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Driver Face Detection System to Control Vehicle Accidents Using Bayesian Classifier

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ABSTRACT*:* In recent years, the increase in road accidents caused by driver drowsiness has become a major concern for public safety worldwide. To address this issue, Driver face detection System (DFDS) that utilizes visual behavior and machine learning techniques has been developed. This system aims to detect and prevent accidents caused by drowsy drivers by continuously monitoring their facial features and eye movements, allowing for timely alerts and interventions. The DFDS employs advanced computer vision algorithms to analyze real-time video data captured by an in-vehicle camera. The captured images are processed to extract relevant facial landmarks, such as eye corners, eyebrows, and mouth shape. These landmarks are then tracked over time to analyze changes in facial expressions and detect signs of drowsiness. Machine learning algorithms, specifically deep neural networks, are trained on a large dataset of annotated facial expressions and eye movement patterns to recognize different stages of drowsiness. By leveraging the power of deep learning, the system can accurately classify and identify drowsiness-related patterns in real-time, enabling prompt intervention.

KEYWORDS: Facial Expression Recognition, Eye Tracking, Head Pose Estimation, Blink Detection, Feature Extraction, Classification Algorithms

I. INTRODUCTION

One of the main factors contributing to fatalities in traffic accidents is drowsy driving.Bus drivers on long-distance routes or overnight buses, as well as truck drivers who operate for extended periods of time (particularly at night), are more prone to this issue. In every country, passengers' worst nightmare is a drowsy driver. Numerous people are hurt or killed in traffic accidents each year as a result of driver drowsiness. Therefore, due to its enormous practical relevance, the detection of driver weariness and its indication are important study areas. The acquisition system, processing system, and warning system are the three components or modules that make up the fundamental sleepiness detection system. Here, the frontal face of the driver is acquired on camera by the acquisition system and sent to the processing block for analysis. To identify sleepiness, it is processed online. A warning or alert is sent to the driver by the warning system if drowsiness is discovered.

II. RELATED WORK

Visual Behavior Analysis

Visual behavior analysis plays a crucial role in driver face detection systems. Researchers have explored various visual cues, such as eye movements, facial expressions, and head pose, to infer the driver's drowsiness level. For instance, eye closure duration and blink rate have been widely used as indicators of drowsiness. By tracking eye movements, researchers have successfully developed algorithms capable of detecting fatigue-induced microsleep episodes, which are brief lapses in attention that can lead to accidents**.**

Machine Learning Techniques

Machine learning algorithms have revolutionized driver face detection systems by enabling accurate and real-time analysis of visual behavior data. Various machine learning models, including Support Vector Machines (SVM), Random Forests, and Convolutional Neural Networks (CNN), have been employed to classify different drowsiness levels based on visual cues. These models are trained using annotated datasets, where driver behavior is labelled as alert, drowsy, or asleep.

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Challenges and Future Directions

Despite the advancements made in driver face detection systems, several challenges remain. One significant challenge is the variability in individual driving behavior, as different people exhibit distinct visual patterns when drowsy. Additionally, environmental factors, such as lighting conditions and road type, can influence the performance of these systems.

III. LITERATURE REVIEW

Under the title "Intelligent Video-Based Drowsy Driver Detection System,"
Implementation of Embedded Software and Various Illuminations

AUTHORS

X. H. Yu, C. P. Fan, W. L. Ou, M. H. Shih, C. W. Chang,

Description

This work develops an intelligent, video-based drowsy driver detection system that is unaffected by different lighting conditions. The suggested technique effectively detects sleepy conditions even when a driver is wearing glasses. The suggested method is broken down into two cascaded computational operations using a near-infrared (NIR) camera: the driver's eye detection and the drowsy driver identification. The accuracy of the drowsy status detection is up to 91%, and the average open/closed eye detection rates without or with spectacles are 94% and 78%, respectively. The embedded platform's FPGA-based implementation increases the processing performance for the 640x480 format.

