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Identification of Driver Drowsiness Using Image Processing

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ABSTRACT: ***The paper's motive is to demonstrate the implementation of a driver's drowsiness detection using MATLAB through image processing. Studies suggest that about one-fourth of all serious road accidents occur because of the vehicle drivers' drowsiness where they need to take, confirming that drowsiness gives rise to more road accidents than accidents occur through Drink and Drive. Drowsiness Detection System is designed by employing vision-based concepts. The system's main component is a small camera pointing towards the driver's face scan and monitoring the driver's eyes to detect drowsiness. First of all, the system scans the driver's face then the eyes and then confirms whether the eyes are open or close using the software MATLAB and therefore, the algorithms used are the Viola-Jones and Hough transform. The machine deals with images binary to scan the facial sides, narrowing the area where the eyes will reside. Suppose the eyes are observed as closed for five or more successive frames. In that case, the system monitors the driving force's activeness and concludes that the driver is falling asleep and issues an alarm or generates an alarm signal to wake him up.***

KEYWORDS: ***Eye blinking, Face detection, Viola-Jones algorithm, Driver fatigue, Drowsiness detection methods, Facial appearance, Eye status, and Head position***

1. INTRODUCTION

Driver drowsiness identification is a system used for car safety, which avoids accidents when drivers get sleepy. Different reports have indicated that around 20 percent of all road injuries are related to fatigue, up to 50 percent on certain motorways. Driver fatigue [1] [2] [3] is the leading cause of a significant number of road accidents. Recent figures suggest that annually there are around 1,300 deaths and 75,000 injuries due to overtiredness. Trying to develop technologies to identify or avoid drowsiness is the most crucial problem in accident prevention systems. Since the danger that drowsiness poses on the road, techniques to counteract its effects need to be created. Driver negligence may result from driving with a lack of attentiveness or due to driver sleepiness and diversion. Driver [4] [5] interruption occurs when any activity or an object distracts the driver's attention away from the duty of driving. Unlike driver fatigue, driver drowsiness does not require any triggering incident but is instead characterized by the gradual withdrawal of focus from road and traffic demand.

Nevertheless, both driver sleepiness and distraction might have the same consequences, i.e., more reaction time diminished driving efficiency and raised risk of involvement in the accident. If the Fatigue level of the driver and the estimation of drowsiness are determined, then the output is sent to the detection system, and the warning will be triggered.

Many ways to detect driver drowsiness, few symptoms of sleepiness are
The driver will yawn repeatedly,
The driver couldn't keep his eyes open.
The vehicle driver cannot recall driving the endmost few kilometers.
Float into another track.

2. LITERATURE SURVEY

The author's Ralph Oyini Mbouna, Seong G.Kong [6] proposed method considers visual features like eye index (EI) and pupil activity (PA) to obtain necessary data on non-alertness of a driver in the vehicle. The eye index determines the eye position like it is open or close using the ratio of two parameters pupil height and eye height. Over a while, the Rate of pupil center to eye center deviation is measured by PA. HP counts the number of video segments having variations of head movements from a normal head position in three different angles. HP gives a lack of attention to the driver due to massive head movements by observing the eyes. But authors have not discussed the yawning head nods detection.

The [7] paper explained about monitoring of the eye and detection of the eye closure. The proposed methods found the face edges with binary information of the image to see the sights. Since eyes reflect more intensity variations than the other parts of the face, eyes are detected by observing the remarkable amount of variations in the face. Intensity variations in the eyes region decide whether eyes are open or closed. If eyes appeared to be closed for five consecutive frames or more than that, the vehicle driver is falling asleep and gives a warning signal. The accuracy of drowsiness finding is less because the authors are not considered the detection of other parameters like yawning and node detection.

Researchers [8] have strived to determine the driver's drowsiness by following assessments: (1) vehicle-based assessment, (2) behavioral assessment, (3) physiological assessment. A comprehensive review based on these assessments provides information on the current systems, problems with the present system, and the improvements to make a correct system. The authors provided information about sensors used and the advantages and disadvantages of each. These authors did not concentrate on eyes blinking and yawning.

The previous research [9] [10] on the drowsiness detection is classified into three different aspects Vehicle-based, Behavioral based, and Physiological based. The complete view on these methods in all the corners will give the required details, and some changes need to be made to get fruitful results.

3. PROPOSED APPROACH

The car or the vehicle will produce a signal and warn the driver the following cases must be considered as it can alarm the driver at proper times. There are many technologies which can detect the drowsiness of vehicle drivers such as ECG and EEG, LBP (local binary patterns), Steering wheel movement (SVM) and Optical Detection. These methods include detecting the facial expressions, yawning head nods, and majorly on eye blink frequencies.

