Driver Drowsiness Monitoring System using Visual Behaviour Using SVM

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ABSTRACT_ In this project by monitoring Visual Behaviour 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.

Keywords

Magnetic heads,Vehicles,Nose,Face,Ear,Mouth,Feature extraction

1.INTRODUCTION

Tired driving is one of the significant reasons for passings happening in street mishaps. The truck drivers who drive for nonstop extended periods of time (particularly around evening time), transport drivers of significant distance course or overnight transports are progressively vulnerable to this issue. Driver tiredness is a cloudy bad dream to travelers in each nation. Consistently, an enormous number of wounds and passings happen because of weariness related street mishaps. Consequently, location of driver's exhaustion and its sign is a functioning zone of research because of its huge useful relevance. The fundamental languor discovery framework has three squares/modules; obtaining framework, preparing framework and cautioning framework. Here, the video of the driver's frontal face is caught in obtaining framework and moved to the preparing square where it is handled online to distinguish languor. On the off chance that tiredness is distinguished, an admonition or caution is send to the driver from the notice framework. This is a nonintrusive estimation as the sensors are not connected on the driver. In social based technique [1-7], the visual conduct of the driver i.e., eye flickering, eye shutting, yawn, head twisting and so on are broke down to recognize laziness. This is additionally nonintrusive estimation as straightforward camera is utilized to identify these highlights. In physiological based technique [8,9], the physiological signs like

Electrocardiogram (ECG), Electooculogram (EOG), Electroencephalogram (EEG), heartbeat, beat rate and so forth are checked and from these measurements, tiredness or exhaustion level is recognized. This is meddlesome estimation as the sensors are connected on the driver which will divert the driver. Contingent upon the sensors utilized in the framework, framework cost just as size will increment. Nonetheless, incorporation of more parameters/highlights will build the exactness of the framework partly. These elements rouse us to build up a minimal effort, continuous driver's sluggishness identification framework with adequate precision. Consequently, we have proposed a webcam based framework to identify driver's weakness from the face picture just utilizing picture preparing and AI procedures to make the framework minimal effort just as convenient.

2.LITERATURE SURVEY

2.1 W. L. Ou, M. H. Shih, C. W. Chang, X. H. Yu, C. P. Fan, "Intelligent Video-Based Drowsy Driver Detection System under Various Illuminations and Embedded Software Implementation"

An intelligent video-based drowsy driver detection system, which is unaffected by various illuminations, is developed in this study. Even if a driver wears glasses, the proposed system detects the drowsy conditions effectively. By a near-infrared-ray (NIR) camera, the proposed system is divided into two cascaded computational procedures: the driver eyes detection and the drowsy driver detection. The average open/closed eyes detection rates without/with glasses are 94% and 78%, respectively, and the accuracy of the drowsy status detection is up to 91%. By implementing on the FPGA-based embedded platform, the processing speed with the 640×480 format video is up to 16 frames per second (fps) after software optimizations.

2.2 W. B. Horng, C. Y. Chen, Y. Chang, C. H. Fan, "Driver Fatigue Detection based on Eye Tracking and Dynamic Template Matching"

A vision-based real-time driver fatigue detection system is proposed for driving safely. The driver's face is located, from color images captured in a car, by using the characteristic of skin colors. Then, edge detection is used to locate the regions of eyes. In addition to being used as the dynamic templates for eye tracking in the next frame, the obtained eyes' images are also used for fatigue detection in order to generate some warning alarms for driving safety. The system is tested on a Pentium III 550 CPU with 128 MB RAM. The experiment results seem quite encouraging andpromising. The system can reach 20 frames per second for eye tracking, and the average correct rate for eye location and tracking can achieve 99.1% on four test videos. The correct rate for fatigue detection is l00%, but the average precision rate is 88.9% on the test videos.

2.3 S. Singh, N. P. Papanikolopoulos, "Monitoring Driver Fatigue using Facial Analysis Techniques"

In this paper, we describe a non-intrusive vision-based system for the detection of driver fatigue. The system uses a color video camera that points directly towards the driver's face and monitors the driver's eyes in order to detect micro-sleeps (short periods of sleep). The system deals with skin-color information in order to search for the face in the input space. After segmenting the pixels with skin like color, we perform blob processing in order to determine the exact position of the face. We reduce the search space by analyzing the horizontal gradient map of the face, taking into account the knowledge that eye regions in the face present a great change in the horizontal intensity gradient. In order to find and track the location of the pupil, we use gray scale model matching. We also use the same pattern recognition technique to determine whether the eye is open or closed. If the eyes remain closed for an abnormal period of time (5-6 sec), the system draws the conclusion that the person is falling asleep and issues a warning signal.

