DRIVER DROWSINESS CLASSIFICATION USING EYES DETECTION

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Abstract

Due to human errors, the deaths and fatalities in road accidents is rising every year. Driving when inebriated is extremely dangerous and difficult to spot. Drowsiness is the second most common factor in car accidents after drinking. People are aware of the dangers of driving after drinking, but they are not aware of the dangers of tiredness since there are no tools available to gauge driver fatigue. This essay offers a fresh perspective on car security and safety. Automobile crashes caused by driver drowsiness have increased significantly in recent years. We have included a better driver warning and sleep detection system that watches the driver's eyes in an effort to reduce these problems. This explains how to locate and follow the eyes. We also provide a technique for figuring out if the eyes are open or closed. This system's primary requirements are that it be extremely unobtrusive and that it start when the ignition is turned on without requiring the driver to do so. Also, the driver shouldn't be expected to give the system any input. Also, the system must function independent of the face's color and texture. Also, it must be able to cope with a variety of conditions, including shifting lighting, shadows, reflections, etc. An image processing- based sleepy driver warning system is presented in the study.

I. INTRODUCTION:

One of the key objectives of the Intelligent Transportation Systems is the improvement of public safety and the decrease of accidents (ITS). The high number of auto accidents caused by driver fatigue has led to the need for technology to detect and prevent tiredness while driving. The primary goal of this research is to develop a prototype sleepiness detection system that can accurately track the driver's eyes in real-time. How- ever, it is important to ensure the reliability and accuracy of such a system to effectively reduce accidents caused by drowsy driving.Alongside developing sleepiness detection technology, addressing the root causes of driver fatigue, such as work schedules and unhealthy lifestyle habits, is equally important. While modern vehicles are equipped with intelligent systems, drivers should exercise self-control and remain attentive while driving. It is a shared responsibility between drivers and manufacturers to prioritize safety and prevent accidents caused by driver fatigue. Here, we developed a technique to identify drowsy driving. Drowsiness is recognized, and a buzzer sounds to switch off the ignition. The car will then come to a complete halt. The most frequent cause of auto accidents is poor driving. If the driver is sleepy, they occur on many occasions. Driver fatigue is acknowledged as a significant contributing factor in auto accidents. According to the National Sleep Foundation (NSF), 64% of adult drivers have driven while feeling sleepy, and 22% have actually slept off.

As a result, it's critical to monitor drowsiness in real time toprevent mishaps.

This paper highlights how to prevent accidents brought on by unconsciousness by using eye blinks. Here, a fixed eye blink sensor in the car will buzz if the driver becomes unconscious.

II. DEFINING DROWSINESS:

Drowsiness is the same as being sleepy, which is just another word for having a tendency to nod off. There are three phases of sleep: rapid eye movement (REM), non-rapid eye movement (NREM), and wakefulness (REM). The next three phases make up the second stage, known as NREM. Stage I: waking to sleeping transition (drowsy) Stage II: a short nap and Deep sleep is stage three. Researchers have mainly focused on Stage I, which is the drowsiness phase, in order to investigate driver drowsiness. Driver drowsiness is a factor in several types of collisions, including late at night (between 0 and 7 in the morning) or in the afternoon with only one car leaving the road, occur on highways with high speeds, often driving alone Drivers are mostly young men between the ages of 16 and 25. No signs of braking or skid marks. Due to the intricacy involved, data generated using these criteria cannot completely account for accidents brought on by driver sleepiness. As a result, actual accident severity may exceed what the statistics indicate. Thus, it is vital to develop efficient techniques to identify driver drowsiness and inform the driver in order to prevent these sorts of accident.

III. METHADOLOGIES USED:

The length of time someone's eyelids are closed when awake can be used to gauge how sleepy they are. The quicker identification and processing of data receive priority in our system. Eyes are closed for a monitored number of frames. If the sleepiness detection system detects that the driver is becoming tired and the number of frames captured by the system surpasses a certain threshold, a warning message will be displayed on the display.

A. Image sequence input:

Image acquisition is the act of capturing an image from a source, typically a hardware-based device. It is an essential step in the image processing workflow since no processing can take place without first obtaining an image. Therefore, image acquisition is considered the first stage in the image processing workflow sequence.

