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ANALYSIS OF REAL TIME DRIVER FATIGUE DETECTION BASED ON FACE FEATURES AND PERCLOS

Email ID:-akhila.borimala@gmail.com

Name:-Borimala.Akhila

M.TECH-CSE

JNTUH college of engineering ,Jagtial

Email.ID:-sam@jntuh.ac.in

Name:-DR.P.Samulal

Professor of CSE Department

JNTUH college of engineering, Jagtial

Email:-sam@jntuh.ac.in

Name:DR.P.Samulal

HOD of CSE department

JNTUH college of engineering, Jagtial

ABSTRACT:

One of the most common causes of car accidents in recent years has been driver weariness. Driver drowsiness, which is an immediate sign of exhaustion, can be measured by the driver's current state of health. Due to this, drivers should be monitored for signs of tiredness to ensure they arrive at their destination safely. Because weariness detection is so important, our study is focused on developing a framework that can be used in the real world. The primary objective of the project is to continuously photograph the driver and collect ocular information using the given methodology. Uses a webcam and image processing to identify the driver in each frame of video that is recorded. In order to determine if a person is weary based on their facial traits, the aspect ratio, mouth opening ratio and the nose longitation connection are calculated.

This paper uses terminology like Image Processing, Computer Vision, Eye Aspect Ratio, and OpenCV.

I.INRODUCTION:

100,000 driver sleepiness or fatigue accidents occur in the United States each year, according to the National Highway Traffic Safety Administration (NHTSA). According to the National Highway Traffic Safety Administration, 72,000 accidents, 44,000 incidents, and 800 fatalities were caused by fatigued drivers in 2013. A car is used by every human being in today's globe. However, it has now become an essential part of the daily lives of most people, and is commonly seen as such. Most people are worried about their own safety, and the safety of one's vehicle is especially important in the event of a break-in or accident. No one takes drowsiness seriously because it's a natural occurrence. If this human tendency is not taken into account or acted upon, especially when driving on streets, it can have disastrous and deadly repercussions.

Drowsiness is described as feeling sleepy. Humans require a minimum of 6-7 hours of sleep per night in order to function properly and complete their daily tasks. In the event that this aspect is ignored and an individual does not get adequate sleep, this will result in fatigue. This can be dangerous if done while operating a motor vehicle. Drivers who are drowsy are responsible for the majority of car accidents, and this may be prevented.

Monitoring for drowsiness in the driver is a way to assure the safety of the vehicle and, as a consequence, may help prevent accidents. Road conditions, weather conditions, and mechanical faults can all contribute to a car collision. Despite this, driver error is to blame for 80% of issues, including drunk driving and driving when fatigued or sleep deprived. Factors such as vision, unconscious reasoning, and cognition all have an impact on how well a driver controls their vehicle. Accidents may occur if these parameters are reduced. These computer vision approaches are particularly effective since they can identify drowsiness based on facial and visual bio-compliance, such as head positions and gazes as well as eyelid movement and open mouths. Based on computer vision, we've come up with a new algorithm. Instead, the emphasis is on detecting blinks and measuring their frequency" (Eye aspect ratio). The driver's eyes may be seen throughout the video. In all lighting circumstances, an infrared camera records live video of the driver's eyes, and the images are retrieved for use in video capture and image processing systems. Drivers' eyes and sleep-detection measures are our primary emphasis. In the preceding system, image processing is crucial because it is one of the most effective strategies for promptly identifying tiredness and saving time to avoid accidents. This technology uses image processing to analyse the images taken by the vehicle's driver. Additional input identification features are also included in our project module. This would be a critical component in assuring the safety of motor vehicles.

II.LITERATURE SURVEY

SYSTEM REVIEW - In order to gather data for this study, we looked through numerous websites and applications for information on the general public's wants and needs. An audit based on this information let us come up with new ideas and devise new plans for our assignment. That such an application is required and that considerable progress has been made in this field was our conclusion.

TECHNOLOGY USED

a. PYTHON - Python is a high-level, general-purpose programming language that may be executed using an interpreter. Programming in Python is all about making code easier to understand by using a lot of whitespace. For both small and large-scale projects, its language constructs and object-oriented approach seek to help programmers produce clear, logical code. Programming paradigms such as procedural, object-oriented, and functional programming are all supported by Python.

b. IMAGE PROCESSING -Using computer techniques, digital image processing may be used to conduct image processing on digital images.

c. MACHINE LEARNING - It is the study of algorithms and statistical models for computer systems that can execute a specific task without relying on explicit instructions, but rather relying on patterns and inference. As a subset of it, artificial intelligence is regarded as a technology. Machine learning algorithms build a mathematical model from sample data, known as "training data," in order to make predictions or judgments without being explicitly instructed.