The key aim is first to develop a device for detecting driver drowsiness assisted yawning measurement through the eye and mouth detection, ensuring effective track down of yawning expression even in the existence of variable lighting environment and facial occlusions those road accidents are often successfully prevented. Secondly, using a beep or buzzer to alert the driving force in the detection of drowsiness and ensure a quick and efficient design will be implemented using simulation and hardware without detecting any errors.

The vehicle driver's face is recorded regularly with a video camera mounted underneath the front mirror. To detect the yawn at first instance, it's required to detect and monitor the face using the camera's sequence of frame shots. The position of eyes and mouth is detected from the detected face. The closed eye movement is detected for yawning detection along with closed eyes. It makes the segmentation of false detection method more robust. The geometrical features of the mouth and eye are then used to identify the yawn. The device warns the driver of his fatigue using a beep or buzzer and the unsafe driving condition in case of yawning detection.

The proposed method in various steps given the following:
Step 1: Face Detection

Step 2: Eyes Detection
Step 3: Mouth Detection or Yawn Detection
Step 4: Skin Segmentation
Step 5: Alert System

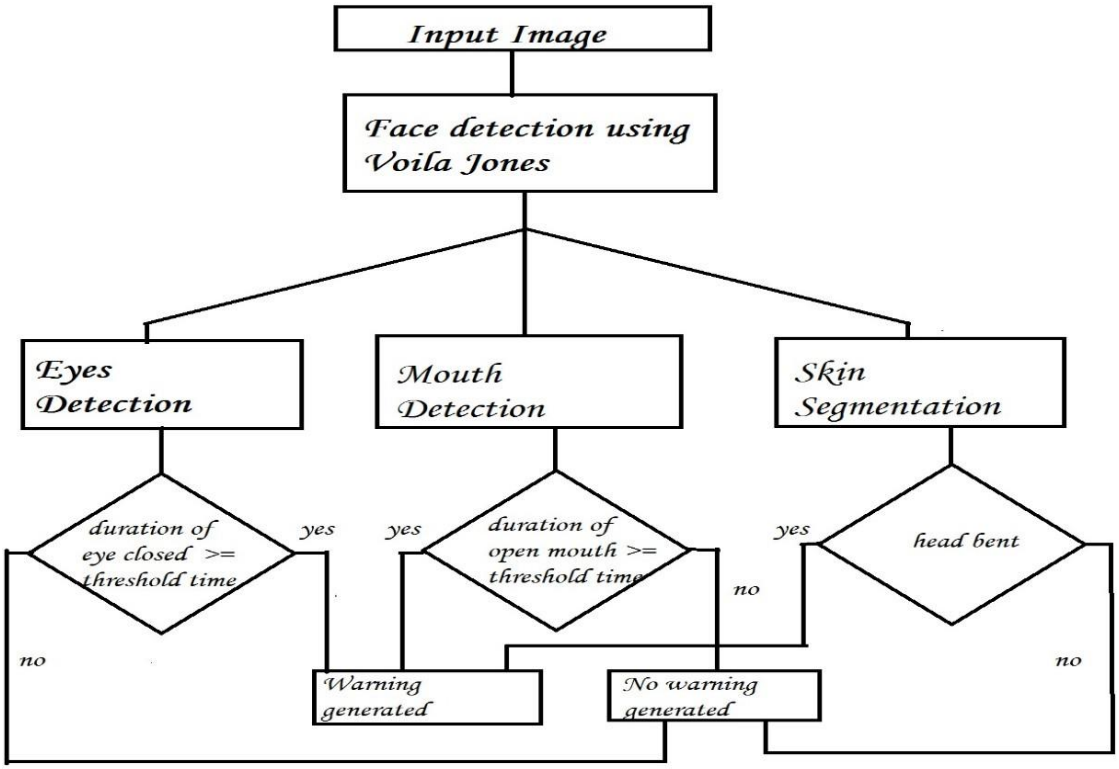

Fig 1: Flow Diagram for working of the detection system

4. SIMULATION

Based on many methods and procedures, the driver drowsiness is detected, and the results can be known through simulation. When an image is uploaded, tiredness can be seen with a popup alert, as shown in the results below.

