SLEEP DETECTION USING FACIAL EMOTION RECOGNITION

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Abstract : In long distance journeys, drowsiness is one of the most important factor in causing accidents .The drowsiness can be automatically detected using neural networks. This project tracks and analyses the user's face & detects the eyes. We used Local Binary Pattern (LBP) to analyze the characteristics of the eye .Using the eye features the SVM performs state analysis on the eye. Facial detection is done using "Viola Jones" algorithm. we've obtained a high accuracy of 98% in drowsiness detection.

***IndexTerms* - Artificial Intelligence, Computer Vision, MATLAB & Neural Networks.**

I.INTRODUCTION

Ad hoc networks were the first systems to develop the automatic navigation in cars. A noticeable weakness of these systems is that their response to environmental changes is unreal time. The chances of having an accident relies on the driver's decision. Monitoring the physical condition and facial expressions of the driver helps us in knowing the driver fatigue. This cannot be done by the wireless sensor networks are unable to process and transmit this information with adequate precision. Huge number of accidents are caused due to Driver fatigue. A survey estimates that nearly 1,200 deaths and more than 70,000 people get injured because of driver fatigue problems.

II.PROPOSED SYSTEM

The proposed system records a video sequence in 24fps. It then processes the video through different phases f the system. The system has three phases:-detection of face, segmentation of eyes & mouth. The system first detects an object in-front of it & then checks if it's a face using the inbuilt database reference. The system does the same several times to get an accurate image of the face & it's position. The repetive process used in the detection avoids any error or misplacement of the face/eyes/mouth due to tonal value.

III.EXISTTING SYSTEM

In the past few years, many researchers have been working on the development of safety systems using the different techniques. No technique is found with a reliable accuracy. Techniques based on physiological measures showed the highest accuracy till date. However, these techniques cannot be implemented practically as it requires the drivers to attach electrodes to his body which causes irritation. In the advanced safety vehicle (ASV) project conducted by Toyota has released an advanced safety vehicle project & it requires the driver to wear a wristband. This band measures the heart rate of the user. There are few other techniques which monitor eyes and gaze the eye movements. This eye tracking requires a helmet or special contact lens. These techniques, though less intrusive, are still not acceptable in practice.

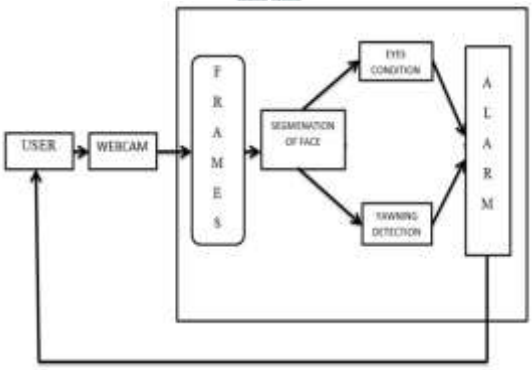

Figure 1: System Architecture

IV.DESCRIPTION OF MODULES

3.1 Segmentation of Face

The face is segmented from the input image that is initially whatever the video that is recorded by the camera will be fragmented into the frames and this frames will be given as input for segmenting the face.

3.2 Eyes condition

The position of the driver's eyes is determined by using appropriate threshold. In this module, edge detection of the eye's region is considered.

3.3 Yawning Detection

We have the mean-based clustering method to detect the mouth. The system checks if the mouth is open or closed and decided if the user is yawing based on the time in user has mouth open.

