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Accident Prevention by Detecting Drivers Fatigueness

Kripanshu Singh[1], Manan Rastogi[2], Mimansa Mahajan[3], Dr. Ranjeet Kumar[4]
[1, 2, 3, 4]*Department of Computer Science and Engineering (CSE), Meerut institute of engineering and technology, Meerut, U.P., India*

Abstract: ***Various studies indicate that fatigueness in drivers leads to road accidents. It can lead to serious injuries like brain damage or it can lead to death. Therefore preventing people from harming the countermeasure device is necessary as a reliable solution. This study therefore came up with a new way of explaining the driver's fatigueness. This example uses the Haar Cascade algorithm, next to the OpenCV library to keep an eye on the real-time video of the driver and critique the driver's eyes. The Eye Aspect Ratio (EAR) is used in this measurement device to determine if the eyes are open or closed. The Mouth Aspect Ratio (MAR) is also used as an important element while this model describes the driver's fatigueness as the driver begins to yawn just before the driver feels fatigue. If the driver is found to be fatigue, a warning signal is issued.***
Keywords: OpenCV Automated algorithms, database, Image recognition, face detection, frontal postures, extraction phase, OpenCV, data models, HaarCascade classifier, training set.

I. INTRODUCTION

According to the World Health Organization (WHO), the death toll is estimated at 1.35 million. According to the WHO one person loses his or her life every second due to road accidents. In the world of about 195 countries only 28 countries have established reliable transportation laws. The Global Road Safety report states that an estimated 141 526 people were killed in road accidents and 5 lakh people were injured in accidents while most of them involved accidents due to fatigueness. About 21 percent of road accidents and 27 percent of fatal crashes occurred due to a decrease in drivers' vigilance. Several models have been expanded and some of them are now being used to criticize drivers' fatigueness.

Machine learning is a subset of artificial intelligence that uses different knowledge and data sets to train the prototype, and uses different separators and algorithms. For a prototype to have ideas, it is intelligent and free. This example uses the Haar Cascade algorithm, next to the OpenCV library to keep an eye on the real-time video of the driver and critique the driver's eyes. While observing the driver's fatigueness, the model focuses on three factors, including facial movement, positioning of the eye, and blinking of the eye. For facial movement the web camera comes in the role of capturing blinking and eye-catching patterns. It focuses on the perfect face of the driver. The Eye Aspect Ratio (EAR) is used in this measuring device to determine if the eyes are open or closed. The Mouth Aspect Ratio (MAR) is also used as an important element while this model describes the driver's fatigueness as a driver.

II. RELATED LITERATURE WORK

Countless strategies have been developed in the context of the driver's sleep deprivation. These techniques involve different machine learning methods. Increasing accuracy and this accelerated detection of driver fatigueness has been shown in many ways. These are listed below:

A. Computer View

Computer vision determines whether the eyes are closed or open using image processing technology. If the eyes are seen closed more than the threshold value than that received by the driver fatigueness. Along with the eyes, oral symptoms are also considered as yawning a large parameter to explain the driver's fatigueness.

B. Vector Support Machine

SVM is a machine learning algorithm used by computer vision method to determine the driver fatigueness. This separator classifies data objects and classifies them as objects. But the consequences slight accuracy with high errors.

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C. Driving Fashion

It is a method that considers the route traveled by the driver as a parameter to describe the driver fatigueness. This study is seen when the car starts off the middle lane. Through the graph. This method can clearly detect deviations from the normal curve and provide a warning. Likewise the results of the vector support machine of this method are also less accurate in this way subject to several external measures.

D. Physiological Sensors

There are parameters in which the physiological nerves function and are named Electrocardiogram (ECG), Electrocardiographs (EOG), Electroencephalogram (EEG). These parameters help determine the state of the human brain. The consequences of this approach are many straight but the driver does not feel comfortable as the human body is connected to different nerves.

