Driver Drowsiness Detection Observance System Using Data Science and Visual Behaviour

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Abstract— Data science and machine learning technologies were employed to predict a person's health and mood to deliver information that would improve road safety. It's an example of intelligence in action. (AI) technique for teaching system to learn and get better without having to be explicitly programmed. A driver's health can be determined via bioindicators, driving behavior, and facial expressions. Through talk, recent researches on driver sleepiness detection and alarm systems. Other machine learning approaches, such as the adaptable algorithm and the HOR algorithm, are also covered. Here we able to predict the driver's drowsiness state and give an alert for cause of road accidents.

Indexed Terms-- Data Science, Image processing Technology, Detection of drowsiness, Histogram, Object Gradients.

I. INTRODUCTION

Drowse deprivation leads the body to behave inefficiently, reducing both reaction time and arousal levels. as well as low attention and focus, lowering the capacity to perform activities that require care, such as driving a car Drowsiness is linked to large numbers of car crashes annually, with roughly half of them resulting in fatalities or severe injuries [1], owing to the fact that they are relatively high collisions in which the driver who has fallen asleep is unable to decelerate or diverge in time to avoid or minimize contact. Given these data, we must take steps to reduce the number of incidents.

Manufacturers have created sleepiness detection systems to recognize symptoms of impending tiredness and alert drivers to their condition. During the investigation, the following was discovered: " A data-fusion-based device driver safety monitoring system. Sensors are devices that detect something." Lee and Chung use an information fusion strategy to assess driver safety levels utilizing ocular characteristics, variations in biological signals, automobile temperature, and driving speed [2]. This system is developed as an Android-based smart phone application that can be used to measure security-related data without the need for additional expenses or equipment.

II. LITERATURE

A. Techniques for Detecting Drowsiness in Drivers:

Experts claim that drivers who do not take a break are more likely to become drowsy. According to a study, accidents are caused by weary drivers who are in need of a break, implying that drowsiness rather than drink-driving is the leading cause of road accidents. Attention assist can detect inattentiveness and drowsiness over a wide speed range, notify drivers of their current state of fatigue and driving time since the last break, and, if a warning is issued, indicate nearby service areas in the COMAND navigation system. It also has adjustable sensitivity and, if a warning is issued, can indicate nearby service areas in the COMAND navigation system.

B. The Driver Drowsiness Detection System (DDDS) is being implemented:

This study is about making automobiles more intelligent and responsive, so that they can warn or resist users in dangerous situations, or offer important information about real-time events to rescuers, cops, or the owner himself. The rising frequency of accidents on today's roadways is mostly due to driver weariness brought on by sleep disorders. We present a

real-time safety prototype that regulates vehicle speed when the driver is tired [4].

C. Drowsy Driving Detection Sensor-based Researchers used the following measures to try to figure out if a motorist was drowsy:

(1) vehicle-based measurements, (2) behavioural measurements, and physiological measurements. A thorough examination of these measurements will provide light on the current systems, the problems they cause, and the improvements that must be made in order to create a reliable system [3]. This paper examines the three sensor-based measurements and discusses their benefits and drawbacks. Drowsiness has been experimentally controlled in a variety of methods [4]. It was established that by building a hybrid sleepiness detection system that combines non-intrusive physiological measures with other metrics, the tiredness degree of a driver may be accurately determined. If a drowsy driver is alerted, a number of traffic incidents may be averted [5].

III. WORK FLOW

Firstly, the workflow is about how to detect the image by HOR algorithm and after the detection of face how to identify the facial landmarks after the data send to transformation block and check for drowsiness detection if drowsiness occurred alarm is sent.

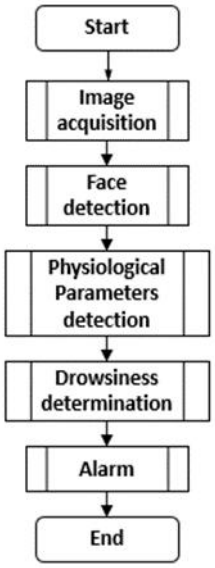

Fig.1.Flow chart of monitoring

The above figure 1 shows the following modules in the system

1. Acquisition system
2. Processingsystem
3. Warningsystem

Drowsiness is a physiological state in which you want tosleep badly. Drowsiness is not the same as fatigue, which is described as a need for motivation to continue doing the same thing. Actions that are performed in a common way with similar muscular components, have a high repetition rate and are commonly performed in forced posture.

