Driver drowsiness detection system using machine learning

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ABSTRACT

This feature is used for the safety of the peoples from the accidents. This work shows the development of ADAS (advance driving assistance system) this focus on the driver drowsiness detection is main aim to alert the driver from the drowsiness state to avoid road accidents. In this we use the Machine Learning to predict the condition and emotions of the driver that will improve the safety on the roads. We use the CNN for this project that will effectively detect the driver fatigue status using driver images. In this project we can use the Electrocardiogram (ECG) for the psychological system to detect drowsiness. Artificial Intelligence means system can automatically learns as well as improve without being programmed. We also use the various machine learning techniques like OpenCv, Keras, tensorflow.

Keywords

Artificial Intelligence, Machine Learning, CNN, Driver drowsiness, etc,

1. INTRODUCTION

Drowsiness Detection System is used for the safety of the driver when due to lack of rest or continuous driving driver is sleepy that he need to rest so the driver eyes are blinked for more than 500ms. Continuous fatigue can level of performance that can similarly cause by the beer wine etc. While driver having this type of symptoms and he continuously driver so this is very dangerous for him as well as for others this can cause driver can hit the car on the other car or he will jump the car on other lanes and he may also brake the so many traffic rules causing serious accidents.

For this project our aim is following, we have a camera mounted on a vehicle will record front images of the driver, which will be identify using Artificial Intelligence (AI) technique such as deep learning that will tell us that driver is drowsy or not. With the help of the camera the system will aware the driver and fend off the accidents. In this ADAS is used for avoid the false alarm that distract the driver and cause him to off the ADAS. ADAS in this the driver set the speed and according to that the vehicle can run. So many research speed deficiency can influence driving as much as alcohol inberiation.

Research shows in India so many accidents crashes due to driver drowsy. Deep Learning Algorithm are defined by the use of neural network whose module and built massive amount of layers. Among the neural network there is Deep Neural Network called Convolutional Neural Network (CNN).

with open eyes and the second dataset images is closed eyes so

after train the machine according to that datasets machine will learn and react according to that. If the eyes are closed alarm will start and open so the fatigue level is 0. This paper focuses on developing non- intrusive system which can detect a fatigue issue a warning on time. Recent research states that annually 1400 deaths and 79,000 injuries can be caused to fatigue related crashes. The main goal of this paper is to develop a framework drowsiness detection system. The CNN have a great impact of computer because CNN easily find the patterns of the images and easily identify the expressions. It is based on the CNN which being easily recording the driver steering behaviour from the moment trip starts. After that it can identify the changes after the long trip and also driver level of fatigue. Now big companies like Audi, Volvo currently offer drowsiness detection system that observe the car movement such as steering wheel angle lane deviation etc. Using the deep learning libraries we can find the eye moment of the driver, eye closure, head position and rate of yawning.

2. BACKGROUND

This advanced system is the real time system. It can use image clarifying for eye and face detection. To identifying the level of the drowsiness of the driver we have to focus on both vehicle as well as driver. Firstly we have to focus on the vehicle that is the angle of the steering wheel behaviours and lane departures. Vehicle is in the right lane or not or the vehicle is not zigzag Sometimes the driver is skilled so after in fatigue condition driver is drive perfectly so in that time we don't focus on vehicle now we have to focused on the driver. After focused on vehicle there is driver most easiest way to find the driver's fatigue level by using Electrocardiogram (ECG) but in real time environment this technology is reject by the driver. Usually the main problem with the ECG is the wire of the electrodes are attached to the driver's head and eye and it cause irritation for the driver. To resolve this problem we can use the driver drowsiness system there is only a camera placed on the dashboard and taking the images of the driver if the driver's eyes are blinked more than 500ms so the alarm will start so compare to ecg there is no electrode around eyes and head and it is most accurate system. Among works that combine so many logics and to detect fatigue a system is observe the mouth and eye of the driver if the driver is yawning more so system is checking the driver id fatigue or not and the system detect drowsiness over the so many frames so it raises the alarm. Camera is observed the head position of the driver eye blinked and the yawning if more than normal then the alarm will raised. The main goal of our project work is to activate an alarm when the system detects that the driver is drowsy, which means that the alarm activation module follow the 0 and 1 module means binary module its on/off depending on the fatigue level of the driver. Because of this we use the dataset on that dataset we have two set one have the people.