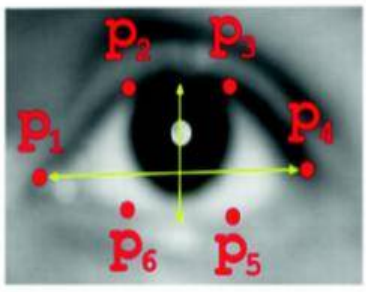
III. PROPOSED WORK

A. Overview of Prototype

Accelerating the detection of driver fatigueness is the focus of this model. Eye Aspect ratio
(EAR) is considered and the number of closed eye frames is recorded as a data reading method to presenting the output. In this reliable Driver Sleep solution, Open CV is used for collection data in the form of images from a webcam and as we proceed similarly the data will be
helps us to distinguish whether the driver's eyes are open or closed.

B. Prototype Approach

1) *Initial Input:* Image data set is collected on a webcam using separators and as in this study keep going the same data will help to distinguish what the driver's eyes are like on or off.
2) *Detection of Face:* The Haar cascade algorithm is used for face recording. The algorithm plays an important role in the training of the proposed model. Using a large data set containing more than thousands of images training. This example used the Haar Cascade algorithm, as well as the OpenCV library to keep an eye on the real-time driver video and critique the driver's eyes.
3) *Detection of Eye***:** After face detection, the focus area is determined by seeing the eye area with the help of EAR. Six different points of view are also considered as the world's landmarks. The Eye Aspect Ratio (EAR) is used in this measurement device to determine eyes open or closed.
4) *Blinking Detected:* The next step is to calculate the amount of blink. Different python libraries come into use called OpenCV, Dlib, imutils.
5) *Eye Aspect Ratio (EAR):* Measure the length of the eyes and the width of the eyes. Measure the length of the eye which is a measure of two different straight lines are considered.



$$EAR = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

6) *MAR: Mouth Aspect ratio*

Measurement of mouth width and mouth width.
MOE: Mouth Aspect Ratio over Eye Aspect Ratio
MOE = MAR / EAR

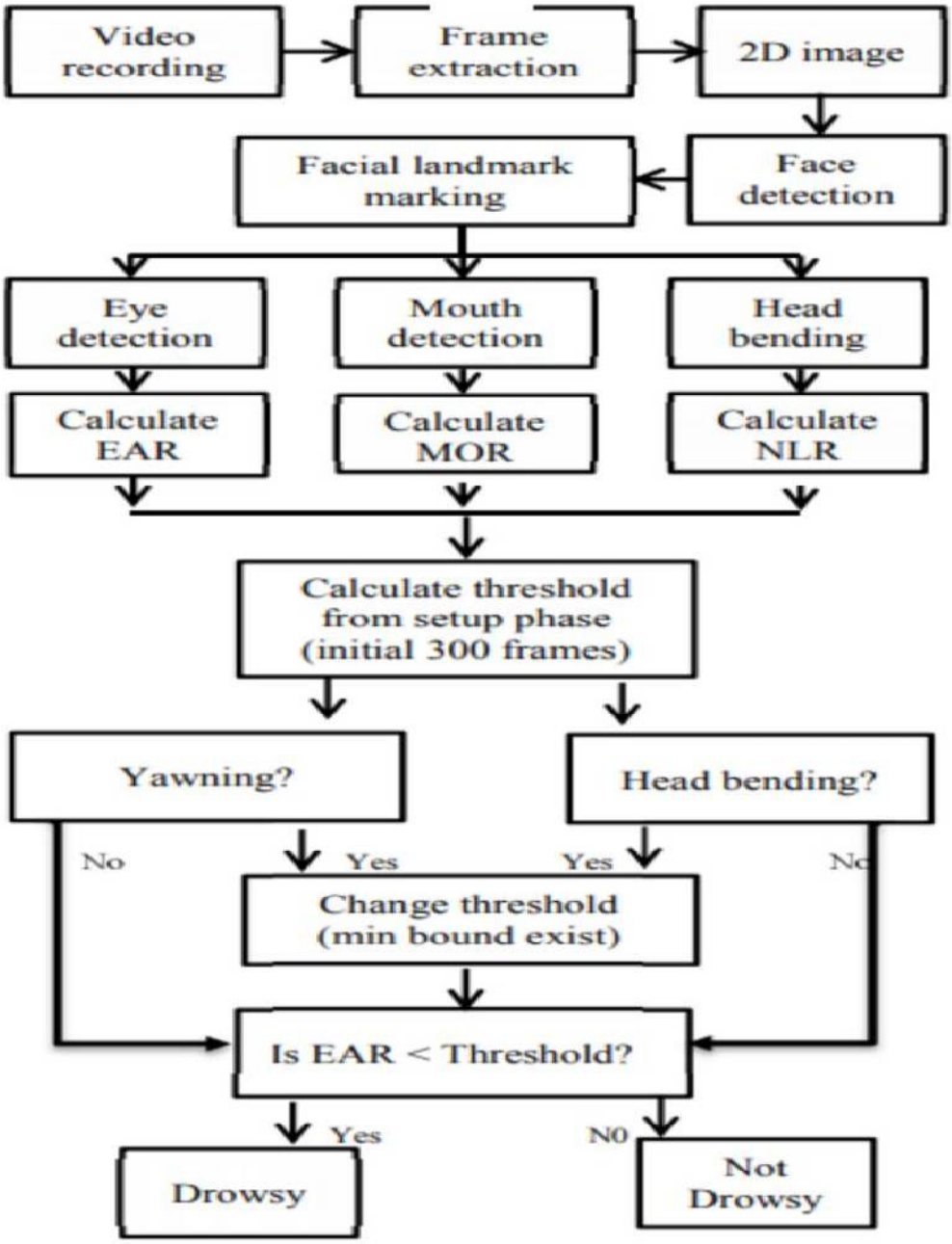
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IV. METHODOLOGY