A. Drowsiness Characteristics:

Here, we learn how to detect the drowsiness of driver Drowsiness is a normal physiological process in which you want to sleep a lot. Drowsiness is not to be confused with fatigue, which is described as a need for motivation to continue doing such a thing [6]. Completing tasks that are always done the common way with similar muscle parts, have a high sampling rate, and are typically done in forced postures, such as looking at the screen, causes fatigue [7]. Although a person might feel tired instead of being drowsy, events that generate exhaustion, such as driving long distances in a car, conceal actual drowsiness but will not cause weariness. Drowsiness affects awareness, reflexes, cognitive coordination, and processing information. The most noticeable effect on the driver is a gradual retreat of attention from the route, congestion, and signaling requirements, which leads to poor ride quality and disasters. Continual blinking, wiping eyes, continuous yawning, head tilt, and distractions are all indicators of exhaustion [8].

B. Detection Methods:

Following are the approaches that were discovered after reviewing a number of different papers:

To begin, the sleepy status of the driver must be determined.

Face awareness and face pursuing. The position of one's gaze and the direction in which it.

Drowsiness is a physiological state in which you want to sleep a lot. Drowsiness is not to be confused with tiredness, which is characterized as a determination to keep doing the common thing [9]. Actions that have

always been repeated in the paired way with the common muscular areas, have a high repetition rate, and are typically performed in forced posture, such as staring at a computer screen, cause weariness [10]. Although a person can feel tired and be droopy, situations often create weariness, like as driving at night in a car, conceal sleepiness but do not cause exhaustion.

IV. IMPLEMENTATION

The rate of drowsiness is determined using an eye behavior technique that calculates the frequency of blinking and the time interval between eyes closing. The PERCLOS (Per of instances Eyebrows are Lowered) indicator, which counts the total length of time a user's eyelids are closed at 80 percent to percent in a period, is one of the most commonly used indexes to evaluate the state of sleepiness. As per a study by Walter Wierwille and colleagues, PERCLOS is one of the most critical and essential alarm indications for vehicle sleepiness detection systems.

(Shut eyes time /(closed views time + eyes wide open time)*100) Perclose

Two modules make up this system. The face and eye detection module is the first of two modules, while the face tracking module is the second.

The two main types of detection methods are approaches based on car skills and methods based on driver status . Methods that rely on artificial vision and approaches that rely on physiological cues. Here, how to find the ratios is determined as follows as

- Examining the condition of the eyes.
- Percentage of eyelid closure calculation
- Recognize drowsiness.

One of the ways to detect tiredness is to use the PERCLOS scale.

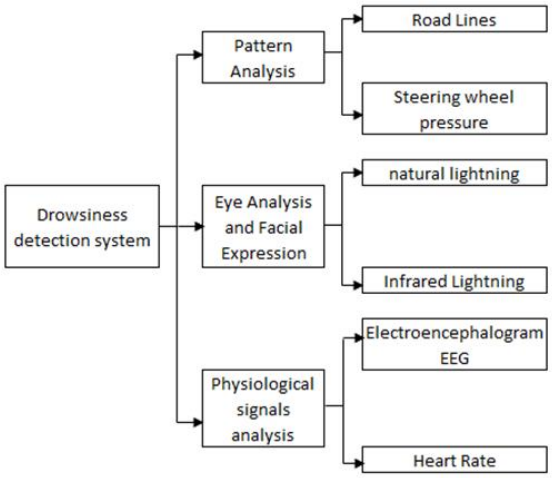

Fig. 2.Classification of drowsiness detectionMethods.

The above figure 2 depicts the process of analyzing the drowsiness detection system. Mainly the process divided into three blocks the first part is about pattern of the image and second to detect the eye mouth nose ratios and the last is to know the physiological signals. After extracting the frames, first the human faces are detected. Numerous online face detection algorithms are there. Human faces are detected using HOG and linear SVM methods.

A. SVM DESCRIPTION:

Machine learning entails predicting and classifying data, and we use a variety of machine learning methods to accomplish this depending on the dataset[11]. The Support Vector Machine, or SVM, is a linear model that can be used to solve classification and regression issues. It can solve both linear and nonlinear problems and is useful for a wide range of applications. SVM is a basic concept: The method divides the data into classes by drawing a line or hyper plane[12]. The radial basis function kernel, or RBF kernel, is a prominent kernel function in machine learning that is utilized in a variety of kernel zed learning techniques. It's especially popular in support vector machine classification. Ahyperplane, for example, can be thought of as a line that divides and categorizes a piece of facts for a classification problem using only two features in a linear manner[13].

B. Facial Landmark Points:

Facial landmarks are determined in points to recognize the face.

