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Review Article

Automatic Drowsy Driver Recognizer System Using Machine Learning Model

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Abstract

Drivers who do not take periodic rest while long driving process a more chances of becoming drowsy, a condition in which they sometimes are unable to identify soon enough the danger. Research found that nearly twenty five percent (25%) of all severe motor way mishap occur due to inactive drivers in need of a break, which means that drowsiness, is responsible for high number of accidents as compared to drink driving. Alert help can notify of sleepiness in situation of risky speed and alert driver about their present condition of tiredness, provide convertible reactivity and if a warning come forth, signaling the local useful points in the portal.

Keywords: Alert; Drowsiness; Drowsy; Portal; Sleepiness

Introduction

Drowsiness of driver observation is the vehicle security system fending off caution while driver become sleepy many researchers concluded that yearly 20% of the motor casualties are due to drowsiness up to 50% on conclusive roads. Driver sleepiness is a particular element of many car accidents present statistics found that yearly 1200 deaths and 76000 injuries are due to sleepiness causing accidents. The advanced automation for alerting drowsiness at the steering is a main dispute in area of accident preventing portals.

Due to the threat that sleepiness presence on highways, ways required to be advance for defending its impact.

Driver sleepiness and non-awareness to the cause of lack of alertness which leads to drowsiness in drivers.

Driver diversion happens when anything leads them away from controlling the steering.

Unlike driver diversion, driver sleepiness no immediate incident but is distinguish by an increasing distraction from road and traffic rules. Both the factors lead same impact i.e., reducing driving task, late responding time and a higher chance of causing accidents. Depending on streaming if video of the front camera gives a live streaming of incoming video to alert the driver's stage of sleepiness is observed then data is transferred for alarm portal.

Factors Causing Driving: Drowsiness Mostly driver feel tiredness because of some major causes, such as not sleep properly, work burden, lack of physical activities. Sometimes people work more in a day and they get tired and did not sleep properly. Sometimes people take tea, coffee or green tea to the stay awake and for the refreshment.

Report on road accidents in India

Related study

Different approaches for drowsiness of driver detection can be categorized into 4 main levels i.e. vehicle base measures, driver behavioral measures, physiological measures and subjective measures.

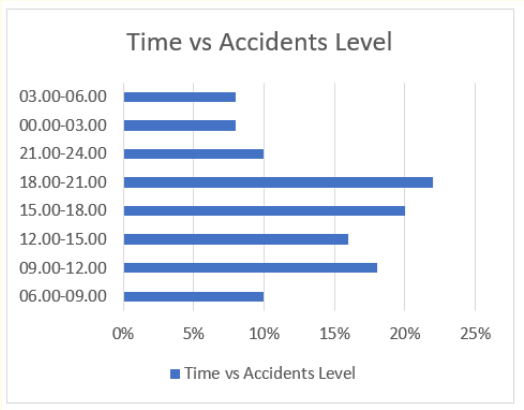

Figure 1: Time of occurrence of accidents in 2015 Survey report (% share of the total Accidents).

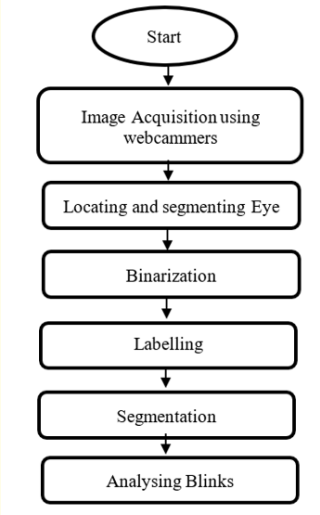

Figure 2: Working flow diagram for the drowsy driver detection.

Vehicle based measures

These measures provide driving performance assessment by analyzing the way driver control a vehicle and their capabilities. But the limitation is, standard deviation of lateral position typically occurs only during the later stages of drowsiness.

Driver behavioral measures

This measure basically focused on driver's ability to concentrate on driving obtained through behavior (e.g., yawning, facial expressions, eye blinking duration/frequency etc.). These measures have not been found to be reliable for drowsiness detection.

