

Driver Sleepy Mood Detection Using Face Recognition

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Abstract -Sleepy mood is the one of the major reasons for accidents occurrence. These types of incidences can be avoided by detecting the sleepy mood as early as possible and take necessary actions to save the life save peoples. A system is proposed which will detect sleepy mood by face recognition and also alert the user based on user given music. The sleepy mood is detected purely based blinking of eyes and yawning. If the user not evoke after alerting, then heat will produce from the seat and make active the person.

Keywords – Camera, Python OpenCV library, dlib Toolkit, shape_predictor_68_face_landmarks.dat, Seat heater, Speaker

I. INTRODUCTION

Although most people were physically and mentally engaged with their professions, sleepy moods were more likely to happen when they were undertaking less actionable tasks, such as long trips. This may result in serious accidents, and their lives may be lost. So, it is necessary to avoid this type of incident that we should measure the sleepy mood of a body. No one immediately falls into a sleepy mood; rather, everyone exhibits certain indicators of a sleepy mood, such as difficulty keeping eyes open, etc. Yawning, blinking frequently, difficulty concentrating, drifting out of lane and delayed responsiveness to traffic, nodding, and unjustified speed variances when driving that every person's drowsy mood can be determined by their facial expressions. So, the proposed system looking into detecting a sleepy mood based on eye blinking and yawning. It cannot be considered as a sleepy mood because it is known to concentrate the eyes blinked for a long, therefore the continuity of the blinking of eyes is examined. To detect whether the person is in a sleepy mood compare the real-time image with 68 facial landmarks and if any changes come to the real-time image, they will be noted, and identify the changes, if it is sleepy mood-related that will be notified by alert music. Alert music based on our interest can be set. Because it is better to add music which is liked rather than fear one which avoids taking sudden harmful actions. Thus, other's life also can be saved. And if the person is not active or evoked after 3 times the music rang then the system will detect that the driver is in a sleepier mood. The body temperature of the driver is monitored when they sits in the driving seat. If the alert music rang more than 3 times the temperature of the seat gets increased by 2-degree Fahrenheit for 45 seconds. Then the temperature goes to the normal as before. Thus, the driver can evoke and get active. If not, temperature continues to 60 seconds and the temperature will increase to 3-degree Fahrenheit and continue the normal process. Thus, a driver gets evoked and they can escape from accidents.

Here the sleepy mood of the is driver detected by the system based on face recognition then alerts and evokes the user first with music then with heat.

II. SYSTEM ANALYSIS

A. Existing System Limitations

The sleepy mood was recognised in the existing system based on facial expressions, but the alert given to the driver was always dreaded, thus the drivers took rash actions, leading to severe accidents.

And messages and emails get to the family members regarding this and all the people who know this become confused and feared about this and their peace gets out. And this hurt the user too.

B. Problem Definition

Alerting the driver suddenly creates too many difficulties for the driver. Driver may suddenly forget everything (driving too). And also, they may be stuck and confused that what action to be done next, and they may do the wrong action which can mislead to a heavy accident, and may their surrounded people's life get dropped and get affected.

Sending messages related such as a member of the family member is in a sleepy mood while driving surely makes the whole family is upset and suppose in any case the members cannot get contact with the person on that time surely make the situation more serious. And this makes the whole family depressed.

C. Proposed System

The "Driver Sleepy Mood Detection Using Face Recognition" is a system that has a good understanding of human beings and does favourable steps regarding the actions observed by the system. A sleepy mood can easily detect based on the yawning and eye action if a person is in a sleepy mood, then the person may do one of these surely [4]. The camera senses the real-time image of the driver and detects the face using face recognition. And detect the eyes. It observed the eyes and based on the EAR (Eye Aspect Ratio) [1], detects whether the eye is blinking or not then it is detected more than 4 times a music alert will occur and inform that the driver is drowsiness state.

And also, if the eye is closed for a while that is more than 4 times it will detect that the driver is sleepy mood. Similarly, suppose the mouth is opened beyond a limit which recognizes as yawning and informs that driver is in a sleepy mood.