Using this strategy, you can recognise faces in colour images with ease. Eye candidates are typically found using an extremely sensitive detector of the surface of the skin. Noise reduction and morphological filtering of the understudy are also part of this process. Face-shaping rules are used to select the two remaining candidates. The results show that 90% of the frontal photographs with two well-lit faces were effective with this strategy. Furthermore, this strategy is unsuccessful for the great majority of profile images. Unless both eyes are open, the procedure will fail. In order to carry out additional study, it is necessary to do certain procedures including the identification of boundary areas and the identifying of light sources by an ear.

This study presents a reliable eye identification method based on grey intensity. Combining the advantages of two current techniques—a function-based method and a template-based approach—is our goal. For each eye, a feature-based approach is used to determine two raw areas on the body following the location of the face. A model-dependent technique is then used to identify the iris centres in these two rough areas. This method's efficiency and dependability have been demonstrated through many tests.

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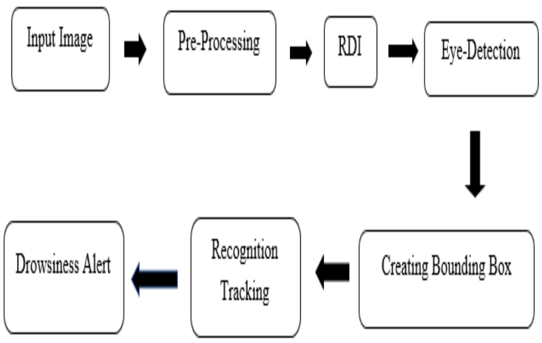
III. PROPOSED METHOD

In most cases, they can be traced back to the driver's eye highlights (frequently seen as reflections in the eye) in a video. Retinal reflection was used to find the eyes on the face and subsequently to determine when they were closed. The eye closing period can be determined by applying this method to sequential video outlines. When a motorist is in a sluggish state, the blinking time is longer than typical. It is also exceedingly small, and if left unattended for any length of time, it might cause a catastrophic failure. We will give a warning to the motorist as soon as we identify a closed eye.



BLOCK DIAGRAM

STEPS

- You can utilise a webcam to take photographs as an input for the camera if you want to. As a result, we constructed an infinite loop that would record every frame of the webcam. We use the OpenCV method cv2.VideoCapture(0) to access the camera and set the capture object (cap). Cap.Read() will take a snapshot of each frame and save it in a frame variable.
- Protest location computation (OpenCV) demands grey photos as input, therefore before we can identify a person's face in a photograph, we first need to convert it to grayscale. The items can be identified without the need of colour data. The Haar cascade classifier will be used to identify faces. Confront = cv2.CascadeClassifier('path to our haar cascade xml file') establishes our classifier. After that, we use faces = face to determine the location. detectMultiScale(gray). x,y coordinates and the protest's boundary box width can be found in this collection of findings. At this point, I'm able to create borders around each face and emphasise them.
- In the same way that faces can be recognised, eyes may be recognised using a technique called ROI. A cascade classifier for eyes is first established in l-eye, followed by the usage of shape[lStart:lEnd] to distinguish between the eyes (gray). We're now limited to extracting simply the eyeballs from the image. Remove the eye's boundary box and then use code to extract the eye image from the outline. The eye's image data is kept in the eye. OPENCV, a classifier that can tell if someone's eyes are open or closed, will incorporate this. As a result, we'll be taking out the correct part of your eye.
- In order to predict whether the eyes are open or closed, we use the OPENCV classifier. As a result, we had to go out a series of procedures in order to ensure that the model had the correct measurements to begin with. Gray = cv2.cvtColor(frame, cv2.COLOR BGR2GRAY) is used to convert the colour picture to grayscale. At this stage, we resize the image to 24*24 pixels, since our show relies on images with a resolution of 24*24 pixels. Our information is normalised to better match the r eye = r eye/255 standard. Each value must fall within the range 0 to 1.) Increase our classifier's measurements. We used exhibit = load model('models/cnnCat2.h5') to build our model. Currently, our model lpred = model.predictclasses(l eye) predicts each eye. It claims that the eyes are open if the lpred[0] esteem is 1, and it states that the eyes are closed when it is less than 1.
- You can use this score to determine the length of time the subject has been dozing off and on. If both eyes are closed, we'll keep adding points; if they're open, we'll take points away. cv2 is being used to

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display the result on the screen. The putText() function is able to display the individual's current state in real time. An upper limit has been set for when the score exceeds 15, which means that the person's eyes are shut off for a long amount of time. When we use sound to beep a warning, that's when it happens. play().

IV Methodology -It is the primary goal of this article to create a simple and user friendly system that will lead to a safe road journey.