We will be following underneath mentioned steps in this task:

1) Step 1: Pictures are taken from a webcam as required input data.
2) Step 2: Blinking of eyes and Facial movement is discovered after it.
3) Step 3: Captured information will be checked on the idea of algorithms and former connected information.
4) Step 4: If driver found fatigue(driver = fatigue) Then alarm sound will bring driver back to sense Else Driver not fatigue (driver already in senses).
5) Step 5: Similarly the method goes on futher.

A. *Flow Chart*



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V. TOOLS USED

1) *Web Camera:* It is a device which is used to capture human facial expressions and eye movements.
2) *Alert Alarm:* It is a way of alerting a vehicle's driver by playing sound. If his eyes remain closed for more than a set duration then it will alert the driver.
3) *System Required:* 64 Bit operating system and x64 based processor.
4) *Google Chrome:* It is a browsing software used for references.
5) *Open CV:* It is used for face movements and for blinking eye patterns.
6) *Python:* It is a high quality programming language for general purpose. Its design philosophy emphasizes the legitimacy of the code and its use of critical retreats. Its language structure and its object-oriented approach aims to help programmers write clear, logical code for small and large projects. Python has a variety of versions that we have used version 3.6.

VI. PROS AND CONS LINKED

A. *Pro*

1) Can be life saving.
2) Can prevent any big mishappening.
3) Can reduce the number of deaths in road accidents.

B. *Cons*

1) Difficulty in finding face in low lighting.
2) Problem with driver wearing sunglassess.
3) Multiple faces getting detected

VII. FUTURE SCOPE

One feature that can be definitely added in our project in future is that we can place a screen on back window panel of the car where we can display a message that “Driver inside is feeling sleepy kindly maintain a safe distance to prevent any mishappening” because of this message screen nearby drivers will also get attention and can do then the needful.

VIII. RESULT IMAGES

A. *Eyes Detected*





Here the system is counting the number of times a person blinks his/her eyes and takes a yawn which is calculated through EAR and MAR.