The temperature of the driver is already observed by the system using the seat heater which is placed inside the seat of the driver. If the music alarm is activated more than three times in three minutes, the seat heater's heat is boosted by two degrees Fahrenheit until the driver is activated for 10 seconds and the heat seater returns to its regular level. Thus, the sleepy mood of the driver changes to an active state.

III. SYSTEM DESIGN

Tools & Processing

OpenCV:

OpenCV is a library that is mainly aimed to provide real-time computer vision. It was developed by Intel. Which is mainly used to capture the real-time image of the driver, based on this capture of the real-time video the whole system is working.

Dlib:

Dlib is a modern C++ toolkit that contains machine learning algorithms and tools for creating complex software in C++ to solve real-world problems. And also with the help of the shape_predictor_68_face_landmarks file, the dlib library helps to detect facial landmarks and also observe whether the person is in a sleepy mood or not. The blinking of eyes and the opening of the mouth of the driver were also detected by this library.

EAR (Eye Aspect Ratio):

Based on the ratio of the eye-opening and closing the value of the EAR can be calculated. The EAR can be calculated based on the facial landmarks, calculate the ratio of the horizontal landmark of the eye to the vertical landmark of the eyes. The aspect ratio of the eye is constant, then quickly drops, and then increases again. Suggesting that a single blink occurred.

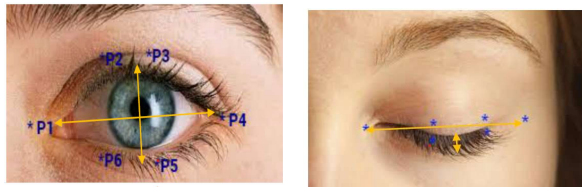


Figure 1: Eye's Landmarks

MAR (Mouth Aspect Ratio):

Based on the ratio of the mouth opening and closing we will get the MAR. The MAR can be calculated based on the facial landmarks and calculate the ratio of the horizontal landmark of the mouth to the vertical landmark of the mouth. The aspect ratio of the mouth is constant, then quickly drops, and then increases again. Suggesting that a mouth is opened.

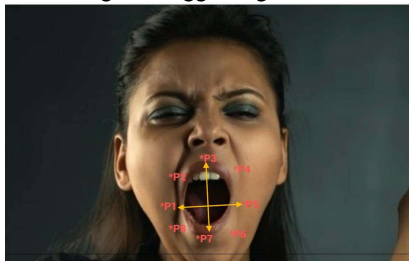


Figure 2: Mouth's Landmarks

Face Recognition:

Face can be detected with the help of shape_predictor_68_face_landmarks. And every movement of the face can be easily detected based on the landmarks. And the further process of the image recognition to the eyes and mouth is detected after the face is recognized, however, face reorganization is one of the most needed functionalities in the procedure of sleepy mood detection.

III. FLOW CHART

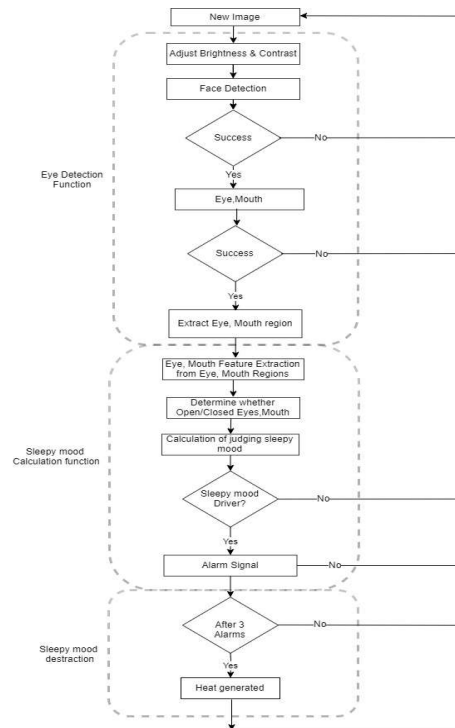


Figure 3: Sleep mood detection and heat generation

IV. METHODOLOGY

The suggested system is built on a set of procedures. Step-by-step directions:

Step 1: Capture the live video.

Step 2: Recognize the face in the image.

Step 3: Recognize the eyes and Mouth.