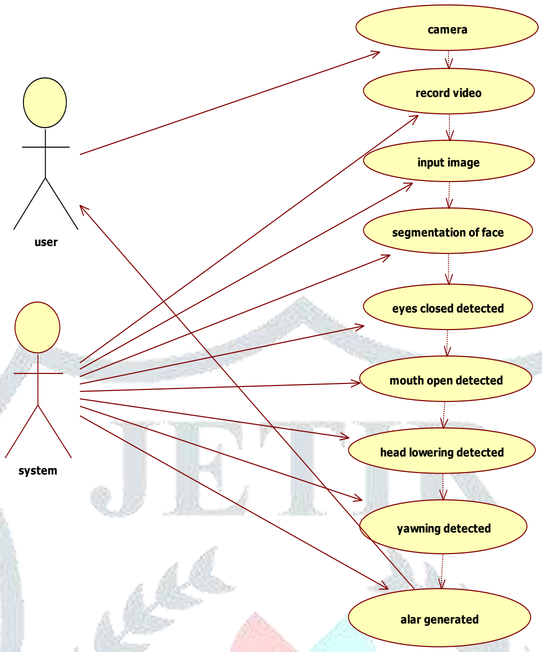

Figure 2: Block diagram

V.IMPLEMENTATION

In our proposed system sequence diagram there are two actors i.e. the user and system were the camera monitored users face and system records the video and creates images for segmentation of face. Segmentation of face is done in order to extract only the eye and mouth region and discard the surrounding region which we are not interested in. Then the conditions for fatigue and non-fatigue are checked. If fatigue is detected then alarm is generated, if no fatigue is detected then no alarm is generated. The system first partially segments the image. It's done by dividing the image into background & foreground classes. The detection of face minimizes the rate of errors in identifying the facial expressions rather than directly identifying the eyes and mouth. For each tonal value, a histogram graph is plotted having tonal variations on the x-axis & total pixels on the y-axis. The eye's precise boundaries are detected using "Sobel Edge Detection" algorithm. Our method starts from left and right side, to find eyes, therefore we can detect the eyes separately. We segment the eyes are segmented from the image and use them to generate an eye template. We extract a stable eye template for the status analyses. This reduces the influence caused by light reflections. The mouth's precise boundaries are also detected using "Sobel Edge Detection" algorithm. After this, the classification is done using k-means clustering method. Classification of image pixels is based on the brightness intensity.

TID1	Detecting face	Input Frame	Face detected	Segmentation of face	Pass
TID2	Detecting eyes	Segmentation of face	Eyes detected	Edges of the eyes	Pass
TID3	Detection of mouth	Segmentation of face	Detected mouth	Clustered mouth with large hole	Pass
TID4	Driver's fatigue condition	Eyes open and Mouth closed	Non Fatigue	No Alarm	Pass
TID5	Driver's fatigue condition	Eyes closed and Mouth closed	Fatigue	Alarm generated	Pass
TID6	Driver's fatigue condition	Eyes closed and Mouth opened	Fatigue	Alarm Generated	Pass
TID7	Driver's fatigue condition	Eyes opened and Mouth opened	Fatigue	Alarm Generated	Pass

Figure 3: Test Cases

VI.RESULT

When the person's face is captured by the camera first it will extract the background and foreground classes then for the extracted face part segmentation is done. By observing the eye and mouth state it will check for driver fatigue. Here we can observe that eye is opened and mouth is closed so there is no sign of fatigue detected. Hence Alarm is not generated.

VII.CONCLUSION

The high fatalities of road accidents, which is primarily due to human errors committed out of fatigue, justifies the use of this system to alarm drivers at the time of driving. High-speed data processing and great accuracy distinguish this system from the similar ones. The processing rate or framing of this camera is 15 fps and the first video sequence is related to the state where the head is in a lowered position which includes 85 sample frames. The second video sequence deals with the recording of the open or closed state of the eyes in which 48 image frames indicate that eyes are closed in a 6 seconds period while 65 frames show that the eyes are normally open. The third video sequence shows the yawning or the frequent opening of the driver's mouth. And finally the fourth video sequence is a combination of all three modes and its recon long takes a longer time. These three factors, which have been proposed for assessing the detection accuracy of the video sequence, indicate the acceptable performance of the proposed system in detecting the signs of fatigue in a driver's face at the time of driving.

VIII.FUTURE ENHANCEMENT

In future works, a driver's distraction identification system will be developed. With its complex and ever-changing nature, including the effect of the light and the condition of shooting environment, it makes the skin segmentation of human faces in color images severely affect face detection, and also makes it an important research topic. A method of face-region segmentation based on skin detection has been proposed in this paper, which partly comes from other studies. Determination of the light interference not only improves the accuracy of image segmentation in the follow-up processing, but also expands the scope of application with skin segmentation in color images. Image enhancement is done by getting the gray images with better and higher contrast. In this paper, we used the method that combines the histogram with the gray-scale image. On detecting the drowsiness the system generates the alarm to wake up the driver. Ultrasonic sensors are connected on the left and behind the car to detect the distance between the car and the road side and to detect any other car behind. When the driver is feeling drowsy the future technology would be enhanced so that the sensors are applied in cars and the car gives the indication to the neighbouring vehicle and just moves towards the lane and park the vehicle.

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