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Drowsy Driver Monitoring System

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Abstract:

One of the leading causes of traffic accidents and fatalities is drowsiness while driving. Driver drowsiness detection and indication is therefore an active research area. Most of the conventional methods are either vehicle based, behavioral based or physiological-based. There are few ways to get in the way and distract the driver, and some require expensive sensors and data processing.

Therefore, in this study, a cost-effective real-time driver drowsiness detection system with acceptable accuracy is developed. In the development system, a webcam records the video and uses image processing techniques to detect the driver's face in each frame. Facial marks of the detected face are displayed and the eye aspect ratio, mouth opening ratio, and nose length ratio are calculated, and depending on those values, drowsiness is determined based on the developed adaptive threshold. Machine learning algorithms are also implemented offline.

***Keywords* — HTML, XML, IDE, PHP,RDBMS,GUI,HTTP,API, E-R,UML,OOAD**

I. INTRODUCTION

One of the top causes of fatalities in road accidents is dozing off while operating a motor vehicle. The most vulnerable drivers in this situation are those who operate trucks for extended periods of time and those who operate long-distance or overnight buses.In any nation, drowsy driving is a nightmare for passengers. Fatigue contributes to numerous injuries and fatalities in traffic accidents every year. Due to its high practicality, driver sleepiness detection and indication is a current study topic. Three blocks or modules make up a fundamental drowsiness detection system. systems for detection, treatment, and warning systems. Here, a video of the driver's front face is captured by the capture system, sent to the processing block, and processed online to detect drowsiness. If drowsiness is detected, the warning system will send a warning or alert to the driver.

Drowsy driver detection methods are generally classified into three types. Vehicle-based, behavior-based, physiological-based. Vehicle based methods continuously monitor many metrics such as steering wheel movement, throttle or braking patterns, vehicle speed, lateral acceleration, and lane departure. Detection of abnormal changes in these values is considered driver drowsiness. This is a non-behavior-based methods [1- 6] detect drowsiness by analyzing the driver's visual behavior i. H. blinking, eye closing, yawning, head bending, etc. This is also a non-contact measurement as a simple camera is used to detect these features. Physiology-based methods [8,9] monitor physiological signals such as electrocardiogram (ECG), electrooculogram (EOG), electroencephalogram (EEG), heartrate, and pulse rate, and based on these metrics: Detect drowsiness or drowsiness. Fatigue. Since the sensor is attached to the driver, this is an annoying measurement and distracting to the driver. The sensors used in the system add both cost and size to the system. However, including an additional parameter/function improves the accuracy of the system to some extent.

II. EXISTING SYSTEM

Now a days maximum members are using vehicle (car, lorry, bus). according to survey 10 to 15% are accidents are accruing because of the driver was in sleepy mode. No software has to give alert to the driver

- The existing system of driver drowsiness detection system has following disadvantages.
- Mainly, using of two cameras in the system one for monitoring the head movement and the other one for facial expressions.
- The other disadvantage is aging of sensors and all these sensors are attached to the driver's body which may affect the driver.

Block diagram of the proposed driver drowsiness monitoring system is shown in FIG. First, the video is recorded with a webcam. A camera is positioned in front of the driver and captures an image of what lies ahead. By extracting frames from the video, he gets a 2D image. Faces in frames are detected using Histogram of Oriented Gradients (HOG) and Linear Support Vector Machines (SVM) for object detection [7].

After recognizing the face, we mark the facial features such as the position of the eyes, nose, and mouth on the image. From facial features, it quantifies eye aspect ratio, mouth opening, and head position, and uses these features along with a machine learning approach to determine driver drowsiness. If it detects drowsiness, it will warn the driver. Details of each block are described below.

A system has been proposed to measure traffic density by comparing captured images containing real-time traffic information with images of empty roads as reference images. Each lane is assigned a minimum green light duration. Control can be performed according to the duration of the appropriate traffic light in percentage.

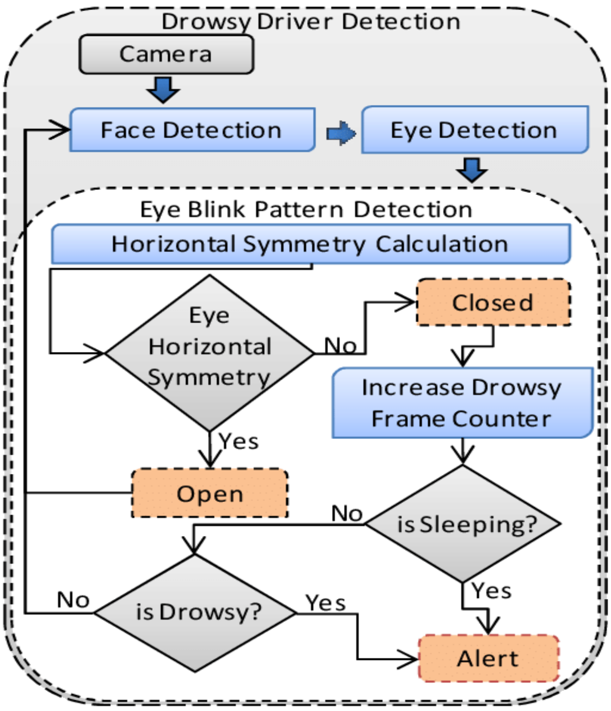

Fig 1: Proposed System

IV. ADVANTAGES

- A webcam-based system to detect driver's fatigue from the face image only using image processing and machine learning techniques to make the system low-cost as well as portable.
- The developed system is capable in identifying the state of drowsiness quickly.
- The system is capable of differentiating between normal eye blink and the eye blink associated with drowsiness.

