Accident Prevention using Eye Drowsiness & Yawning Detection

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ABSTRACT: *Transportation safety is important for the detection of Driver's Drowsiness. Drowsy driving is an important reason for traffic accidents. Driver Fatigue is one of the big reasons causing most fatal road accidents around the world. This shows that in the transportation industry especially, where a heavy vehicle driver is often open to hours of monotonous driving which causes fatigue without frequent rest periods. Hence it is very essential to design a road accident prevention system for detecting driver's drowsiness, which determines the level of driver inattention and gives a warning when an impending hazard exists. Real-time image processing, face/eye detection techniques, eye blink rates and yawning is used in a real-time system. The system is designed as an unobtrusive real-time monitoring system. The priority is on improving the safety of the driver without being meddlesome. The eye blink and yawning of the driver are detected. If the driver's eyes remain closed for more than a certain period of time and the mouth of the driver is open for yawning, the driver is said to be drowsy and an alarm is sounded.*

***Key Words*: Driver, Face Detection, Open-CV, Eye Detection, Yawning Detection, Drowsiness.**

1.INTRODUCTION

One of the most predominant reasons that cause untimely deaths is road accidents. In the former case, the co-passenger would awake the driver of his/her lapse of attention and the driver would take measures to return to the required state of alertness. Many event in the news that report deaths and severe injuries caused by road accidents, mostly in the early morning period. A car hit another or careened into the roadblocks/boundaries. But what if the driver is alone or is driving in the night where there is a chance that the passengers are asleep. Driving under the influence of drowsiness is the root cause of over 100,000 road accidents every year. This amounts to a 2.2% death rate worldwide Microsleep is a temporary lapse in consciousness that may last up to 30 seconds.

1.1 Problem Definition

Fatigue is a safety problem that has not yet been deeply addressed by any country in the world mainly because of its nature. Fatigue, in general, is very tough to measure or notice unlike alcohol and drugs, which have clear key indicators and tests that are available easily. Probably, the best solutions to this problem are consciousness about fatigue-related accidents and promoting drivers to admit fatigue when needed. The former is hard and much more high-priced to achieve, and the latter is not possible without the former as driving for long hours is very lucrative.

2. Proposed System

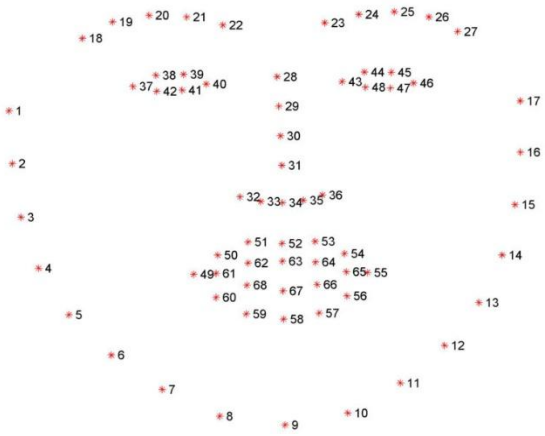
The Camera will detect the eye region and mouth region using facial coordinates. Based on eye aspect ratio and will choice region of interest for mouth.

A. Face detection

There are many features such as height, weights, face features, the threshold of face. threshold of face colors in Haar cascade classifier. It is developed with a lot of positive and negative samples. Depending upon positive sizes features will be extracted. Edge detection is applied based on Haar detection and array is used to store output from edge detector. Parallel processing is done by extracting eyes and mouth features of driver.

B. Facial mapping using Dlib

The dlib library ships with a Histogram of Oriented Gradients based face detector along with the Facial landmark. The facial landmarks produced by dlib are index able list.

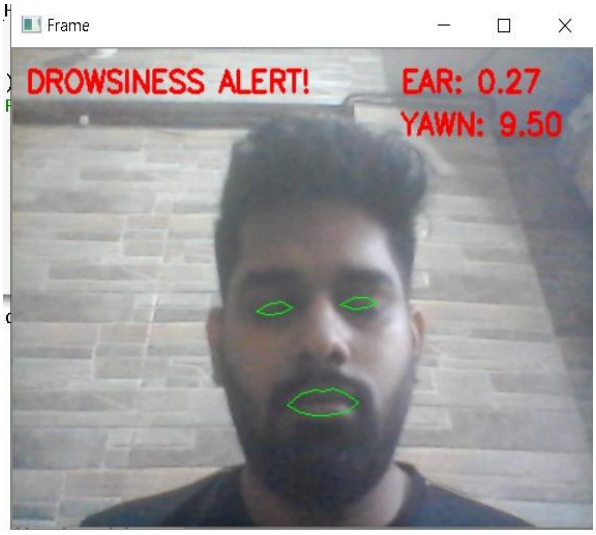


We need to know the correct array slice indexes to extract the eye regions from a set of facial landmarks, With the help of these indexes, we can easily be able to extract the eye regions through an array slice.