Step 4: Using the facial landmark detection ratios, recognise the opening and closing of the eyes by combining all of the surrounding landmarks.

Step 5: If the eye's combining ratios are more than 0.20, the driver is alive.

The music will play if the ratios are between 0.16 and 0.20, indicating that the driver has been drowsy for more than four occasions.

If the ratio is less than 0.16 and the driver has slept more than four times, music will be played.

Step 6: If the combining ratio of mouth is greater than 0.60 the driver is yawning. This implies the driver is drowsy and the music/alert will play.

Step 7: If drowsy detected more than 3 times or sleepy detected more than 2 times then, heat will be transferred about 2-degree Fahrenheit from the driver seat which evokes the driver for a while and this temperature will remain as previous after 60s. and the process will repeat.

V. RESULT AND DISCUSSION

Active mood:

Active mood is the state in which the driver is active in driving which means driver is free from all types of distractions.

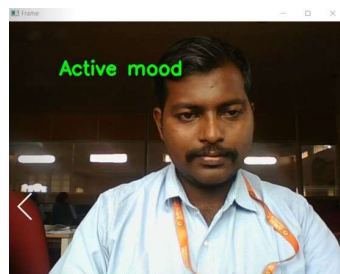


Figure 4: Active Mood

Sleepy mood:

Sleepy mood based on eyes half-closed. Eyes half-closed is happens by blinking eyes which implies that the person is in a sleepy mood and he cannot concentrate further accurately. So, the system will alert the driver with the help of music.

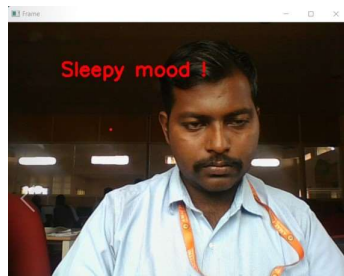


Figure 5: Eyes Half Closed

Sleep:

Sleep implies that the person is fully tired and his eyes are closed. When this happens, the system will alert the driver based with help of music.



Figure 6: Eyes Fully Closed

Yawning:

Yawning implies that the driver is not more in the active state means the driver is in a sleepy mood. Further moving the control of the vehicle may go wrong so it is really necessary to alert the driver at this time. So that the driver gets alerted while they yawn once.



Figure 7: Yawning

With the help of OpenCV and the dlib library, the driver's face is detected. And also, the 68 facial landmarks also help to detect the sleepy mood of the driver.

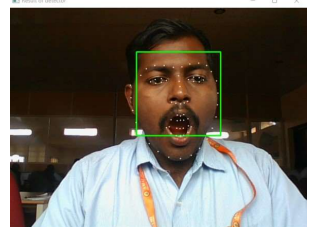
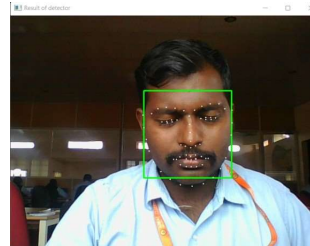
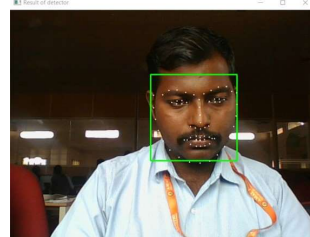
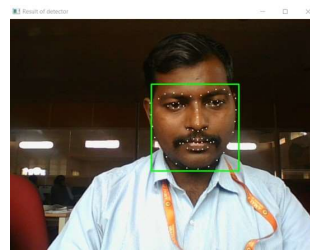


Figure 8: Face Frames

After alerting the driver, if the driver does not get active, the system will increase the temperature of the seat for 45 seconds after 3 alarms happen the time the temperature

increases it increases only by 2-degree Fahrenheit. If the driver does not evoke then it will repeat.

VI. CONCLUSION

Every life of the human is very important one who cannot recreate a life, so detecting the accident or this kind of sleepy mood detection easily save human life. Thus, drive can be made safe, and also it can save lives and activate drivers by this “Sleepy mood Detection using face Recognition” system. Thus, with this proposed system a person can be helped easily to tackle with a tough situation in their life without annoying the family or friends.

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