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Drowsiness Detection and Warning System Using Python

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Abstract

Now-a-days, road accidents have become one of the major issue. The major road accidents are caused due to drowsiness, drunken and rash driving. This is the reason, every year the number of road accidents is increasing especially by cars. Due to drowsiness, drivers become less active while driving. This paper represents to build a system for Drowsiness detection and Warning for automobile safety and accident prevention. We are using eye detection, drowsiness detection and eye blinking pattern detection with the help of machine vision-based concepts. In order to detect fatigue or drowsiness, webcamera has been used which points directly towards the driver's face and detects the eye movement of the driver.

Keywords: Drowsiness Detection and Warning System Using Python

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1. Introduction

Drivers fatigue causes maximum number of accidents. Drowsiness detection reduces the car accidents and increases the safety of driver. Various studies states that around 30-40% accidents occur due to drowsy driver. The development of technology allows introducing more advanced solutions in everyday life. This makes work less exhausting for employees, and also increases the work safety. Now a days vision-based systems are more popular and it is used in different application.

Detection of drowsiness involves an observation of a face, detection of eye position and the observation of eye blinking pattern. The analysis of face images is done by using a "shape predictor containing 68-face-landmarks". To detect fatigue, a webcam has been used which points directly towards driver face and detect eye movement. In this the project will focus on the blinking pattern of the eyes, which involves looking at the entire image of the face, and determining the position of the eyes, by a self-developed image processing algorithm. Once the position of the eyes is located, the system is designed to determine whether the eyes are opened or closed and detect drowsiness. If the eyes are closed for particular time period the alarm will play to alert the driver.

The development of technologies for detecting or preventing drowsiness at the wheel is a major challenge in the field of accident avoidance systems. Because of the hazard that drowsiness presents on the road, methods need to be developed for counteracting its affects. Driver inattention might be the result of a lack of alertness when driving due to driver drowsiness and distraction. Driver distraction occurs when an object or event draws a person's attention away from the driving task.

2. Literature survey

Driver Drowsiness Detection System and Techniques: According to the studies it has been observed that when the drivers continuously drive without taking a break they tend to run a high risk of becoming drowsy. Study shows that accidents occur due to sleepy drivers in need of a rest, which means that road accidents occurs more due to drowsiness rather than drink-driving. Attention assist can warn of inattentiveness and drowsiness in an extended speed range and notify drivers of their current state of fatigue and the driving time since the last break, offers adjustable sensitivity and, if a warning is emitted, indicates nearby service areas in the COMAND navigation system.

Implementation of the Driver Drowsiness Detection System: This paper is about making cars more intelligent and interactive which may notify or resist user under unacceptable conditions, they may provide critical information of real time situations to rescue or police or owner himself. Driver fatigue resulting from sleep disorders is an important factor in the increasing number of accidents on today's roads. In this paper, we describe a real-time safety prototype that controls the vehicle speed under driver fatigue. To advance a system to detect fatigue symptoms in drivers and control the speed of vehicle to avoid accidents is the purpose of such a mode. In this paper, we propose a driver drowsiness detection system in which sensor like eye blink sensor are used for detecting drowsiness of driver. If the driver is found to have sleep, buzzer will start buzzing and then turns the vehicle ignition off.

Driver Drowsiness Detection System: One of the major cause of traffic accident is Driver's drowsiness. It is a serious highway safety problem. If drivers could be warned before they became too drowsy to drive safely, some of these crashes could be prevented. In order to reliably detect the drowsiness, it depends on the presentation of timely warnings of drowsiness. To date, the effectiveness of drowsiness detection methods has been limited by their failure to consider individual differences. Based on the type of data used, drowsiness detection can be conveniently separated into the two categories of intrusive and non-intrusive methods. During the survey, non-intrusive methods detect drowsiness by measuring driving behavior and sometimes eye features, through which camera based detection system is the best method and so are useful for real world driving situations. This paper presents the review of existed drowsiness detection techniques that will be used in this system like Circular Hough Transform, FCM, and Lab Color Space etc.