Physiological measures

Physiological signals provide an accurate measure on how much is the degree of drowsiness due to fatigue of driver.

Subjective measures

In these measures, drivers themselves estimate their sleepiness level. Commonly used sleepiness scales are (KSS), Stanford Scale. But there is a infeasibility of implementation in real world due to subjective nature.

Discovery

Different approaches have been proposed by several authors for Drowsiness Detection System. Vehicle Based approaches have been used by many of them. To audit the lack of attraction paid by vehicle drivers while driving during day and night conditions, there is a substantial real time embedded platform. In this paper, there is the presentation of a drowsiness detection system which involves the usage of both brain and visual activity. The activity of brain is observed by using a single electroencephalogram (EEG) channel. There are two different methods to monitor the driver safety which involve the analysis of information related to exertion, which are bio signal processing and eye movement monitoring. There is also a Support Vector Machine (SVM) which performs the classification of sequence of segments of video into alert driving events. This scheme promises to be highly accurate. The main aim of this paper is to amplify the information related to drowsiness with the help of electrocardiogram (ECG), Electroencephalogram (EEG) and electrooculogram (EOG).

Six measures are calculated with percentage of blink frequency, opening velocity of eyes, closing velocity of eyes, eyelid closure, average opening level of eyes, and maximum closure duration.

Drowsy driver detection techniques

According to research many technologies are there which can detect driver fatigue. First one is via means of using camera that can monitor driver facial expression such as pupil, mouth yawing, head position etc. Another one is voice recognition vocal vibration of person are different when he is fatigue.

The following techniques are widely used to detect drowsy nature are:

- EEG (Electroencephalogram)
- Detection using various optics
- By tracking the steering wheel
- LBP

EEG (Electroencephalogram)

EEG is the technology used very widely used worldwide.

During different stages of Drowsiness, Heart rate (HP) variate accordingly. Therefore, heart rate determined using such technique is very useful.

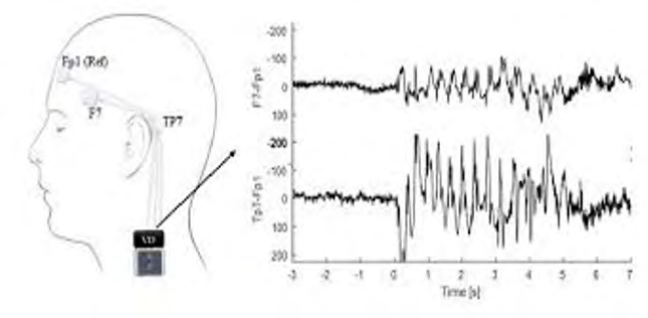

Figure 3: Heart ECG Calculation for the drowsy driver detection
LF -- if frequency is between 0.04 - 0.15 Hz
HF -- if frequencies.

The EEG uses physiological signal to detect tiredness. It comprises of various range of frequencies band which are as follows:

- Delta (0.6 - 4Hz) shows sleep activity.
- Theta (5 - 8Hz) corresponds to drowsiness.
- Alpha band (8 - 13Hz) corresponds relaxation.
- Beta (12 - 25Hz) corresponding to activeness.

Values variation between Alpha frequency and Beta frequency indicate drowsiness.

LBP (Local Binary Pattern)

In the field of image processing and computer vision, there is an increase interest because of LBPs. LBP is a non-parametric method, which summarizes local structure of images by using comparison of each pixel with the pixel in its neighborhood. With the help of LBP, we can detect emotions on face of an individual like sorrow, happiness, excitement etc.

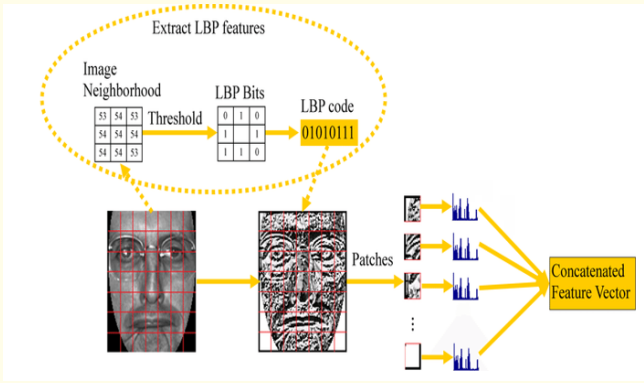

Figure 4: The algorithm based calculate the binary point to detect a person is drowsy stage or not.