The below diagram shows the detection of facial landmarks:

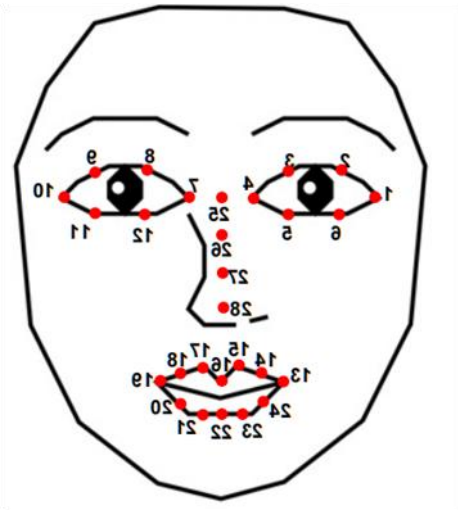

Fig 3:Facial landmarks

Figure 3 illustrates the landmark in the face to recognize. In this method, positive samples of descriptors are computed on them .Subsequently, negative samples (samples that do not contain the required object to be detected i.e., human face here) of same size are taken and HOG descriptors are calculated. Usually the number of negative samples is very greater than number of positive samples. After obtaining the features for both the classes, a linear SVM is trained for the classification task. To improve the accuracy, hard negative mining is used. In this method, after training, the classifier is tested on the labeled data and the false positive sample feature values are used again for training.

V. RESULT AND ANALYSIS

In this result the eye aspect ratio nose ratio and mouth ratio calculated and appears in the left corner block by these values and some of pyshical signs drowsiness alert is examined in the frame.

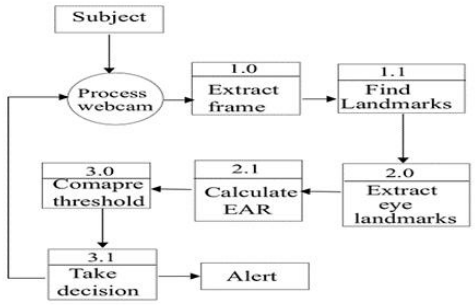

Fig 4:Different Alogrithms on detection methods

The above figure 4 shows the algorithm variations like when we use support vector machine and naïve base and random forest and some of the algorithms graphs.

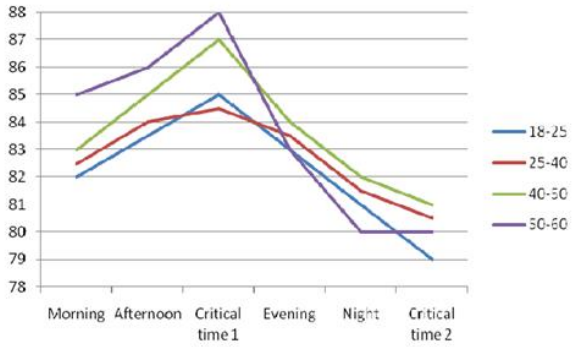

Fig. 5.Result and analysis of driver drowsiness detection

Figure 5 represents how the proposed system detects human face segments whether to give alarm or not [14]. The eye aspect ratio is calculated as the ratio of height and width of the eye.

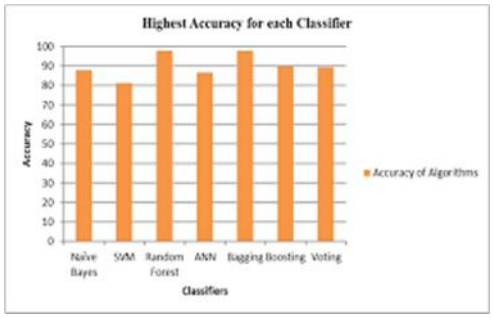

Fig 6 accuracy rate of drowsiness

The above figure 6 shows the drowsiness either mainly occurs in morining times or else night majority is shown by this accuracy rate [15].

VI. COMPARISON OF VARIOUS METHODS

We can detect drowsiness using any of the methods described in this paper. One of the new methods we implemented is by inserting a phone in the driver's seat, as well as visual detection through monitoring. In phones, we can detect by inserting a SIM card. When we hear a warning alarm, we are reminded of this. The alarm sound is immediately sent to the phone, after which the phone rings and the driver enters the active state. Among all existing methods, this is the main method we are implementing in an easy way. This method will aid in the detection of drowsiness.

CONCLUSION

Based on ocular behaviour and machine learning, a low-cost, real-time driver sleepiness monitoring system is proposed in this work. From the streaming video collected by a camera, visual behaviour features such as eye aspect ratio, mouth opening ratio, and nose length ratio are computed.

To identify driver tiredness in real time, an adaptive thresholding technique has been devised. Following that, the feature values are saved, and machine learning methods are employed to classify the data. The Bayesian classifier, FLDA, and SVM have all been investigated. It notifies both the truck driver and the company's owner. The buzzer is sounded whenever the driver becomes drowsy and closes his eyes for longer than a second. As a result, the driver is notified. It also sends text messages to the truck driver's owner to warn him. As a result, the risk of an accident decreases. As a result, if our project is commercialized, it will help save the truck driver's life and the owner's money.

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