2.1. Proposed Eye Detection Method

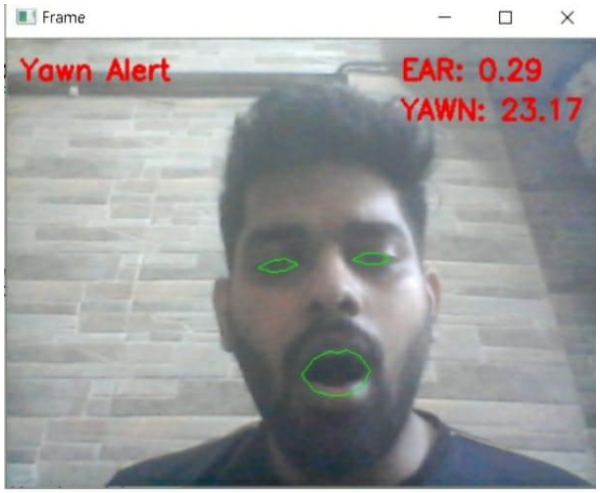
On the top-left, we have an eye that is completely open with the eye facial landmarks plotted. Then on the top-right, we have an eye that is closed. At the bottom then plots the eye aspect ratio over time. As we can see, the eye aspect ratio is constant (indicating the eye is open), then swiftly drops to zero, then increases again, indicating a blink has taken place. In this drowsiness detector case, we'll be keep track of the eye aspect ratio to see if the value falls but does not increase again, thus implying that the person has closed their eyes.

$$EAR = l2-l6 + l3-l4/(2\ l1-l5\ )$$

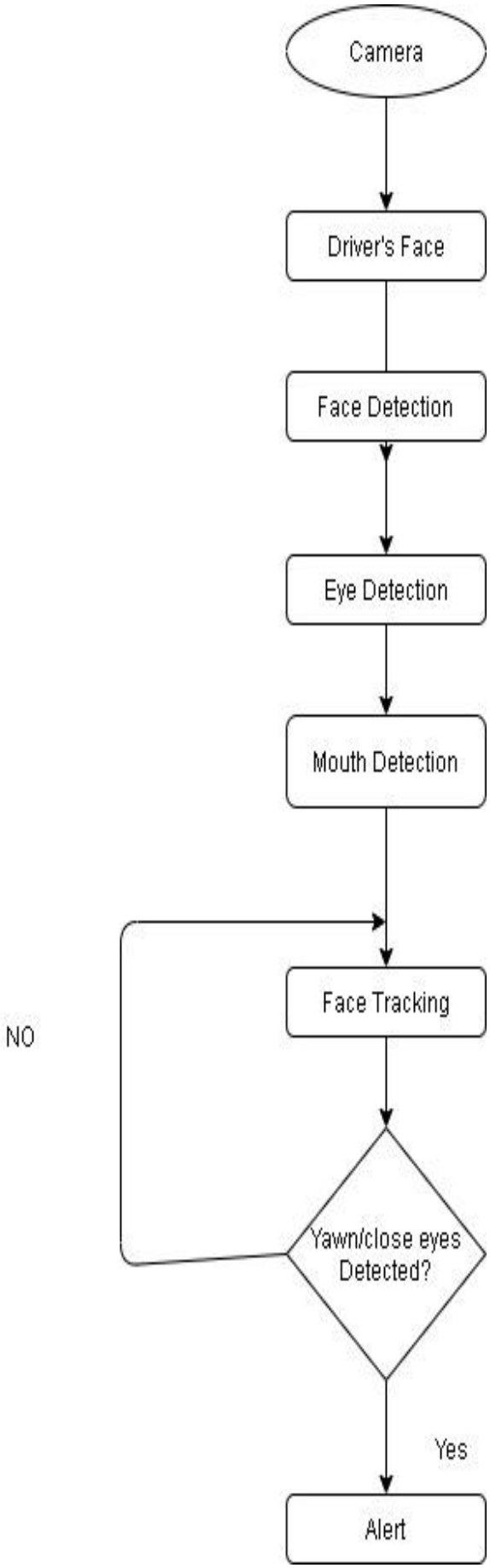


2.2. Proposed Yawning Method

In each video frame, we select the location of the mouth and, then, convert it into an image array over a chosen region of interest. Then, the histogram bin is determined for each of the arrays that are related to the mouth region. The calculated new mouth histogram is compared with the reference mouth histogram. This process is repeated for the mouth region of the entire video sequence in real time.



3. WORKFLOW



4. CONCLUSIONS

The driver abnormality monitoring system is developed capable of detecting drowsiness, drunken and reckless behaviors of drivers in a short time. The Drowsiness Detection System progress based on eye closure of the driver can differentiate normal eye blink and drowsiness and detect the drowsiness while driving. The proposed system can prevent accidents due to sleepiness while driving. The system works well even in the case of drivers wearing spectacles and even under low light conditions if the camera delivers better output.

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