3.IMPLEMENTATION

3.1 Video Recording: Using this module we will connect application to webcam using OPENCV built-in function called VideoCapture.

3.2 Frame Extraction: Using this module we will grab frames from webcam and then extract each picture frame by frame and convert image into 2 dimensional array.

3.3 Face Detection & Facial Landmark Detection: Using SVM algorithm we will detect faces from images and then extract facial expression from the frames.

3.4 Detection: Using this module we will detect eyes and mouth from the face

3.5 Calculate: Using this module we will calculate distance with Euclidean Distance formula to check whether given face distance closer to eye blinks or yawning, if eyes blink for 20 frames continuously and mouth open as yawn then it will alert driver.

3.6 Face Detection Using OpenCV

This seems complex at first but it is very easy. Let me walk you through the entire process and you will feel the same.

Step 1: Considering our prerequisites, we will require an image, to begin with. Later we need to create a cascade classifier which will eventually give us the features of the face.

Step 2: This step involves making use of OpenCV which will read the image and the features file. So at this point, there are NumPy arrays at the primary data points.

All we need to do is to search for the row and column values of the face NumPy N dimensional array. This is the array with the face rectangle coordinates.

Step 3: This final step involves displaying the image with the rectangular face box.

4. SVM DESCRIPTION

Machine learning involves predicting and classifying data and to do so we employ various machine learning algorithms according to the dataset. SVM or Support Vector Machine is a linear model for classification and regression problems. It can solve linear and non-linear problems and work well for many practical problems. The idea of SVM is simple: The algorithm creates a line or a hyperplane which separates the data into classes. In machine learning, the radial basis function kernel, or RBF kernel, is a popular kernel function used in various kernelized learning algorithms. In particular, it is commonly used in support vector machine classification. As a simple example, for a classification task with only two features (like the image above), you can think of a hyperplane as a line that linearly separates and classifies a set of data.

Intuitively, the further from the hyperplane our data points lie, the more confident we are that they have been correctly classified. We therefore want our data points to be as far away from the hyperplane as possible, while still being on the correct side of it.

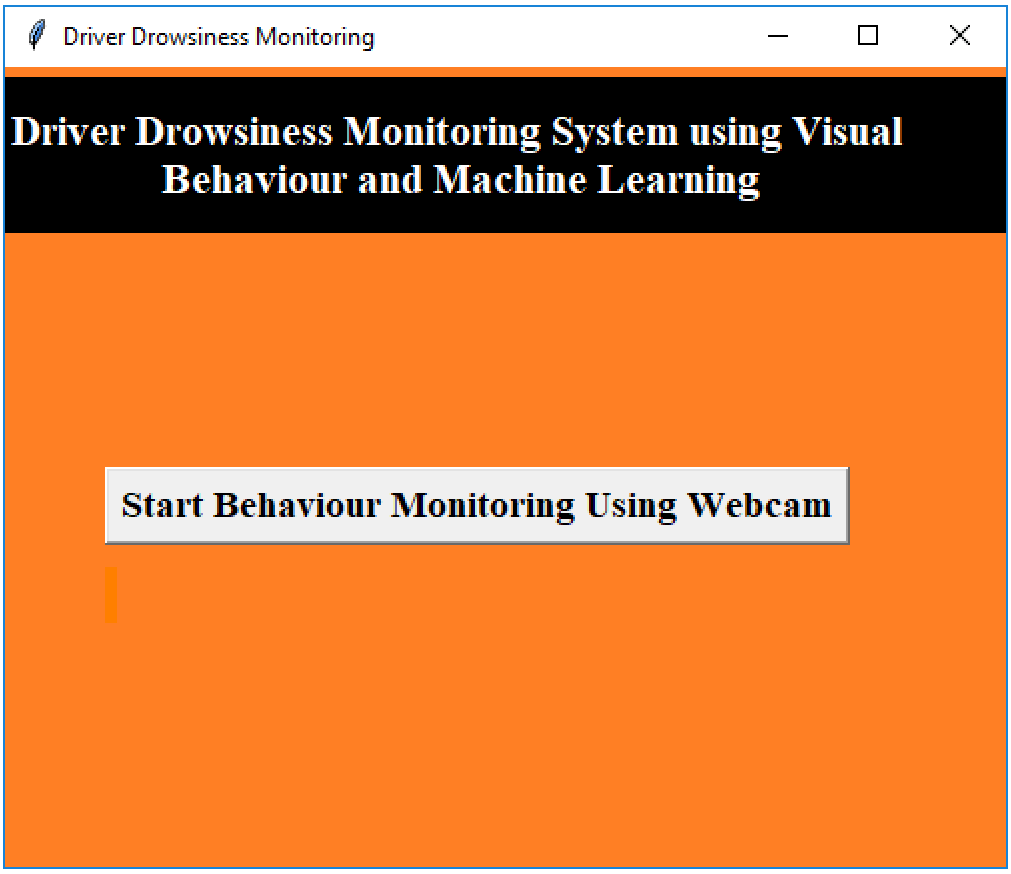
So when new testing data is added, whatever side of the hyperplane it lands will decide the class that we assign to it.

