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DRIVER DROWSINESS DETECTION USING MACHINE LEARNING ALGORITHM

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Abstract

In this project by monitoring Visual Behavior of a driver with webcam and machine learning SVM (support vector machine) algorithm we are detecting drowsiness in a driver. This application will use inbuilt webcam to read pictures of a driver and then using OPENCV SVM algorithm extract facial features from the picture and then check whether driver in picture is blinking his eyes for consecutive 20 frames or yawning mouth then application will alert driver with drowsiness messages. We are using SVM pre-trained drowsiness model and then using Euclidean distance function we are continuously checking or predicting EYES and MOUTH distance closer to drowsiness, if distance is closer to drowsiness, then application will alert driver.

1. INTRODUCTION

With this intermediate-level Python project, we will be making a drowsiness detecting device. A countless number of people drive on the highway day and night. Taxi drivers, bus drivers, truck drivers and people traveling long-distance suffer from lack of sleep. Due to which it becomes very dangerous to drive when feeling sleepy. The majority of accidents happen due to the drowsiness of the driver. So, to prevent these accidents we will build a system using

Python, OpenCV, and Keras which will alert the driver when he feels sleepy. Drowsiness detection is a safety technology that can prevent accidents that are caused by drivers who fell asleep while driving. A new approach towards automobile safety and security with autonomous region primarily based automatic automotive system is projected during this conception. We have a tendency to propose 3 distinct however closely connected ideas viz. a VIDEO BASED ABNORMAL DRIVING BEHAVIOR DETECTION VIA DEEP LEARNING FUSIONS system and a traffic detection system with external vehicle intrusion dodging primarily based conception. In recent time's automobile fatigue connected crashes have very enlarged. so as to attenuate these problems, we've incorporated driver alert system by watching each the driver's eyes still as sensing still because the driver state of affairs based primarily based native setting recognition-based AI system is projected. Nowadays, more and more professions require long-term concentration. Drivers must keep a close eye on the road, so they can react to sudden events immediately. Driver fatigue often becomes a direct cause of many traffic accidents. Therefore, there is a need to develop the systems that will detect and notify a driver of her/him bad psychophysical condition, which could significantly reduce the number of fatigue-related car accidents. However, the development of such systems encounters many difficulties related to fast and proper recognition of a driver's fatigue symptoms. One of the technical possibilities to implement driver drowsiness detection systems is to use the vision-based approach. This article presents the currently used driver drowsiness detection systems. Here we are detecting the driver drowsiness by estimating vision system of him

1.2 Objective

The objective of this intermediate Python project is to build a drowsiness detection system that will detect that a person's eyes are closed for a few seconds. This system will alert the driver when drowsiness is detected.

1.3 Scope

The scope of the project is any system that has the modules and python installed. The trained model can be deployed as in itself post training and validation which can be integrated into any vehicle.

2. EXISTING DEPRESSION DETECTION METHODS

Most of the existing systems are either vehicle based , behavioral based or physiological based. When we look into vehicle based systems we have seat belts. When we don't wear the seat belts in all the vehicles which are manufactured recently we will get a beep sound which is not that irritating and which is restricted to some period of time . In such cases most of the drivers will neglect that and that will definitely lead to an accident.

Disadvantages:

So , in such cases when the alarm sound we are getting is less irritating and which gets stopped automatically after some point of time the probability of the accidents is very high. And also the existing driver drowsiness detection systems are less efficient. These are the main disadvantages of driver drowsiness detection system.

3. PROPOSED DEPRESSION DETECTION METHOD

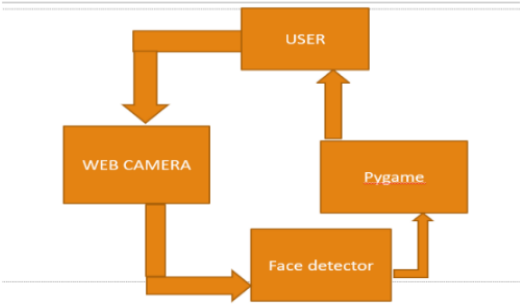
The proposed driver drowsiness detection system will detect the detect the drowsiness of the driver as soon as he feels sleepy and the alarm sound is very irritating and is continous. So , when that sound is irritating and is continuous the driver will definitely get irritated and will stop the car. Then he

has to take another modes of transportation until and unless the driver is not drowsy or there's another person with him/her who can driver and is not drowsy.

Advantages:

It uses SVM algorithm to classify. It is more efficient. The alarm sound will decrease the drowsiness of the driver.