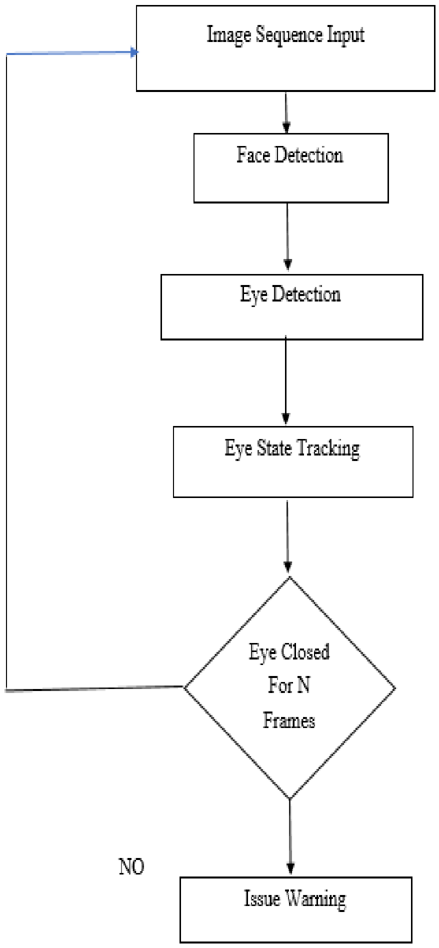

Figure 1 shows how the system's design was approached in a successful way. Sub-regions are used to determine whether or not an area of an image belongs to someone's face, and the processing method used to feed code to identify the face in an image. Only domains that contain faces are processed by this method.

Fig 2.

Fig 2 shows how the system would work and look in real world

Fig 3

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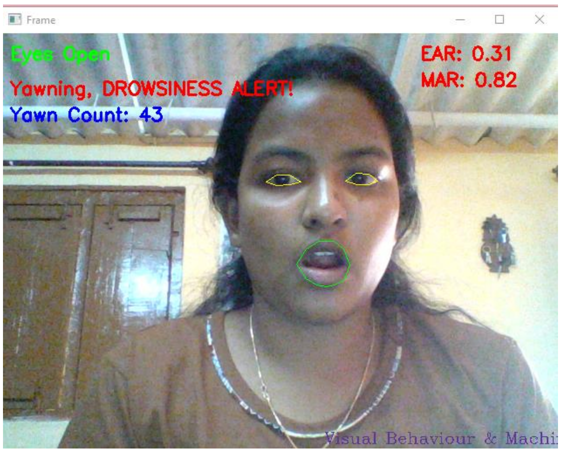


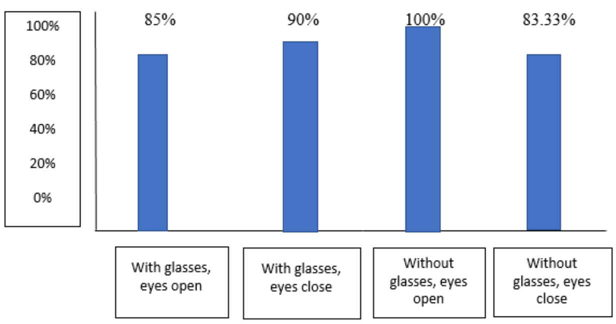
Fig 3,4,5,6An alarm is sounded when the eyelids are closed for an extended period of time in this real-time test case.

V Results:

The following is a list of four test situations that will be faced while working on this drowsy driver project.

Test Cases	Eyes Detected	Eye Closure	Result
Case 1	NO	NO	No Result
Case 2	NO	YES	No Result
Case 3	YES	NO	No Result
Case 4	YES	YES	Alarm Beep

Examples of Real-Life Situations We know a driver is tired if their eyes are closed above a certain number of edges. There will be warnings in the future about these kinds of scenarios. Attempts were attempted to determine the blink of an eye and tiredness in order to arrive at the conclusion. Our primary tool was a PC equipped with a 5-megapixel webcam. With a built-in white LED, the camera could be easily identified as working. White LEDs should not be utilised for framing in real-time, but infrared LEDs should. The built-in speaker plays a sound to rouse the driver if drowsiness is detected. The frame is flexible enough to accommodate a wide range of people and lighting conditions (day and night). For more than 95 percent of the time, the webcam is able to distinguish blinking and fatigue when the backdrop light is turned on.



Eye Fatigue Algorithm for Driver Drowsiness Detection System

VI.CONCLUSION

It is proposed in this post that visual activity and machine learning be used to create an inexpensive, real-time system for detecting tiredness. Some of the visual appearance metrics that a camera collects from a streaming video are the eye to mouth ratio, mouth opening ratio, and nose width reference. When driving, a camera module attached to the vehicle captures images of the driver's face, which the system subsequently analyses to determine the driver's health status. There are times when the acquired data points out that a person is asleep in the automobile, therefore they are alerted and offered the choice of stopping the vehicle. After analysing the feature values, machine learning classification techniques are applied.

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