Drowsiness Detection System Using MATLAB: As the survey done, driver fatigue is the major reason why half (50 %) of road accidents takes place. It is an interesting challenge in today's date to detect drowsiness in order prevent accidents. Various experiments have been done earlier with regard to the drowsiness detection of driver. In the past few years, many countries became curious to pay high attention towards driver's safety problems. Researchers have been making various efforts to invent techniques for the detection of drowsy driver such as monitoring of road and physiological techniques which requires the contact of electrode with our body such as chest, face making it an implantable method.

Detecting Driver Drowsiness Based on Sensors: Researchers have attempted to determine driver drowsiness using the following measures: (1) vehicle-based measures; (2) behavioral measures and (3) physiological measures. A detailed review on these measures will provide insight on the present systems, issues associated with them and the enhancements that need to be done to make a robust system. This paper reviews the three measures as to the sensors used and discuss the advantages and limitations of each. The various ways through which drowsiness has been experimentally manipulated is also discussed. It is concluded that by designing a hybrid drowsiness detection system that combines non-intrusive physiological measures with other measures one would accurately determine the drowsiness level of a driver. A number of road accidents might then be avoided if an alert is sent to a driver that is deemed drowsy.

3. Working

Drowsy Driver Detection System has been developed, using the intrusive machine vision based concepts. The system uses a web camera that points directly towards the driver's face and monitors the driver's eye movements in order to detect fatigue. In such a case when fatigue is detected, a warning signal is issued to alert the driver. The algorithm developed is different from any currently published papers, which was a primary objective of the project. The system deals with detecting eyes within the specific segment of the face. If these are not found for 20 consecutive frames, the system draws the conclusion that the driver is falling asleep.

In this project we have developed drowsiness detection system by using Python. The input video is captured by using webcam (camera) and then it will be extracted. The face and eye detection is done by using OpenCv with the help of 68-face-landmarks. By using the Euclidean eye aspect ratio we can get eye blinking ratio, it helps to detect either eyes are open or closed.

It will detect the face and eyes of the driver by using the given commands. Then it will detect whether the eyes of driver are open or close. If the eyes are closed more than given time interval it will warn the driver by playing the alarm or if eyes are open it will display message "eyes open" and then it will go to taking the video of driver and the process will go on.

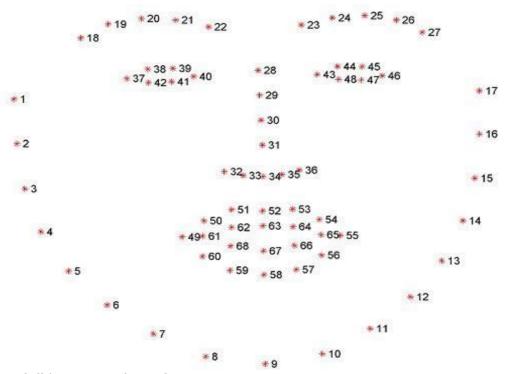


Fig.1 Har-cascade 68 face recognition shape predictor.

4. Requirements

4.1. Anaconda Software:

Anaconda is a free and open-source distribution of the Python and R programming languages for scientific computing (data science, machine learning applications, large-scale data processing, predictive analytics, etc.), that aims to simplify package management and deployment.

4.2. *Python* :

We have used pythons 3.6 version which support opency and dlib packages for face recognition. Python is an interpreted, general purpose programming language. It is easy to understand.

4.3. *OpenCV*:

It is a library of many programming functions which is mainly used for real time computer vision program.

4.4. Dlib:

It is used for creating more complex software and used to solve many real time based problems.

4.5. Webcam:

To detect face and eye movements.

4.6. Play sound:

If eyes are closed for more interval of time with the help of play sound application it will be able to play the alarm.

