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M.L & A.I BASED DROWSINESS DETECTION OF DRIVER BY USING RASPBERRY PI

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ABSTRACT

The number of vehicle accidents is on the rise these days. Drunk driving or feeling tired while driving are two of the most common causes. When performing duties that demand constant concentration, such as driving a car, drowsiness can be harmful. Human safety is the primary concern in vehicle automation. As a result, the number of fatigue-related automobile accidents can be reduced by recognising drowsiness. As a result, the main goal of this work is to create a prototype of a drowsiness and yawn detection system based on Python and the Dlib model. It is a real-time system which will detect the drowsiness among car drivers by capturing image continuously and will give alert the driver whenever they will feel sleepy. The current work's novelty is based on the frequency with which people blink their eyes and yawn. The per closure value of the eye is analyzed for tiredness detection, and if it exceeds a particular amount, the driver is considered sleepy. Similarly, we will examine the yawn value to detect tiredness, and if it exceeds its minimal threshold value, a yawn alarm will be issued.

Keywords: Drowsiness Detection, Face Detection, Eye Detection, Yawn Detection, Driver, Accidents.

I. INTRODUCTION

According to the survey, there are numerous traffic accidents caused by drowsy driving around the world. A driver who does not take a break when driving long distances is the one who is more prone to get drowsy .There are lots of road accident happening driver sleepiness is the leading cause of road accidents around the world, causing more than drink-driving. Drowsiness is an abnormal feeling of being sleepy or feeling tired during the day or night. Drowsiness is induced by a lack of sleep, a number of medicines, and the disgust caused by driving for lengthy periods of time. Every year 1.24 million people die on the road; almost 6% of all the accidents are yield by drivers driving in a drowsy condition; and most of the accidents of this type result in casualties. To address this issue and prevent these fatal collisions, the driver must be constantly monitored. By implementing a system that would prevent accidents and closely monitor, supervise, and counsel the driver, all of the above-mentioned causes of accidents due to human error may be avoided. With its ongoing growth in medical and health care, communication, agriculture, education, and transportation, technology has changed practically everything in today's globe. With the development in the field of computer technology, car safety has been an area of interest in research. Most of the accidents caused today by cars are mainly due to driver drowsiness. There is no tool that can measure drowsiness, however there are certain indicators, such as eye movement, yawning, pulse rate, brain activity, and breathing rate, brain activity, and breathing rate which may tell whether a person is drowsy or not. Today in the market there are few measuring device for drowsiness detection of the driver is categorized into three techniques:

1) Vehicle behaviour based on mechanical and sensor input.

2) Biological Signals that are based on sensors, and

3) Image Processing is a type of computer vision that focuses on changes in facial features, which is one of the drowsiness-related indicators.

In comparison to previous techniques, the employment of image processing technique achieves a highly precise detection of drowsiness. Developing a system that monitors drivers' drowsiness. There are different

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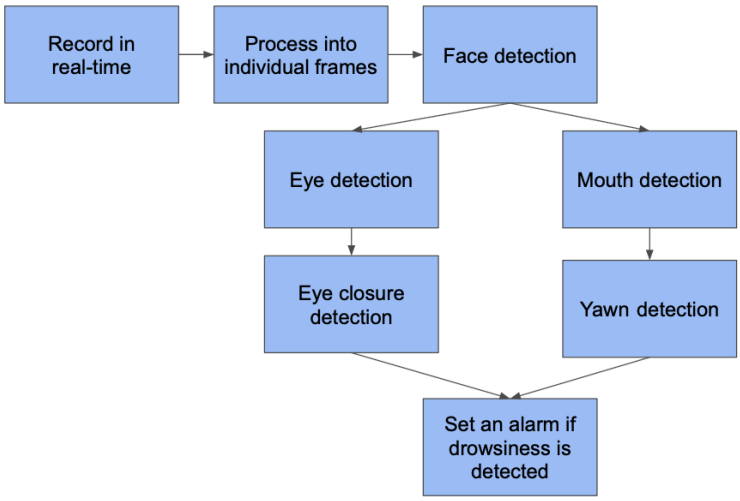
parameters considered in different studies like focusing in the mouth yawning, detecting the face and then detecting an eye.