SWM (Steering Wheel Movement)

Sometimes a blink during driving is worse, it can cause a lot of damage to other people as well as us by accident. To avoid this, we should have at least an assistant or a system which alarm us before any damage. However, we cannot always afford assistant for this little driving work. So, to alarm us before such accident, we have an alarming system. A system that can alarm us before any damage happen. This system is called (ADAS) Advanced Driving Assistant System. The ADAS system uses Steering Wheel Movement (SWM in short) which check the drowsiness of driver. Drivers have some sort of driving task (such as speed - curve, land width etc.), driver experience, and physical state. They judge the situation and for that they make some little changes into system to continue their journey.

Optical detection

Today's scenario, everyone wants to do their work on time. So, they try to make it with shortest way. If we are talking about transportation, modern technology helps us to make it possible but at what cost. Make people meet road accident due to, lack to drowsy, unconsciousness, lack of sleep etc.

To overcome this issue, I think Optical detection is a better step to cure these problems. When we drive vehicles on the road, performance of the technique. We can use the infrared for

helping the drivers that can be useful for the person to detect the drowsiness to detect the drowsiness, yawning etc. By this application of modern technology, we can spread the awareness and protect the many lives.

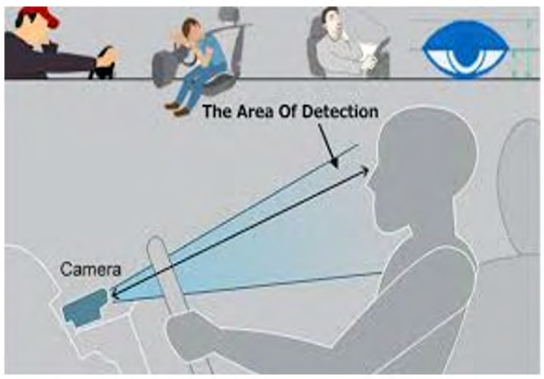

Figure 5: The system which is fixed with the car for allotting system to monitoring for a future system.

Yawning based technique

Driven Drowsiness can be detected by using yawning-based techniques. For this we have to follow several steps such as actual beat of observation, follow the pilot profile, observation along with follow of face contain and at last observation of deep found on measurements of charge along with the quantity of exchange the jaw shape region. Here, purpose connive corp. has developed APEXTM automotive smart camera.

Yawning discovery is acted in two principles ventures: in the initial step, we recognize the yawn segment in the face free of the mouth area. This segment is essentially the opening in the mouth as the aftereffect of a wide mouth opening. In the subsequent advance, we will utilize the mouth area to check the legitimacy of the recognized segment. After skin division, the biggest opening situated inside the face is chosen as the possibility for a yawning mouth. This opening is really identified with a non-skin region inside the face that can be identified with eyes, mouth, or open mouth. It very well may be accepted that the open mouth will be the biggest of the three of a yawning state. Along these lines, a contender for a yawning mouth is found. We will at that point utilize the data from the identified mouth to check the distinguished yawning mouth. The versification rule is the number of pixels situated in the yawning mouth concerning the number of mouth pixels just as the general area of the open mouth for the lips.

Proposed algorithms

Viola jones

It is one the most accurate and well-known algorithm for detection works. We can understand this by the following architecture about how it works.

Some of the Characteristics of this algo are:

- Robust
- Real Time
- Face Detection (Not identity detection)

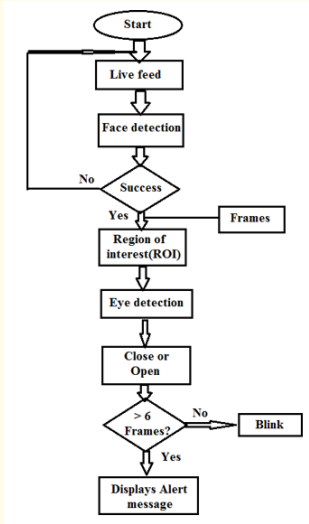

Figure 6: The work control for a proposed method.