How do we find the right hyperplane?

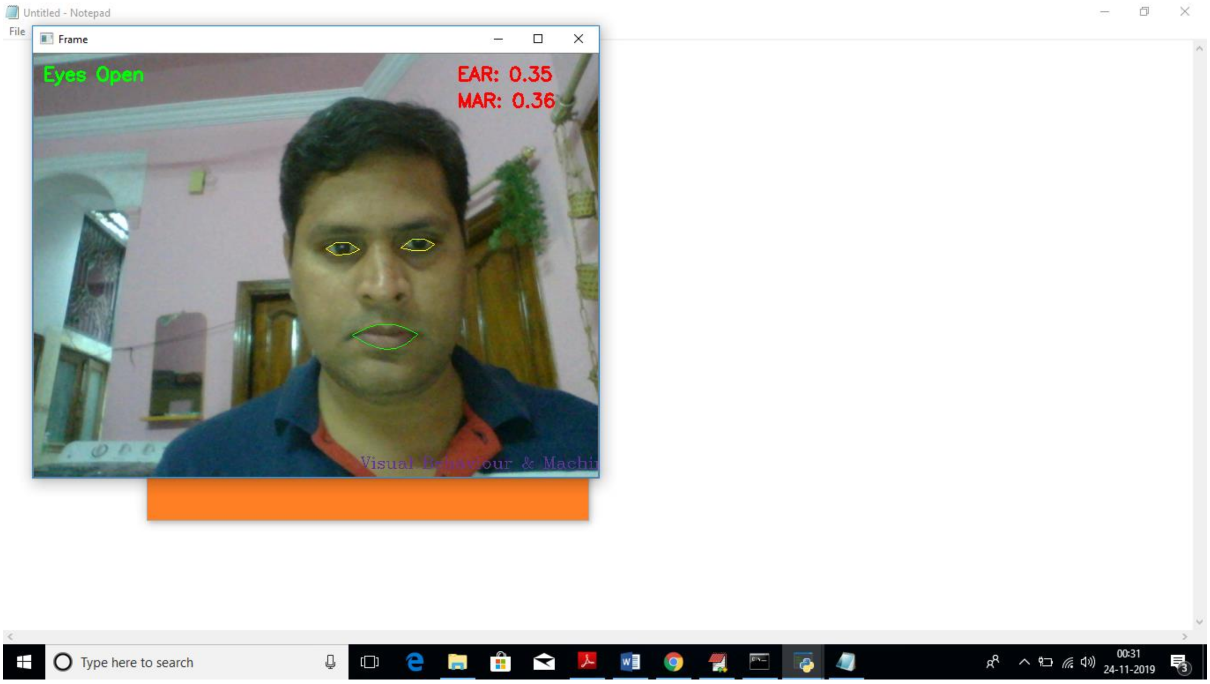
Or, in other words, how do we best segregate the two classes within the data?

The distance between the hyperplane and the nearest data point from either set is known as the margin. The goal is to choose a hyperplane with the greatest possible margin between the hyperplane and any point within the training set, giving a greater chance of new data being classified correctly.