II. METHODOLOGY

We present two efficient strategies for alert systems in this paper. The first technique makes use of facial landmarks to combine two blink and yawn features. Adaptive blink and yawn thresholds, on the other hand, were determined correctly for each driver without the need to pre-determine for everyone.

III. PROPOSED SYSTEM

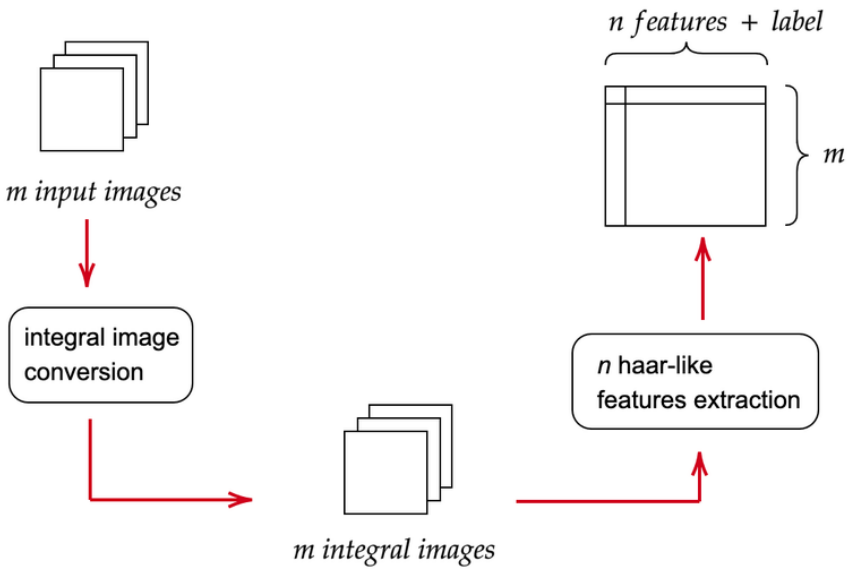
Drowsiness identification based on eye state has been done accurately using a variety of indicators and parameters, as well as the expertise of specialists. The most important aspect for drowsiness detection is predicting facial landmarks, detecting eye-state, and showing the driver status on the screen and in the App. Generally, the driver feels tired as a result of driving for lengthy periods of time, physical illness, or being inebriated, which results in severe road accidents. Our goal is to identify drowsiness, notify people to avoid accidents, and provide an app notice as well as an alarm sound.



IV. RESULTS AND DISCUSSION

The bulk of the machines that we use today are physically determined, for example, which are operated physically by human concern (for example, automobiles driven by people), but as we can see, the majority of the auto accidents that occur on the road are caused by human issues.

Step 1: Detecting the Face of the User



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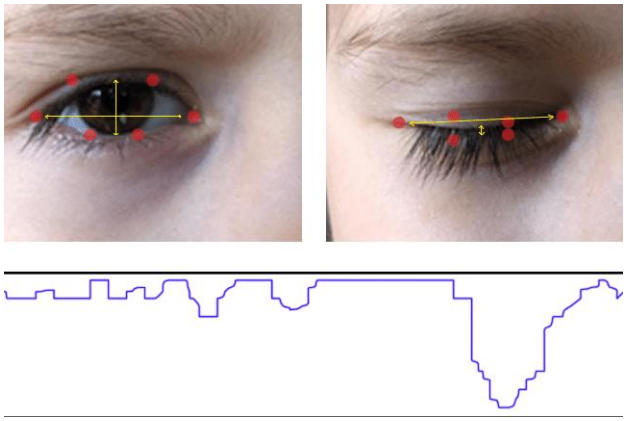
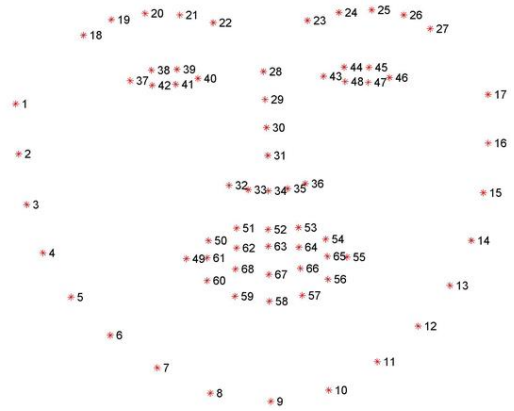
So, before we can determine if the user is drowsy or not, we must first detect the user's face. There are several algorithms to choose from, but we need one that uses less processing power (so that we can run it on the Raspberry Pi), is fast, and is accurate. As a result, we chose the well-known "Viola-Jones" method for face detection. Deep learning-based algorithms are also more accurate, but they won't operate in real time on the Raspberry Pi (or even on a PC if you don't have a good GPU).

