

Driver Fatigue Detection and Visual Awareness Application

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Abstract: Accidents are a censorious disease suffered by this society, Although the swamping rise of the vehicular industry has become a boon for the human livelihood, the industry also bought many factors of physical disruption. The factors for these disruptions are as follows Driver's incapability of surrounding awareness, Driver's Drowsiness, Safety measures produced by the manufacturer. The study examines the driver's state of consciousness and it gradually decreases the response time to either avoid the risk or mitigate it. The vehicle might not be in a place to identify the driver's expressions which becomes harder in conditions favorable to have an accident. The main aim of this research is to create an application which will predict when the user is subjective to fatigue and let's the manufacturers to add features which can prevent human made discrepancies such as accidents.

Keywords: Data acquisition, face landmark marking, image processing, data science, machine learning.

1. Introduction

Applications have become common in human's daily consumption of internet, Moreover, with the invention of smart phones this usage has grown to greater lengths, these are tools which are created to decrease human's every day or newly invented tasks which grow the scope of savings in terms of time dissipation.

Although, applications have such great usage, they have not been implemented correctly with regards to safety in the vehicular sector, as we see many unwanted and preventable accidents. As many accidents will take place from the driver's side, though the companies invested much into safety perspective, it is not being sufficient in stopping this unwanted damage to life and property.

Drowsy driving is one of the major causes of deaths occurring in road accidents. The truck drivers who drive for continuous long hours (especially at night), bus drivers of long-distance route or overnight buses are more susceptible to this problem. Driver drowsiness is an overcast nightmare to passengers in every country. Every year, a large number of injuries and deaths occur due to fatigue related road accidents. Hence, detection of driver's fatigue and its indication is an

active area of research due to its immense practical applicability. The basic drowsiness detection system has three blocks/modules: acquisition system, processing system and warning system. Here, the video of the driver's frontal face is captured in acquisition system and transferred to the processing block where it is processed online to detect drowsiness. If drowsiness is detected, a warning or alarm is sent to the driver from the warning system.

The application will allow the manufacturers to collect data based on the driver movements, responses and prepare a dataset which can be further optimized using complex data science and machine learning algorithm to find when the driver is attentive and when there is a need for precaution to be taken to make sure there almost low risk.

2. Related Work

A. Cases of Expertise

Generally, the methods to detect drowsy drivers are classified in three types; vehicle based, behavioral based and physiological based. In vehicle-based method, a number of metrics like steering wheel movement, accelerator or brake pattern, vehicle speed, lateral acceleration, deviations from lane position etc. are monitored continuously. Detection of any abnormal change in these values is considered as driver drowsiness. This is a nonintrusive measurement as the sensors are not attached on the driver. In behavioral based method, the visual behavior of the driver i.e., eye blinking, eye closing, yawn, head bending etc. are analyzed to detect drowsiness. This is also nonintrusive measurement as simple camera is used to detect these features. In physiological based method, the physiological signals like Electrocardiogram (ECG), Electrooculogram (EOG), Electroencephalogram (EEG), heartbeat, pulse rate etc. are monitored and from these metrics,

drowsiness or fatigue level is detected. This is intrusive measurement as the sensors are attached to the device which holds the application which will be used to track the driver's movements and predict when the right time is to perform an operation which will move them away from danger.

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B. Camera and Application

If you have a sub subsection. In this project, we place an infrared camera-based system to detect the driver's fatigue from the face image using image processing and machine learning techniques. This is to make the system cost-efficient as well as portable. The frames are extracted from the camera to obtain 2D images from the facial landmarks. Eye aspect ratio, mouth opening ratio and position of the head are analyzed and by machine learning approach, a decision is obtained about the drowsiness of the driver. All of these after being calculated give values accordingly which are stored in a dataset and fed to the machine learning algorithm so the application understands whether if drowsiness is present and if it is detected, an alarm will be sent to the driver to alert him or her.

1) Alerting System

The alert system we use here is based on the values produced by the algorithm, As the intensity and severity of the case are evaluated, we can now make the adjustment. Based on the psychoanalysis we can understand that the more we can control the mind the more it gets addicted to listen, Keeping the value in hand which are calculated with Machine Learning.

This system allows the application to use various ways to alert, these are as follows

- Ringing an alarm inside the vehicle or the helmet
- Motion sensing and vibrating the chair or seat.

When the situation is out of application's capability of making the human alert, then it goes into safety mode which allows the vehicle to turn on GPS and navigate to nearest place of safety for rest, until the human is conscious again.

3. Existing System

The existing drowsiness detection system forces the user or alerts the user every few minutes to catch the handle or a vehicle which we drive, but as we can see accidents can take place in seconds. This method is not only prevaricated but also misleading, as the primary focus of a vehicle must be to reach a destination early and safely. The existing system also has setbacks as creating autonomous driving vehicles without even making a good progress in understanding the human mind and

state of responding towards situations.

4. Proposed System

The proposed system allows the manufacturer to make adjustments to their vehicle which care more about the people travelling inside it and makes sure that with the help of the trained and applied application it will be able to guess

- Driver's fatigue based on the matching pattern.
- Alerts the driver with the support from available devices
- Halts the vehicle if there's no response from the driver for a period of time
- Uses GPS to stop the vehicle in a safe place.

5. Future Scope and Conclusion

Keeping in mind that making a stupendous impact on decreasing the risk by making minuscule but well defined changes to the already present system, this will lead to great developments in future, it might help give birth to flying cars, as now there is not much risk of staying on the road the next place for human's imagination will be above us, same as the next place human wants to visit after the moon is mars.

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