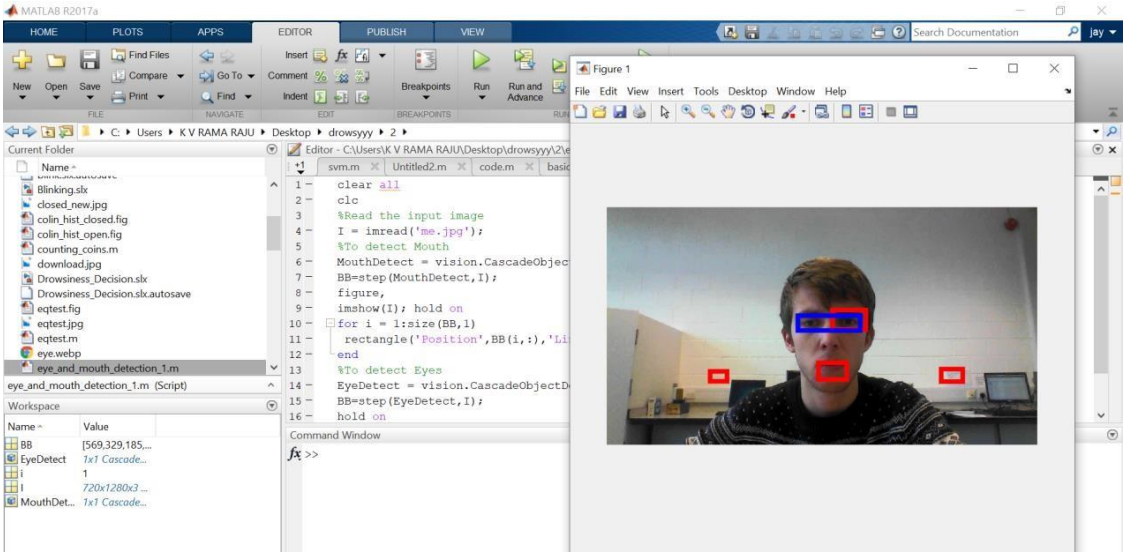

Fig 2: When the driver's image is uploaded, the inbuilt software recognizes his image and divides his image into respective parts like nose mouth and eyes.

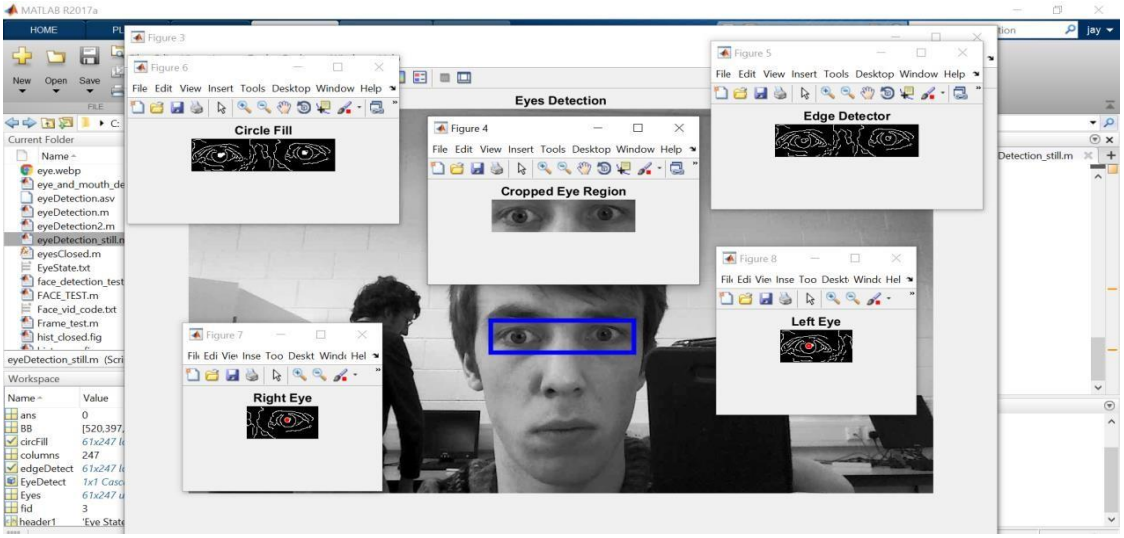

Fig:3 The respective cropped parts of the recognized face are displayed as above as left eye, right eye, edge detector, etc.