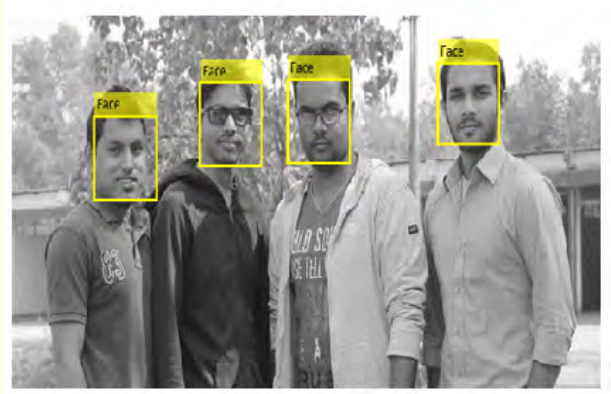

Figure 7: Sample output to detect the coding with tested the image in the image based and got an accuracy.

Accuracy tracker and testing

After running all the codes successfully, we keep a track on what is the accuracy percentage of the system, thus we created a confusion matrix to detect the closed eye and opened eye percentage and in the end is shows the overall accuracy of the system. The purpose of this matrix is to just maintain the integrity of this software and to provide the end user the most detailed and accurate data to that he or she can get best possible outcomes.

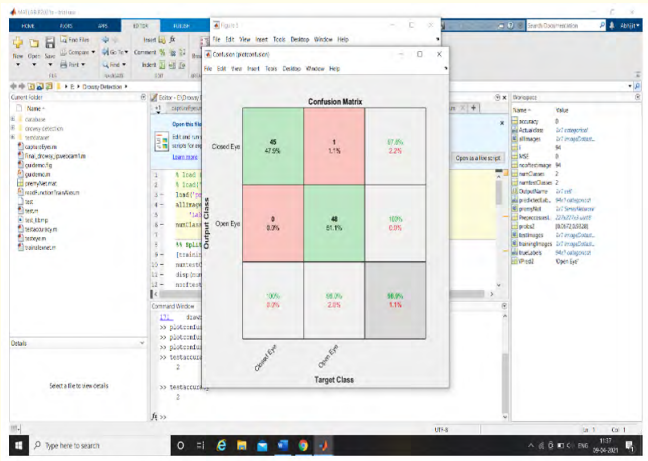

Figure 8: This table shows the performance of the testing confusion matrix.

An Implement and test your algorithms easily with Develop the computational codes easily and Debug in less time with fast. Use a large database of built-in algorithms. Process still images and create simulation videos easily. Symbolic computation can be easily done. Call external libraries. Perform extensive data analysis and visualization.

We were able to understand various ways the aim paper is used into drowsiness will find and give alert the person and reduce the accidents. Our group achieved the desired model using MATLAB software.

Input	Eye detection (open) %	Eye detection (closed) %	Drowsy detection %
Sample 1	99%	99.4%	99.8%
Sample 2	98.2%	100%	100%
Sample 3	98.4%	98.2%	98.2%
Sample 4	100%	99%	100%

Table 1: Eye detection possibility based on the drowsy detection.

Conclusion

As we are all aware of the existing technologies for detecting driver's fatigue while driving. Here, we are trying to find out a better and accurate technology to prevent the chance of road tragedies. In present scenario, many automobile companies providing this type of facilities in their vehicles but they are nothing more than to detect driver's head angle tilt. These types of product are limited in the market and also not much effective to prevent the cause. Companies like BMW and Tesla have much better detection of driver's fatigue technology in their high-end products but fails to give warning on time. Today's market and technologies is in its developing stage or we can say these techniques are new to market and will take time to be in perfection mode. New technologies are regularly developing by using various techniques.

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