4. SYSTEM ARCHITECTURE

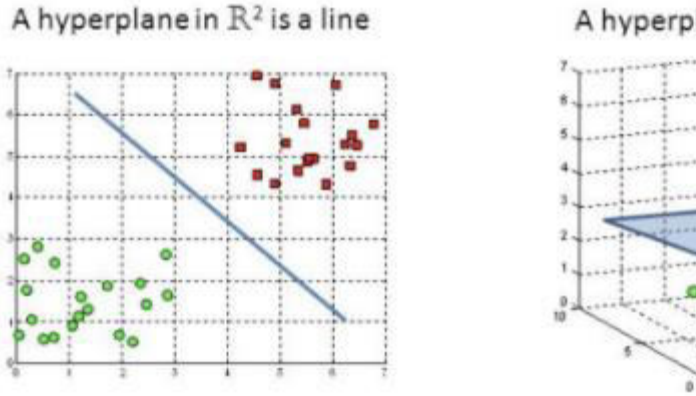


5. IMPLEMENTATION

5.1 Support Vector Machine

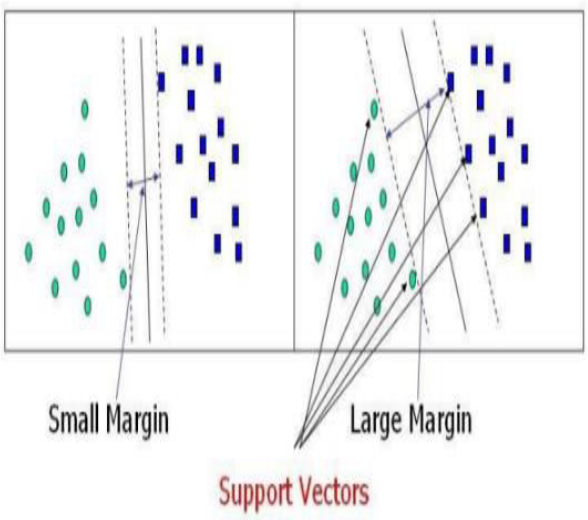
The objective of the support vector machine algorithm is to find a hyperplane in an N-dimensional space(N — the number of features) that distinctly classifies the data points. separate the two classes of data points, there are many possible hyperplanes that could be chosen. Our objective is to find a plane that has the maximum margin, i.e the maximum distance between data points of both classes. Maximizing the margin distance provides some reinforcement so that future data points can be classified with more confidence.

5.2 Hyperplanes and Support Vectors



Hyperplanes in 2D and 3D feature space

Hyperplanes are decision boundaries that help classify the data points. Data points falling on either side of the hyperplane can be attributed to different classes. Also, the dimension of the hyperplane depends upon the number of features. If the number of input features is 2, then the hyperplane is just a line. If the number of input features is 3, then the hyperplane becomes a two-dimensional plane. It becomes difficult to imagine when the number of features exceeds 3.



5.3 Support Vectors

Support vectors are data points that are closer to the hyperplane and influence the position and orientation of the hyperplane. Using these support vectors, we maximize the margin of the classifier. Deleting the support vectors will change the position of the hyperplane. These are the points that help us build our SVM.

(ii) Open cv

OpenCV (Open Source Computer Vision Library) is a library of programming functions mainly aimed at real-time computer vision. Originally developed by Intel, it was later supported by Willow Garage then Itseez (which was later acquired by Intel]). The library is cross-platform and free for use under the open-source BSD license.

OpenCV-Python is a library of Python bindings designed to solve computer vision problems. OpenCV-Python makes use of Numpy, which is a highly optimized library

for numerical operations with a MATLAB-style syntax. All the OpenCV array structures are converted to and from Numpy arrays. The main difference is that TensorFlow is a framework for machine learning, and OpenCV is a library for computer vision. You can do image recognition with TensorFlow. Though it is suited for more general problems as well, such as: classification, clustering and regression Officially launched in 1999 the OpenCV project was initially an Intel Research initiative to advance CPU-intensive applications, part of a series of projects including real-time ray tracing and 3D display walls. The main contributors to the project included a number of optimization experts in Intel Russia, as well as Intel's Performance Library Team. In the early days of OpenCV, the goals of the project were described] as:

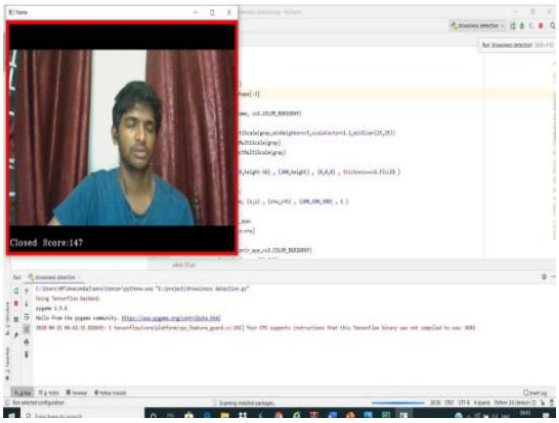
Advance vision research by providing not only open but also optimized code for basic vision infrastructure. No more reinventing the wheel. isseminate vision knowledge by providing a common infrastructure that developers could build on, so that code would be more readily readable and transferable. Advance vision-based commercial applications by making portable, performance- optimized code available for free – with a license that did not require code to be open or free itself.

The first alpha version of OpenCV was released to the public at the IEEE Conference on Computer Vision and PatternRecognition in 2000, and five betas were released between 2001 and 2005. The first 1.0 version was released in 2006. A version 1.1 "pre-release" was released in October 2008.

The second major release of the OpenCV was in October 2009. OpenCV 2 includes major changes to the C++ interface, aiming at easier, more type-safe patterns, new functions, and better implementations

for existing ones in terms of performance (especially on multi-core systems). Official releases now occur every six months and development is now done by an independent Russian team supported by commercial corporations.

6. OUTPUT SCREENS



7. CONCLUSION

This paper presented a machine learning model to detect driver drowsiness detection by classifying them as drowsy or not. Two types of classifiers were used and select the one with better performance. The algorithm SVM helps us in understanding that it has a significant impact in determining if driver is drowsy or not. So finally we conclude by saying that this machine learning model will detect drowsiness of the driver irrespective of low light conditions and also in an efficient manner.

8. FUTURE SCOPE

The trained model can be further used to detect harsh driving in any manually driven vehicle as it will be trained on wheel monitoring etc. Any driver inside the vehicle irrespective of low light can be classified as drowsy or not. This model can be deployed into any working application and can be integrated into any vehicle based application with proper care, implementation and fit to use. It also can be further integrated into any type of vehicle detecting drowsiness and reducing fatigue related accidents.

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[4] fatigue related accidents Prediction in by Aleksandar Čolić (Author), Oge Marques , Borko Furht