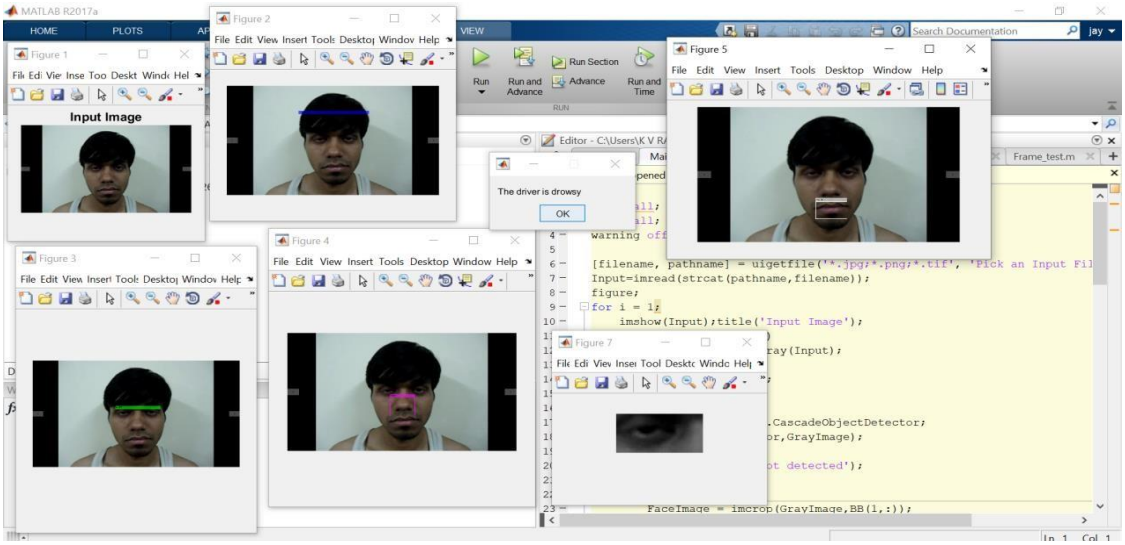

Fig 4: If the respective person's image if detected that the person is exhausted, the output will be shown through an alert box stating that the person is drowsy.

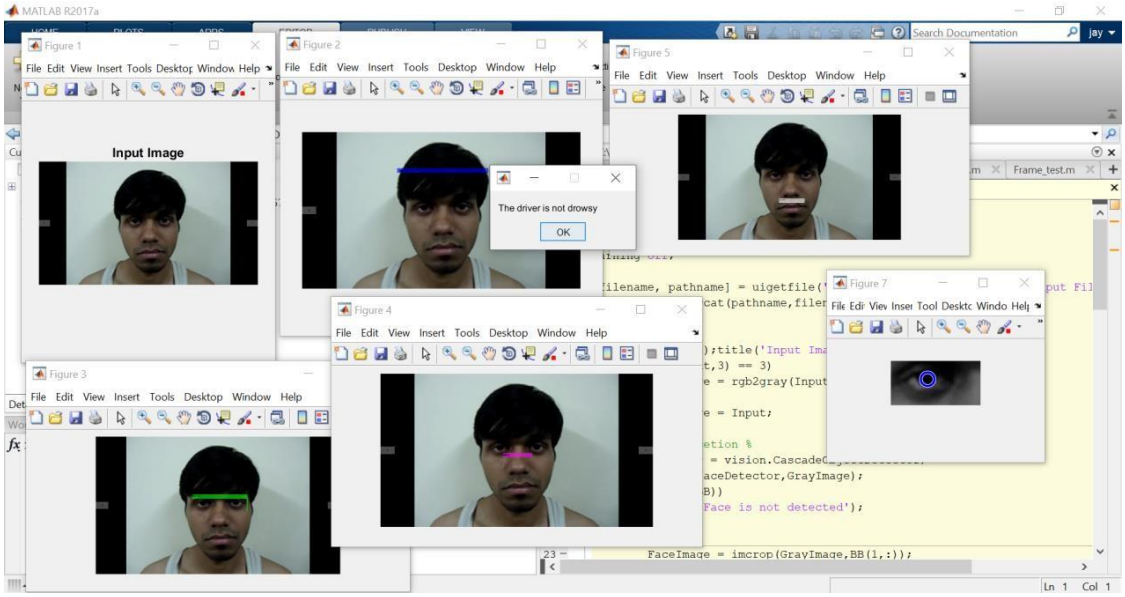

Fig 5: If the person image which is uploaded is detected that the person is not drowsy then the output is an alert box which displays that the person is not drowsy

5. CONCLUSIONS

A program that localizes and tracks the vehicle driver's eyes and head movements developed to detect drowsiness. To locate the pupils, the program uses a mix of template-based matching and feature-based matching. During monitoring, the proposed method decides whether eyes are open or closed, and whether the driver looks in front. An alert signal will be generated in the form of a buzzer or alarm when the device captures the movement of eyes closed for too long.

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