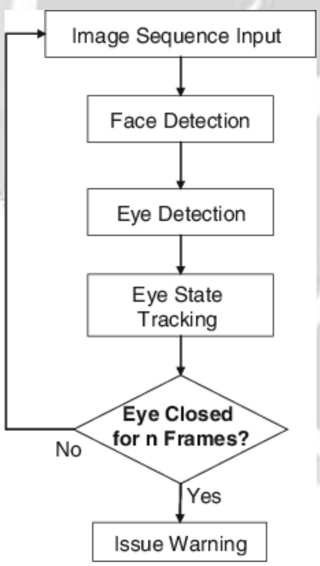


Fig. 1. BLOCK DIAGRAM

In our algorithm, the camera initially captures the picture for processing. The faces in each frame are then found and searched for using the Haarcascade file face. Another frame is collected if there is no face found. A zone of interest is indicated within a face if a face is found. The eyeballs are located in this area of interest. The computing demands on the system are drastically reduced by specifying a region of interest. Then, using Haarcascade, the eyeballs are found inside the target area.

IV. FACE DETECTION:

In this step, an algorithm is used to detect the driver's face within a frame. Face detection involves identifying the position of facial features within the frame using computer technology. The algorithm disregards all other objects present in the frame, such as buildings or trees, and focuses solely on facial structures. Face detection is a type of object detection, where the algorithm attempts to determine the size and position of objects belonging to a specific class within the image. While most face detection algorithms primarily focus on locating the front side of the face, newer algorithms have a more generalized approach that can detect different parts of the face and potential additional faces. Additionally, the algorithm considers the rotation axis of the face relative to the observer, but it can still accomplish its goal even with a vertical rotation plane.

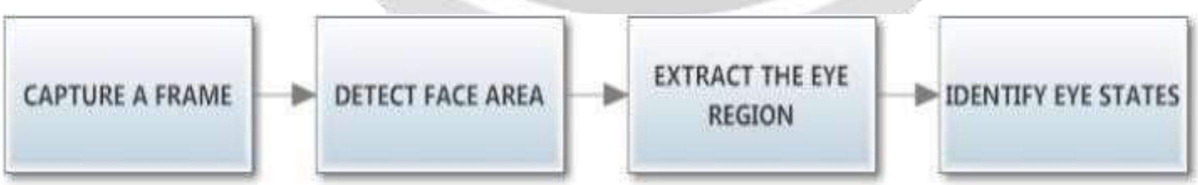
A new algorithm considers images or videos as variables that can be affected by different aspects, such as color, contrast, and lighting, which can affect their variance. The output of the algorithm may also change based on the input location. Face detection is often implemented as a two-way pattern differentiation problem.

V. EYE DETECTION

The driver's state is determined by the eye in our technique. However, detecting the eye can be challenging despite it seem- ing like an easy task. To detect the eye at the required location, several characteristics are identified. The Eigen method is usually used for this procedure, which can take a long time. After detecting the eye, the result is compared to a reference or threshold value to determine the driver's condition.When a face has been successfully recognized, the eye must be found for additional processing. The decision parameter for determining the driver's state is in our technique eye. Even though it doesn't seem complicated, eye detection is actually a very frenetic operation. In this instance, feature detection is used to carry out the given region's eye detection. For this procedure, the Eigen method is typically employed. That is a lengthy procedure. When eye detection is performed, the outcome is compared to the reference or threshold value to determine the driver's condition.

VI. IMPLEMENTATION

OpenCV is a popular programming library that provides functions for processing and analyzing digital images and videos in real-time. It is compatible with most IDEs and sup- ports various programming languages, including C++, Python, and Java.One of OpenCV's key features is its ability to detect facial features such as eyes, mouth, and face, which is important in applications such as driver monitoring. To detect objects, such as faces or eyes, in an image, the Haar classifier object detection algorithm is commonly used in OpenCV. This algorithm utilizes Haar-like features that detect contrast changes between adjacent rectangular groups of pixels. The Haar-like features are calculated by subtracting the sum of pixels in a white rectangle from the sum of pixels in a black rectangle. This allows the algorithm to identify patterns in the image that correspond to specific objects, such as faces or eyes. Overall, OpenCV's support for facial feature detection using the Haar classifier algorithm is a powerful tool for applications that require real-time analysis of digital images and videos, including driver monitoring systems.