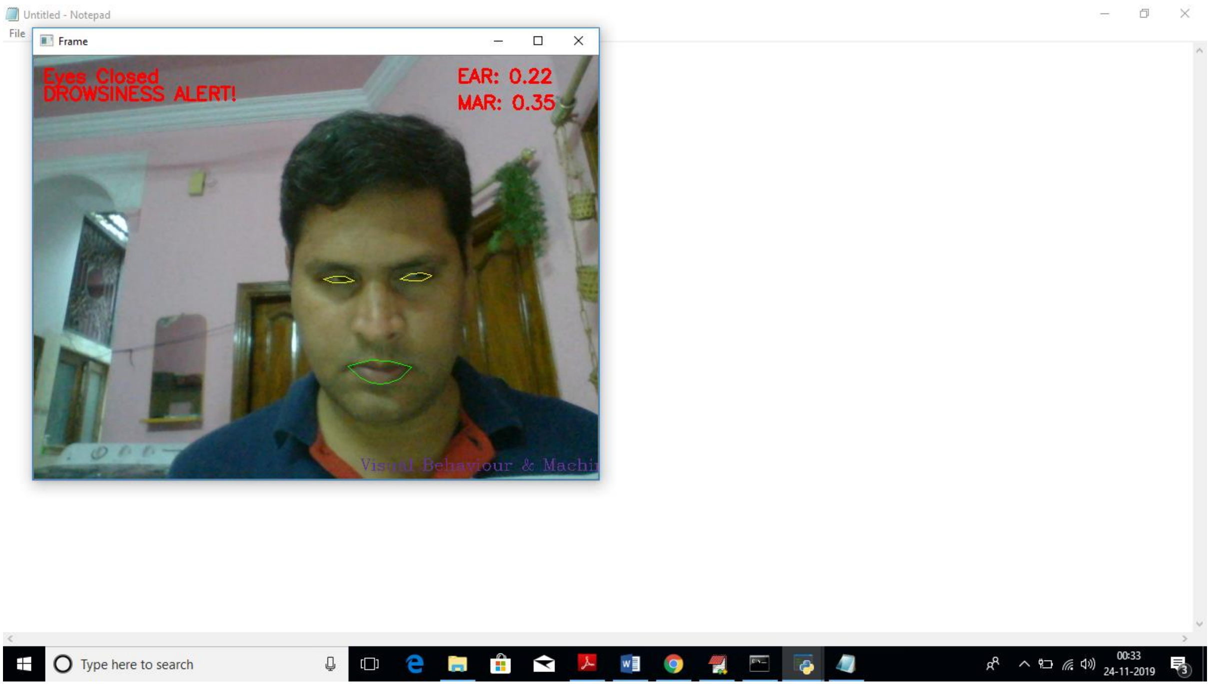
5.RESULTS AND DISCUSSIONS



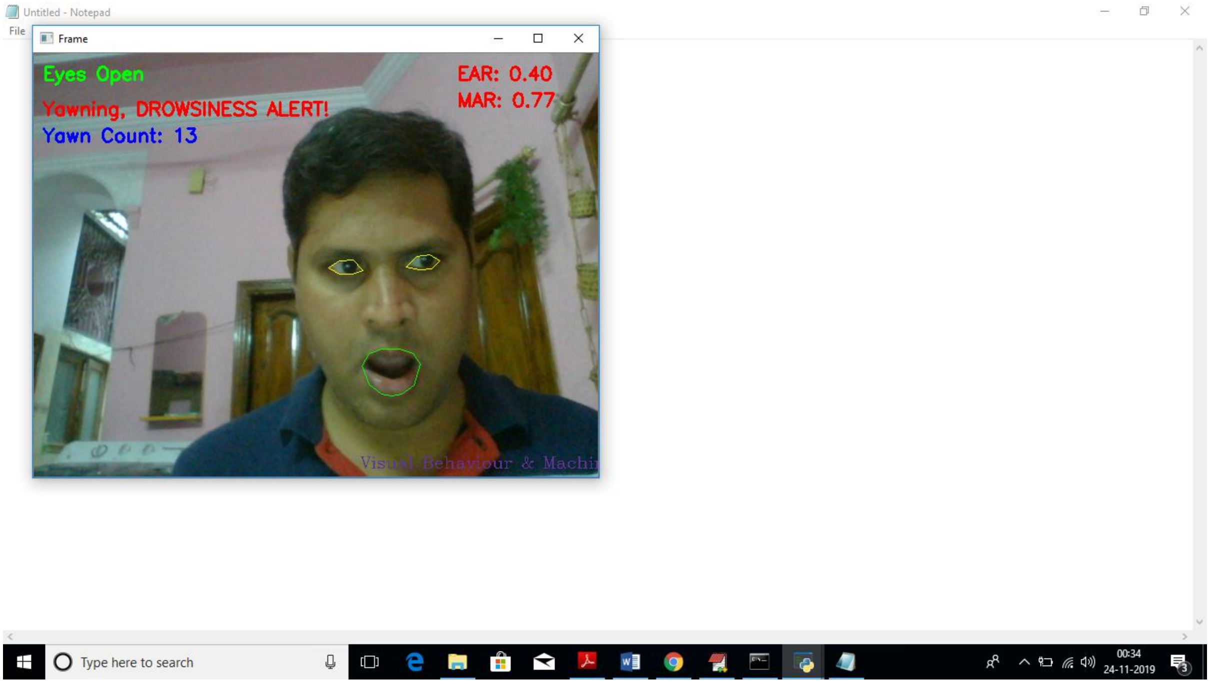
5.1 In above screen click on 'Start Behaviour Monitoring Using Webcam' button to connect application with webcam, after clicking button will get below screen with webcam streaming