Step 2: Detecting If the Eyes Are Opened or Closed





To determine whether or not the user is sleeping, we must first determine whether or not the user's eyes are open. We'll utilize the Eye-Aspect-Ratio to figure this out (EAR). When the eyes are open and closed, the average eye aspect ratio is 0.339 and 0.141, respectively. So, whenever our system detects a face, it calculates the EAR, and if it is less than the threshold (specified by the user), it will warn the user, and it will continue to alert the user until the user opens their eyes. To calculate the EAR, we must first identify the face's ocular landmarks (as you can see in the figure). We'll utilise Dlib's 68 facial landmark model, which is a pre-trained model that can be simply used with Python, to find these landmarks. It's used to calculate the location of 68 coordinates (x, y) that map the facial points on a person's face, as shown in the diagram above.

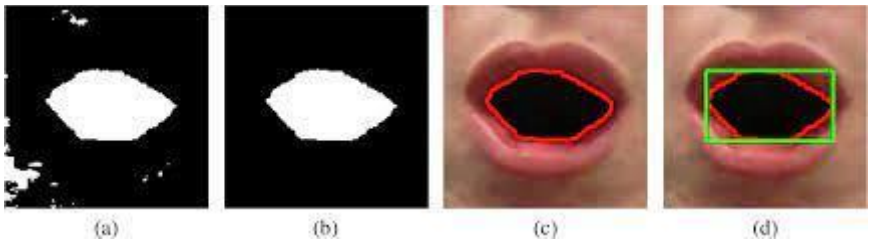
Finally, using the formula, we can find the EAR after receiving the points.

Using the formula, we can find the EAR.

$$EAR = \frac{(|(P2-P6)| + |(P3-P5)|)}{(2* |(P1 - P4)|)}$$

We'll next see if this EAR value is within the threshold, and if it is, the system will notify the user.

Step 3: Detecting the Yawn



To detect a yawn, we need to know how far apart the user's upper and lower lips are. When a person is talking, the distance will be within a certain range, but when the person yawns, the distance will be significantly more than the range. To get the distance between two lips, we must first determine the landmarks of the lips, which we will do using the DLIB's face landmark model once more. Then we'll just calculate the distance between the top lip's midpoint and the lower lip's midpoint. If the distance is greater than the threshold, the system will notify the user with a yawn alert.

The Raspberry Pi and the pi-cam will be used in this project to identify the expressions of the driver of the vehicle. Dlib is an improved variant of harcascade because it includes 68 facial landmarks. Detecting Facial Landmarks: Following the discovery of the face in the film, the next step is to eliminate highlights such as the eyes, nose, and lips. We only require the position of our eyes for this task. There are other approaches for locating face milestones, but I used one for this project. The 68 (x, y)- enables the guide to explicit face designs

produced by the facial milestone indicator in dlib. Preparing a shape indicator on the named.dat dataset yielded these 68-point mappings.

V. CONCLUSION

In this paper, review of driver drowsiness detection is given. Different methods for detecting drowsiness are explained. As Life is the most precious gift of nature, here in this system of the drowsiness detection and estimation through live video streaming; the user/driver will be able to safeguard his/her life. In order to minimize and reduce the numbers of road fatalities we have presented with a system that would eventually detect the face of the driver and reveal, finds out the whether the driver is sleepy or not, it does so by using eye-blink detector which has been developed in python. This software implementation is further connected to the hardware been used in the system that is the Raspberry-pi so as to generate an alarm and alert the driver to awaken him/her.

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