In recent years, driver drowsiness has risen to the top of the list of factors that contribute to car accidents, which can result in fatalities, severe physical harm, and significant financial losses.
- According to statistics, a driver alerting system is required to warn the motorist before an accident happens. Driver fatigue is measured by researchers using behavioural, physiological, and vehicle-based markers.
- A thorough examination of these measurements will shed light on the shortcomings of the existing systems as well as the changes that must be done in order to develop a dependable system.
- It will be possible to identify the flaws in the current systems and make the required corrections to build a dependable system by taking additional precautions.

IV. METHODOLOGY

4.1 Overview

Drowsiness and driver fatigue are major factors in many different car accidents. Designing and maintaining technology that can efficiently detect or prevent driving when fatigued and alert the driver before a collision is a significant challenge in the field of accident prevention systems. We utilize OpenCV to capture webcam photos, and then a deep learning algorithm is used to determine if someone's eyes are open or closed. We are searching for the person's face and eyes in this instance.

4.2 Flowchart



4.3 Working

- Step1: Image is imported from the camera. We'll take pictures with a camera for input. However, we developed an unending loop that records every frame in order to acquire access to the webcam. We make use of OpenCV's cv2 function. The camera is accessed and the object is captured using VideoCapture(0) (cap). Each frame is read using cap.read(), after which the image is saved in a variable.
- Step 2: By identifying a face in the image, create a ROI. Since the OpenCV object detection algorithm only accepts grayscale images as input, we first transformed the acquired image to grey scale in order to segment the face in it. We do not require colour detail to detect the objects. To find the face, we apply the Haar cascade classifier. Face=cv2 is the classifier.With this portion, Cas is prepared. We utilise cv2 for (x,y,w,h)infaces.(100,100,100), rectangle(frame, (x,y), (x+w, y+h), (x+w, y+h), 1
- Step 3: Find the eyes with the ROI, then provide them to the classifier. The method used to detect ears also works to detect eyeballs. Left and right eyes utilise a cascade classifier. Use left_eye=leye after that.To identify the eyeballs, use detectMultiScale(gray). Only the ocular details from the recorded image were retrieved. To accomplish this, first remove the boundary box for the eye, and then use this code to eliminate the eye image from the image. frame = [y: y+h, x: x+w] l_eye CNN receives this information and decides whether or not the eyes are closed. Similar detection was made by the right eye.

V. SCOPE OF THE PROJECT

- The proposed model is used to stop a lot of traffic accidents caused by fatigued driving. A system that could aid in reducing the frequency of accidents brought on by drowsy driving could be built on techniques for recognizing sleepy drivers.
- The intention of the sleepiness detection system is to lessen the likelihood of collisions between passenger and commercial vehicles. The technology detects the first indications of tiredness and warns the driver that they can no longer operate the car safely before the driver completely loses all concentration.
- Nevertheless, employing this device won't guarantee that the driver is alert and that an accident won't happen. It only serves as a tool to improve driver safety, with a focus on long-distance truck drivers, nighttime drivers, lone travelers, and those who are sleep-deprived.

VI. RESULTS

Fig-1: Driver's eye opened

This (Fig 1) shows the driver's eyes are open while driving by detecting the camera. So driver is not drowsy and driving well.

Fig-2: Driver's eye closed

This (Fig 2) shows the driver's eyes are closed and he/she is drowsy while driving by detecting the camera.

VII. CONCLUSION

The Drowsiness Detection System can recognize drowsiness while driving and discriminate between it and a usual eye twitch. It is based on how the motorist closes their eyes. The suggested fix will help avoid accidents caused by fatigued driving. A CNN model was utilized to ascertain the state after OpenCV was used to locate faces and eyes using a Hear cascade classifier. The driver's continuous eye closures reveal their state of consciousness.

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