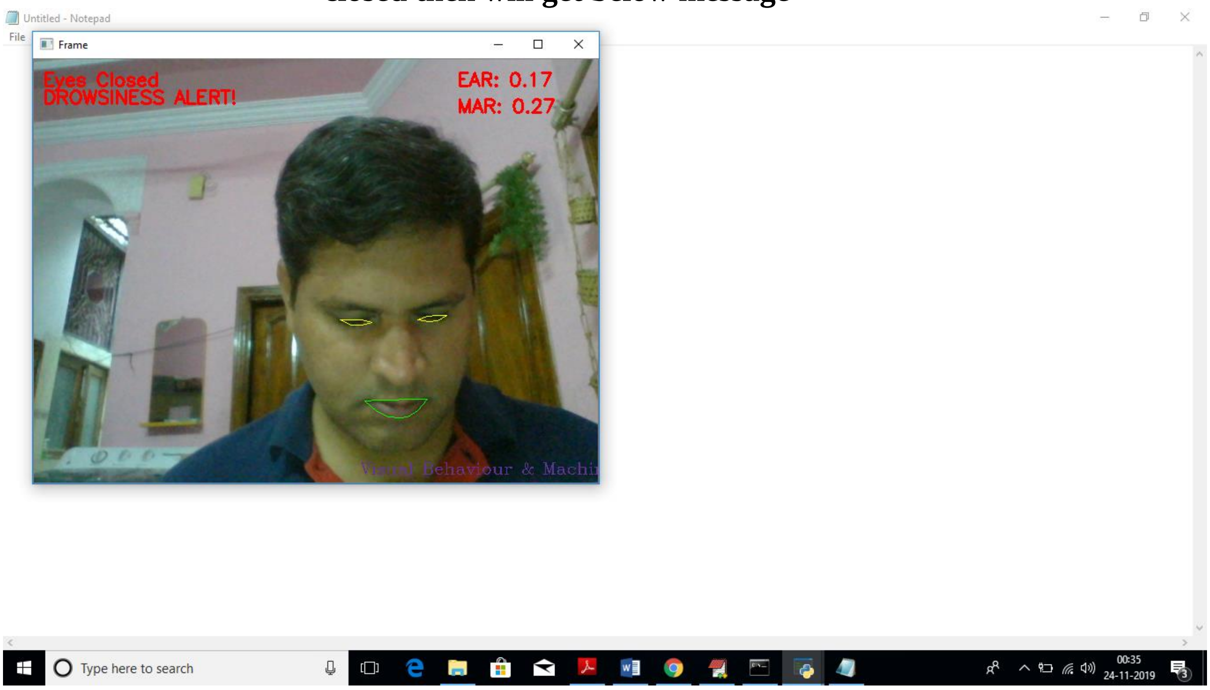
5.2 In above screen we can see web cam stream then application monitor all frames to see person eyes are open or not, if closed then will get below message



5.3 Similarly if mouth starts yawn then also will get alert message



5.4 Above application monitor all frames to see person eyes are open or not, if closed then will get below message



5.5 Above application monitor all frames to see person eyes are closed, then will get below message

6.CONCLUSION

Right now, minimal effort, continuous driver tiredness observing framework has been proposed dependent on visual conduct and AI. Here, visual conduct highlights like eye viewpoint proportion, mouth opening proportion and nose length proportion are figured from the spilling video, caught by a webcam. A versatile thresholding strategy has been created to identify driver languor continuously. The created framework works precisely with the produced engineered information. Thusly, the component esteems are put away and AI calculations have been utilized for order. Bayesian classifier, FLDA and SVM have been investigated here. It has been seen that FLDA and SVM outflank Bayesian classifier.

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