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DROWSINESS DETECTION SYSTEM USING MACHINE LEARNING

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Abstract: ***When driving long distances, drivers who do not take frequent rests are more likely to get sleepy, a condition that experts say they often fail to identify early enough. Based on eye condition, this research proposes a system for detecting driver sleepiness in real time. A camera is often used to take a sequence of images by the system. In our system, these capture images may be saved as individual frames. The resulting frame is sent into facial recognition software as an input. The image's needed feature (eye) is then extracted. The method creates a condition for each eye and suggests a certain number of frames with the same condition that can be registered.***

Keywords - Handwritten recognition, CNN, deep learning, KNN, machine learning,

1. INTRODUCTION

Drowsy driving occurs when a person's ability to stay attentive is impaired owing to a lack of sleep. Driving while drowsy, sleep deprived, exhausted, or weary is referred to as drowsy driving, sleep deprived driving, fatigued driving, or tired driving. According to studies, sleepy driving is more dangerous than texting while driving, distracted driving, or drunk driving combined. According to a research conducted by the Central Road Research Institute (CRRI) exhausted drivers who fall asleep while driving are responsible for roughly 40% of road accidents. In short, the majority of accidents are caused by the driver's tiredness.

Depressions, grief, an irregular work schedule, stress, and travelling between time zones are all possible causes of sleepiness. So a technology called the Driver Drowsiness Detection System was created to avoid accidents caused by drowsiness. Drowsiness detection is an example of how computer science and engineering help to the progress and advancement of society by delivering beneficial services in a variety of fields. This type assists the driver in waking up if he or she falls asleep behind the wheel.

2. METHODOLOGY

Driver drowsiness detection is a vehicle safety feature that helps to save a driver's life by averting accidents when the driver becomes drowsy. The primary goal is to develop a system that can identify driver sleepiness by continually monitoring the retina of the eye. The device works even if the driver is wearing glasses and under different lighting situations. By deploying a buzzer or an alarm, the driver will be notified if sleepiness is detected. With the aid of an automatically sent text message to the driver's relative or the automobile owner, the driver will be notified. The project was implemented using following technologies:

2.1 OpenCV

It is a module that provides real-time vision to computers. More than 2500 optimised algorithms are included in the module which contains a comprehensive mix of both traditional and cutting-edge computer vision and machine learning techniques. These algorithms can be used to detect and recognise faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, produce 3D point clouds from stereo cameras, stitch images together to produce a high resolution image of an entire scene, remove red eyes from images taken with flash, follow eye movements, and establish markers to overlay[2].

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2.2 Keras

Keras is a human-centric API, not a machine-centric one. Keras adheres to best practices for lowering cognitive load by providing consistent, straightforward APIs, limiting the amount of user activities necessary for typical use cases, and providing clear and responsive error signals. There's also a lot of documentation and developer instructions. [3].

2.3 TensorFlow

TensorFlow is a machine learning software library that is free and open-source. It may be used for a variety of applications, but it focuses on deep neural network training and inference. Tensorflow is a dataflow and differentiable programming-based symbolic math toolkit.

2.4 Pygame

Pygame is a suite of cross-platform Python tools for creating video games. It offers sound and graphics libraries that may be utilised with the Python programming language.

2.5 Request

Requests is an Apache License 2.0-compliant Python HTTP library. The project's purpose is to make HTTP requests more human-friendly and straightforward.

2.6 Fast2API

API for Microsoft's Gateway. Our Bulk SMS API is compatible with PHP, JAVA, C#, C, Python, Ruby, Javascript, NodeJS, and other programming languages. REST APIs to deliver Promotional, Transactional, and Quick Transactional SMS are secure, resilient, and simple to integrate.

The four steps of our driver sleepiness detection system are as follows:

1. Detection Stage: This is the system's startup step. The system must be set up and optimised for the present user and conditions every time it is started. The effective identification of heads is the most important step in this stage. If the driver's head is accurately found, we can extract the characteristics required for the system's setup.

2. Tracking Stage: The system begins the regular tracking (monitoring) stage after the driver's head and eyes have been adequately found and all relevant characteristics have been retrieved. The constant monitoring of the driver's eyes within a dynamically allotted tracking region is a critical step in this stage. More specifically, the system will calculate the size of the tracking region based on the historical data of eye movements to reduce processing time. For example, if the eyes have been travelling horizontally to the left for a number of frames, that tendency is likely to continue in the next frame. As a result, it makes sense to enlarge the tracking area in the predicted direction of the eyes while shrinking. The system must also determine the status of the eyes at this point. All of these operations must be completed in real time; depending on the processor's capabilities and the present load, it may be necessary to miss a few frames from time to time without affecting algorithmic precision.

3. Warning Stage: The driver's attention must be enhanced if he keeps his eyes closed for an extended amount of time or begins to nod. The crucial step at this stage is to keep a tight check on the driver's eyes. The system must figure out if the eyes are still closed and where they are in relation to previously determined criteria. At this point, we can't afford to miss frames. In practice, eye tracking is done in very much the same way as the tracking stage, with the addition of the following processes: eye velocity and trajectory computation, and threshold monitoring. These extra calculations are needed to increase the system's capacity to assess whether or not the driver is sleepy.

4. Alert Stage: Once the system has decided that the driver looks to be in an aberrant driving condition, it must be proactive in alerting the driver of potential threats. To draw the driver's attention and enhance their awareness

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level, a combination of audio/visual signals is utilized.Alerting has to be implemented in such a way as not to cause the opposite effect of intended and startle the driver into causing an accident.