2.3 Software Requirement

a. Python:

***** Python 3

b. Libraries

***** Numpy
***** Scipy
***** Playsound
***** Dilib
***** opencv etc

3.3 Operating System

* Windows

main focus will be that we can designing a system that accurately record the open or close eye of the driver in the real time and inform the driver through the alarm if the eye is closed.

2.1 System Review

This research is done to comprehended the need and perquisite of the general population, and to do as such we went through different sites and software and look for the fundamental dataset. With the help of these dataset the machine will learn how to help the driver through the different arrangements of the tasks. End of the discussion we went to the result that how this project is important this project can stop the accidents that can happen due to the sleepy driver so this project can reduce the road accidents.

2.2 Technology Used

a. Python: Python is a computer programming language often used to build websites and software, conduct data analysis etc. Python is a general purpose language which means it can be used to create a variety of different programs and is not specialized for any specific problem.

That's because the language emphasizes readability and makes coding very easy. Python is also the fastest growing programming language. Its high level interpreted and object oriented architecture.

b. JupyterLab: Jupyterlab is the latest web based interactive development environment for notebooks, code and data. Its flexible interface allow user to configure and arrange workflows in data science, scientific computer and machine learning.

c. Image Processing: Image processing is a method to perform some operation on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be some image or any other feature related to the image.

d. Machine Learning: Machine Learning is the field study that gives computer the capability to learn without explicitly programmed. ML is one of the most exciting -logy that one would have ever come across. As it is noticed from the name, it gives the machine that makes it more similar to humans: The ability to learn. Machine learning is actively being used today, perhaps in many more places that one would expect.

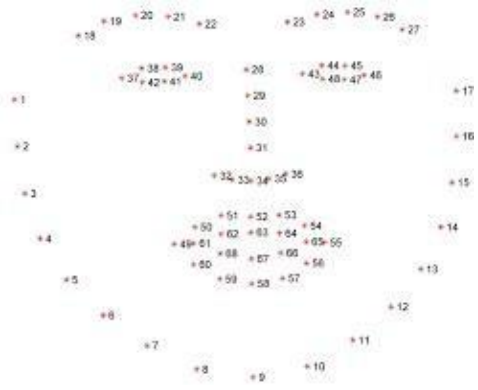

Fig.1

2.4 Hardware Requirement

*****Laptop with basic hardware.
* Webcam

2.5 Requirement Analysis

Python: It is the basic of the program that we wrote.
Libraries:
*Numpy

3. Materials and Methods

Now we can discuss about the different aspects of detection and different methods used for this project. Simply in this project we can discuss about:

Car based:

In this we have different mechanical parts of the car like steering, wheel moment, speed of the car, deviation of the lane position, etc. All the parts are observed by the software continuously and if their is any problem like car movement is not proper so the result is driver is in drowsy state.

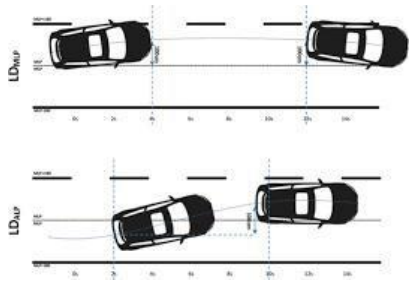

Fig.2

Fig.3

Behavioural Based:

In this we have different angles of the driver face head angle, yawning, eye blinking etc. All these parts are continuously observed by the camera if any symptom.

Fig.4

4. Result:

In order to provide a solution to the problem of detecting the state of drowsiness, an arithmetic based method is used [2]. This system uses eye movement in order to detect fatigue. Eye movement is detected using a camera. This is done to recognize the symptoms of fatigue in order to avoid accidents. [6]. It is based on the concept of eye-tracking. In order to obtain finer results, a hundred and fifty images of different people have been used. If the state of fatigue has been identified, an alarm system is turned on [9]. Computer vision with embedded systems are used. A software algorithm is developed.

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