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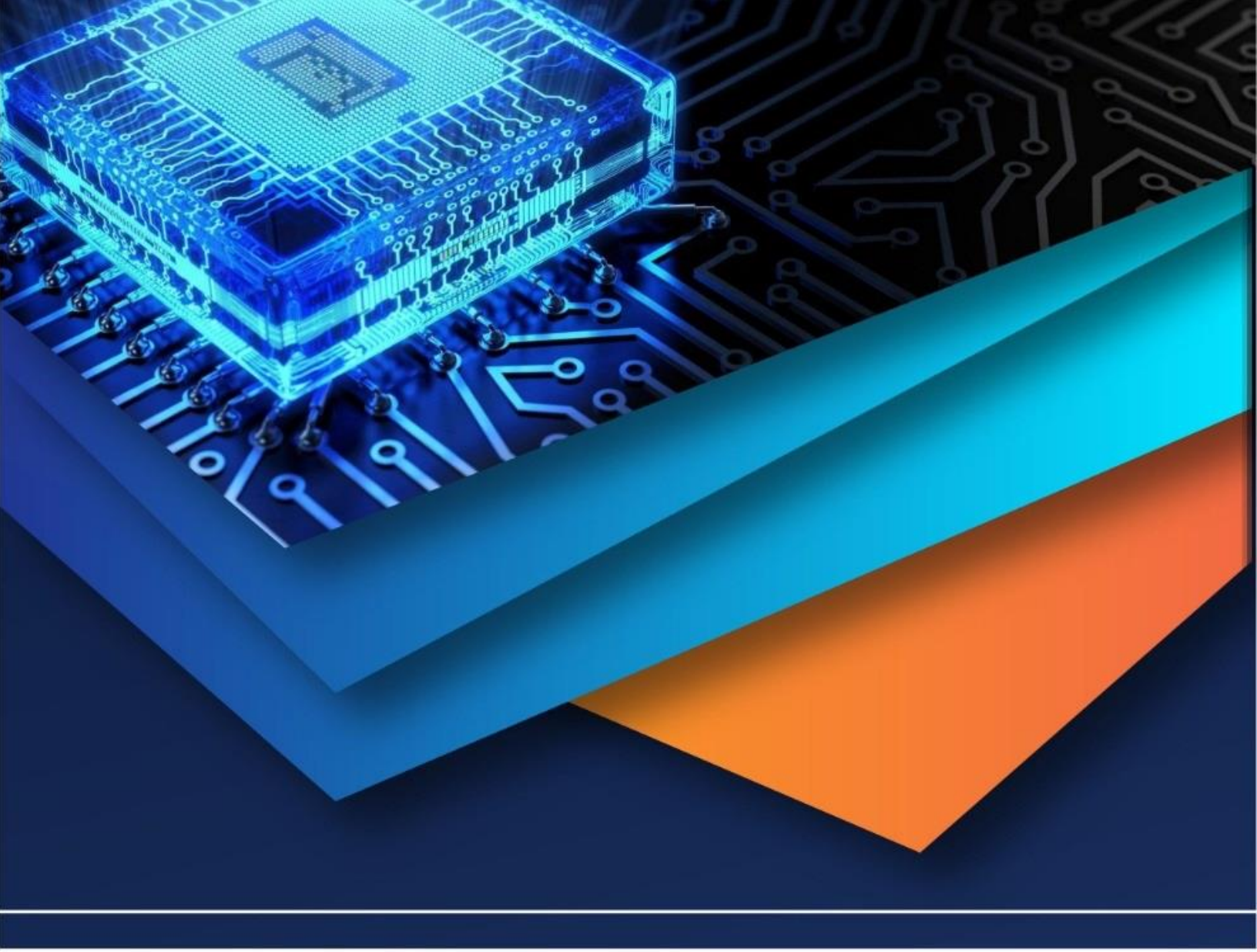


When the number of blinks and mouth reaches a threshold ,then a person gets alert about his/her state.

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