3. RESULTS AND DISCUSSIONS

The suggested system is based on the face, eyes, and skin of the driver. Because of its broad availability and general simplicity, we picked the popular Viola-Jones method for baseline face identification. We improved the face detection technique by using skin colour data. Human skin colour has its own characteristics. Breaking down a colour into its fundamental chroma components (red, green, and blue) and specifying component ranges is the easiest way to convey and define these characteristics. The great majority of skin colour types contain a red chroma component between 133 and 173, and a blue chroma component between 77 and 127, according to research.

Present study used a classification strategy that relied on both head position and eye state to boost the overall robustness of the system.its strategy is based on the following assumptions:

- When fully awake, the driver's head posture does not fluctuate much.
- When tired, the driver's head position varies dramatically.

Based on this the score is provided for images. Following figures shows the score based on the image.

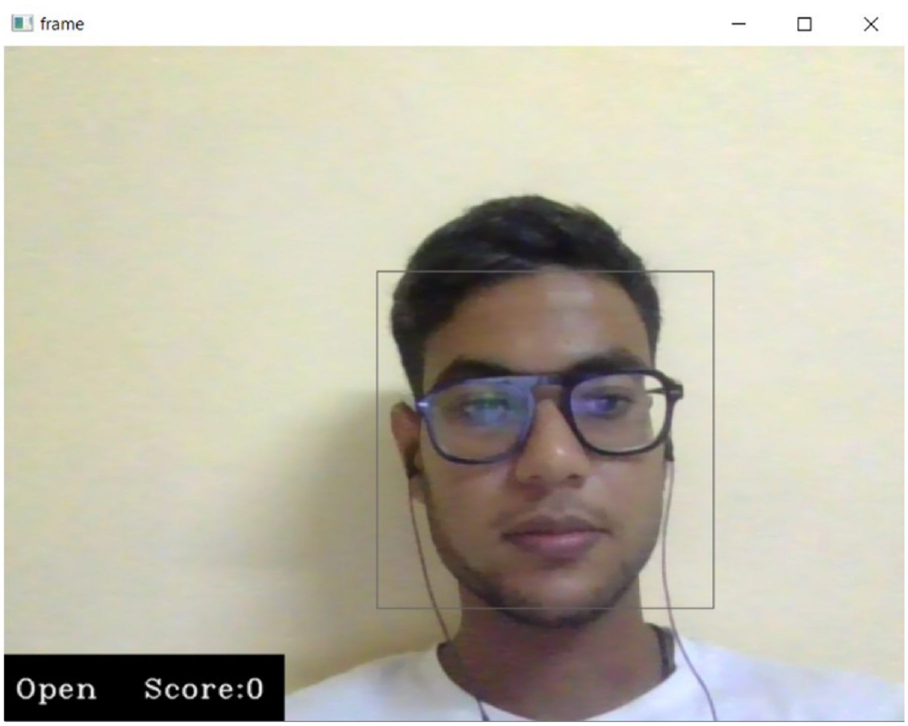

Fig 4.2: When eyes are open: score = 0

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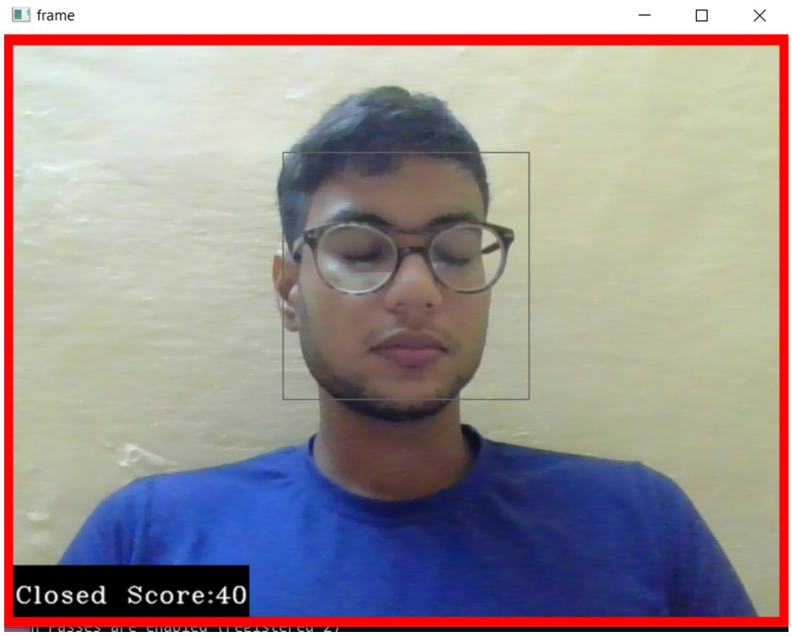

Fig 4.2: When eyes are closed : score = 40

4. CONCLUSION

The system is deemed to be in a normal state as long as the eyes are held above the top threshold. It is considered the commencement of the nodding sequence when the head tilts vertically down and reaches the upper barrier. If the head rebounds and reaches the lower threshold, the nodding sequence is aborted; however, if the head remains down and crosses the lower threshold, we know the driver is no longer watching the road. The device also checks the status of the eyes while monitoring their location in relation to the thresholds. The sequence is cancelled if the driver opens his eyes while moving down in his nodding sequence. The present system can finely determine whether the person operating the car is dozing off or not by taking into account all of the elements and employing all of the technology we had at our disposal. Not only does it successfully notify the driver, but it also sends a message to the person whose phone number is provided so that they are aware when the person driving the can is being careless or endangering its own and others' safety.

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