V. MODULES

A. Data Acquisition
B. Face Detection
C. Facial Landmark marking
D. Feature Extraction
E. Classification

Data Acquisition

The video is recorded with a webcam, the frames are extracted and processed on a laptop. After extracting the frames, image processing

extracting the frames, image processing techniques are applied to these 2D images. Synthetic driver data is now being generated. Volunteers are asked to intermittently wink, close their eyes, yawn, and bend their head to look at the webcam. Video is recorded for 30 minutes.

Face Detection

- After extracting the frames, first detect the human face. There are numerous online facial recognition algorithms. In this study, histogram of oriented gradients (HOG) and linear SVM methods are used. This method computes a positive sample of descriptors. Then negative his samples of the same size (samples that do not contain the objects required for detection, i.e. human faces here) are taken and the HOG descriptors are calculated. After getting the features of both classes, a linear SVM is trained for the classification task. Hard negative mining is used to improve VM accuracy. In this method, after training, the classifier is tested on marked data, and false positive sample feature values are used again for training purposes. For the test images, a fixed size window is moved over the image and the classifier computes the output for each window position. Finally, the maximum returned value is taken as the detected face and a bounding box is drawn around the face. This non-maximum suppression step removes redundant and duplicate bounding boxes.

Facial Landmark Marking

- Once the face is recognized, the next step is to find the locations of various facial features such as the corners of the eyes, corners of the mouth, and the tip of the nose. Before that, face images should be normalized to reduce the effects of distance from the camera, uneven lighting, and different image resolutions. So the face image is reduced to 500 pixels wide and converted to a grayscale image. After image normalization, an ensemble of regression trees is used to estimate the locations of facial landmarks from a sparse subset of pixel intensities.

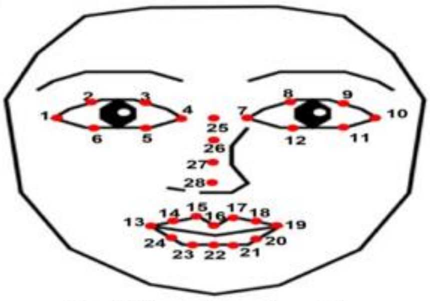

Fig 2: Facial Landmarking

$$EAR = \frac{(p2 - p6) + (p3 - p5)}{2(p4 - p1)}$$

Mouth Open Ratio(MOR) is also used to detect drowsiness

$$MOR = \frac{(p15 - p23) + (p16 - p22) + (p17 - p21)}{3(p19 - p13)}$$

Feature Extraction

After capturing facial features, the features are calculated as follows: Eye Aspect Ratio (EAR): From the corner point of the eye, the eye aspect ratio is calculated as the ratio of eye height to width, as given by the following formula

Classification

Customizing this default setting lessens this effect because everyone's eyes are different sizes. As the mouth may not be fully open during the initial image setup stage, the MOR threshold is also determined empirically through observation.

Drowsiness (or yawning) is identified if the test value exceeds this level. To determine the angle the head makes with regard to the vertical axis in relation to the anticipated nose length, one uses the head curvature function.

NLR generally ranges from 0.9 to 1.1 in an upright position, and it rises or falls during sleepiness depending on how the head is inclined. The calculation of the average nose length uses the average nose length at the setup stage,

VI. RESULT

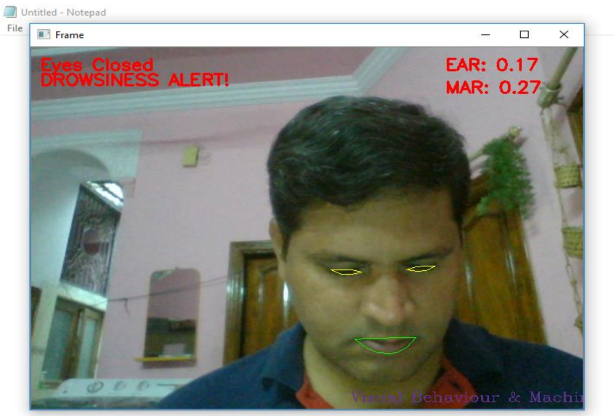

Fig 3: Result of proposed system

VII. CONCLUSION

Based on ocular behaviour and machine learning, a low cost, real-time driver sleepiness monitoring system has been presented. Here, streaming video from a webcam is used to compute visual behaviour characteristics as eye aspect ratio, mouth opening ratio, and nose length ratio. To identify driver tiredness in real time, an adaptive thresholding method has been created.

With the created synthetic data, the designed system performs precisely. The feature values are then saved, and machine learning methods have been utilised for categorization.

Additionally, the system will be built in hardware to make it portable for automobile systems, and a pilot research on drivers will be conducted to validate the produced system.

REFERENCES

1. *Codesnippetsforanyerrors*http://stackoverflow.com/
2. *AndroidDevelopmentGuide*https://www.udemy.com/android
3. *XmlandLayout Guide*https://www.androidhive.com/
4. *ConnectingtoFirebaseDocs* https://firebase.google.com
5. *SoftwareTesting*http://en.wikipedia.org/wiki/Software_testing
6. *ManualTesting*http://en.wikipedia.org/wiki/Manual_testing
7. https://towardsdatascience.com/vehicle-detection-using-support-vector-machine-svm-19e073b61d16