5.Flow chart

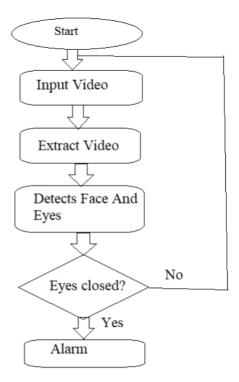


Fig.2 working process.

The working flow of our project is, when user run the project the webcam placed at the position where it can

see the directly the drivers face. User start the running the program, by using webcam the video is started. It then starts to extract the video. After that it will detect the face and eyes of the driver by using the given commands. Then it will detect whether the eyes of driver are open or close. If the eyes are closed more than given time interval it will warn the driver by playing the alarm or if eyes are open it will display message "eyes open" and then it will go to taking the video of driver and the process will go on.

6. Results

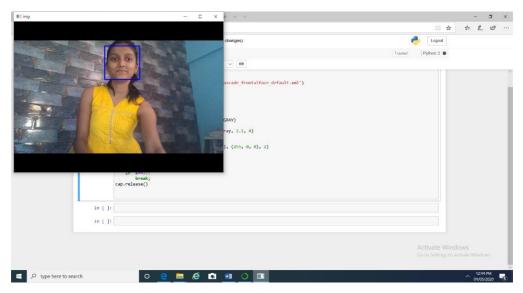


Fig.3 Face detection.

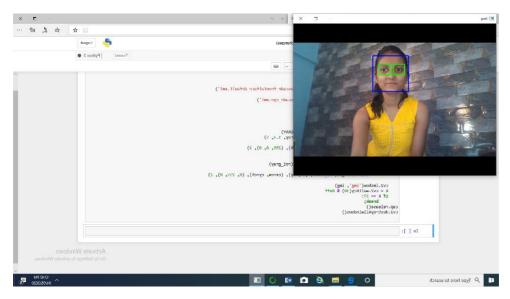


Fig. 4 Eye detection.

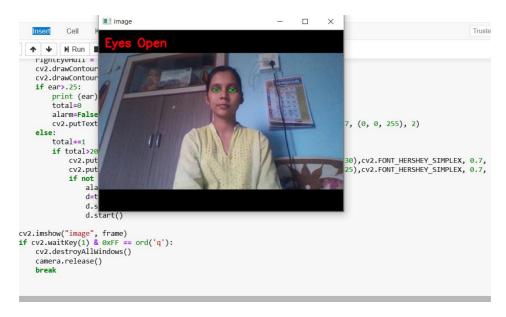


Fig. 5 Eye open/close detect.

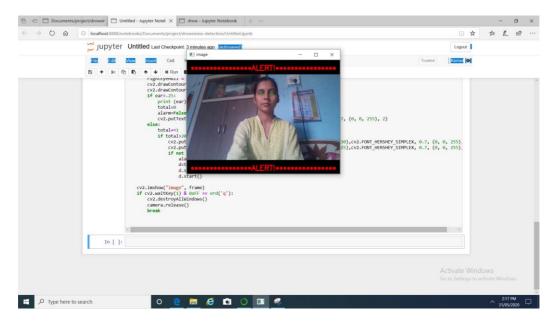


Fig. 6 Alarm will play.

Conclusion

In this way, we have implemented drowsiness detection and warning system using python. Whenever driver feels drowsiness the eyes will close more than given time interval the alarm will play. This project will help to prevent crashes/accidents caused due to drowsiness. In the real time drowsy driver identification using eye blink detection if the parameters exceed a certain limit warning signals can be mounted on the vehicle to warn the driver of drowsiness.

In this project it will detect drowsiness by observing the eye blinking pattern. With the help of Euclidean distance ratio i.e. eye blinking ratio it is easier to analyse the blinking ratio. It is more efficient technique than other system. It can be built at very chip cost. It gives more accurate result than the "drowsiness detection using MATLAB".

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