VII. RESULTS

A huge number of videos were shot to get the results, and their precision in detecting eye blinks and drowsiness was checked. We attached a camera with 0.3 mega pixels to the PC for this project. White LEDs had to be mounted on the camera to provide better lighting. Instead of white LEDs in a real-world application, infrared LEDs should be employed to make the device less obtrusive. When tiredness surpasses a certain level, a buzzer is utilized to provide an alarm sound output in order to wake up the driver.

The system was evaluated for several users under various ambient illumination conditions (daytime and night-time). The technology can identify blinks and tiredness with more than 90% accuracy when the webcam light is switched ON and the face is held at the ideal distance. This is a successful outcome that may also be used in real-time systems. These are some examples of outputs under various situations in various photos. Videos were recorded, and both a face and eyes were seen in them. While the precision of the two CPUs is almost identical.

VIII. LIMITATIONS

A. Dependence on ambient light:

Although a face can often be recognized in dim circumstances, the system occasionally has trouble identifying the eyes. As a result, it produces an incorrect result that must be corrected. To prevent dim illumination in a real-world environment, infrared backlights should be employed.

B. Requirement of optimum range:

When the distance between the face and the webcam goes beyond the ideal range, certain problems arise. If the face is too far from the camera (beyond 70 cm), the backlight may not be strong enough to provide adequate illumination for the face, which can lead to inaccurate eye recognition and, as a result, lower accuracy in detecting sleepiness.

As the distance between the driver's face and the webcam in a real-world scenario is less than 50 cm, this issue is not given much consideration. so that there is never an issue. Considering the above difficulties, the optimum distance range for drowsiness detection is set to 40- 70cm.

C.Poor detection with spectacles:

The biggest flaw in our technology is that it cannot identify eyeballs when the driver is wearing spectacles. The issue of detecting eyes accurately in the presence of inadequate illumination or when the face is at a certain distance from the camera has not been resolved by most existing eye detection systems.

IX. CONCLUSION

In this paper, we have examined the numerous approaches that may be used to assess a driver's level of sleepiness. Although there isn't an one definition of sleepiness that is acknowledged worldwide, the numerous definitions and the justifications for them were addressed. The several ways that tiredness may be modulated in a virtual world are also covered in this essay. Subjective, driving-based, physiological, and behavioral tests are among those used to identify sleepiness; they were also thoroughly reviewed, with the benefits and drawbacks of each measure being listed. Although physio- logical tests are very invasive, they have a high accuracy rate for detecting sleepiness.The invasiveness of current eye detection systems remains a challenge, but this issue can be resolved by using non-invasive electrode implantation.To improve the accuracy of sleepiness detection, it may be beneficial to integrate physiological measurements like ECG with behavioral and vehicle-based metrics. Additionally, it is essential to consider the driving environment to achieve optimal results.

X. FUTURE WORKS

A real-time driver fatigue monitoring system becomes nec- essary when the driver's level of fatigue surpasses a specific threshold. It is preferable to develop a continuous scale system that monitors the driver's tiredness levels consistently instead of relying on a sleepiness threshold level. When the tiredness level reaches a predetermined limit, the system produces a signal that regulates the hydraulic braking system of the vehicle, which slows it down automatically.

The method currently in use for detecting drowsiness only considers the consecutive frames with closed eyelids, which may not be early enough to provide a warning. To detect drowsiness sooner, the system can analyze eye movement patterns. Additionally, using 3D images to locate eyeballs could improve the system's accuracy, as they provide more detailed information. Adaptive polarization can enhance accu- racy, and removing the noise reduction function could decrease the computational load required to locate the eyeballs.

Furthermore, this technique can provide flexibility in deal- ing with changes in ambient lighting. However, it may not be effective for individuals with dark skin. To address this issue, an adjustable light source can be utilized, which measures the amount of light reflected back. If there is less reflection, the intensity of the light increases. Darker skin requires more light, which can result in a binary image where the face appears white against a black background.

XI. REFERENCES

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