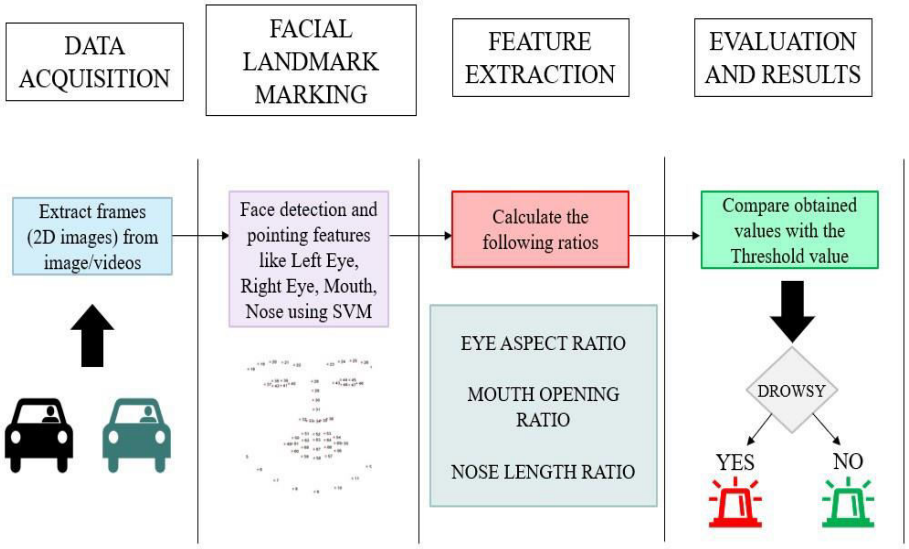
PROPOSED SYSTEM

The suggested driver fatigue detection system has been illustrated. The footage was initially captured with a webcam. To get a good shot of the driver's face, the camera will be placed in front of him or her. Histograms of oriented gradients (HOG) and linear support vector machines (SVM) for object detection are used to identify faces in the frames. The positions of the eyes, nose, and mouth are marked on the photos after the face has been detected. An alarm will sound if sleepiness is detected. will be delivered to the driver to notify them.

Advantages

- High accuracy
- High efficiency

SYSTEM ARCHITECTURE



MODULES

- User module
- System module

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User module

The User Module for Driver face detection System to control vehicle accidents using Bayesian classifier is a crucial step towards promoting road safety and preventing accidents caused by driver drowsiness. By combining cutting-edge visual analysis techniques and machine learning algorithms, this system keeps drivers vigilant, reducing the risk of road accidents and saving lives.

System module

Detect sleepiness with access

Injury-related accidents are primarily caused by drowsy driving. Sleep deprivation and exhaustion can produce sleepiness, which can happen even when cycling. The best strategy to prevent accidents caused by drowsy drivers is to notice their tiredness and warn the motorist before they fall asleep. Many methods, including ocular retina detection and facial function recognition, have been employed to detect tiredness.

Alarm sounds

To initiate the alarm or alert message.

PROPOSED ALGORITHM

SVM

We forecast and categorize data using machine learning, utilizing various techniques depending on the dataset. A linear model called Support Vector Machine, or SVM for short, is employed to address classification and regression problems. It can resolve both linear and non-linear problems and is effective for a variety of real-world challenges. The idea behind SVM is simple: The method generates a line or a hyperplane that categorizes the data. A popular kernel function in machine learning that is used in many different kernelized learning techniques is the radial basis function kernel, or RBF kernel. Particularly in support vector machine classification, it is frequently used. A hyperplane is a straightforward illustration of a classification assignment with only two categories. features (such as the illustration above). A hyperplane is a line that linearly classifies and divides a set of data.

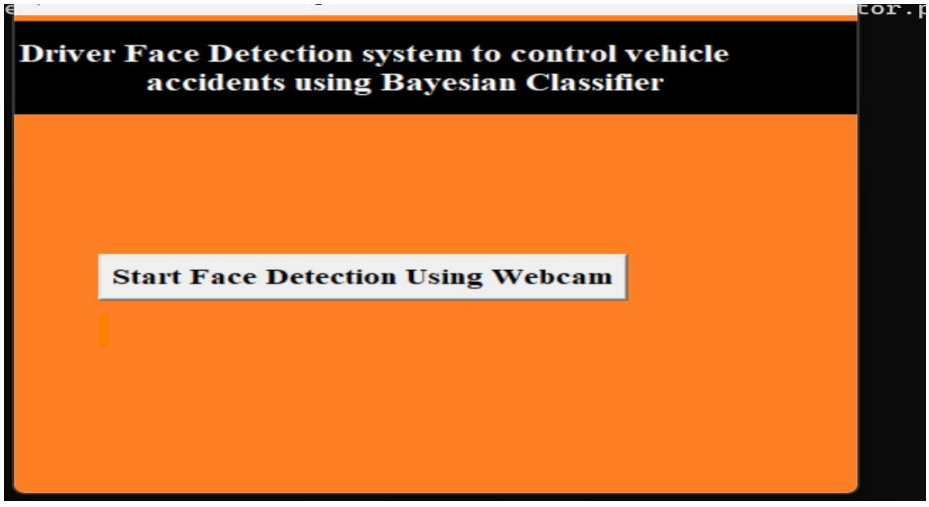
Step 1: In light of our qualifications, I will need an image to start. I will later need to develop a cascade classifier that will eventually provide us with the face's features.

Step 2: In this stage, OpenCV will be used to read the features file and the image. As a result, the main data points at this stage are NumPy arrays.

All I have to do is look up the values in the face NumPy N-dimensional array's row and column. The face rectangle coordinates are contained in this array.

Step 3: Displaying the image with the rectangle face box is the last stage.

IV. SCREEN SHOTS



Homepage

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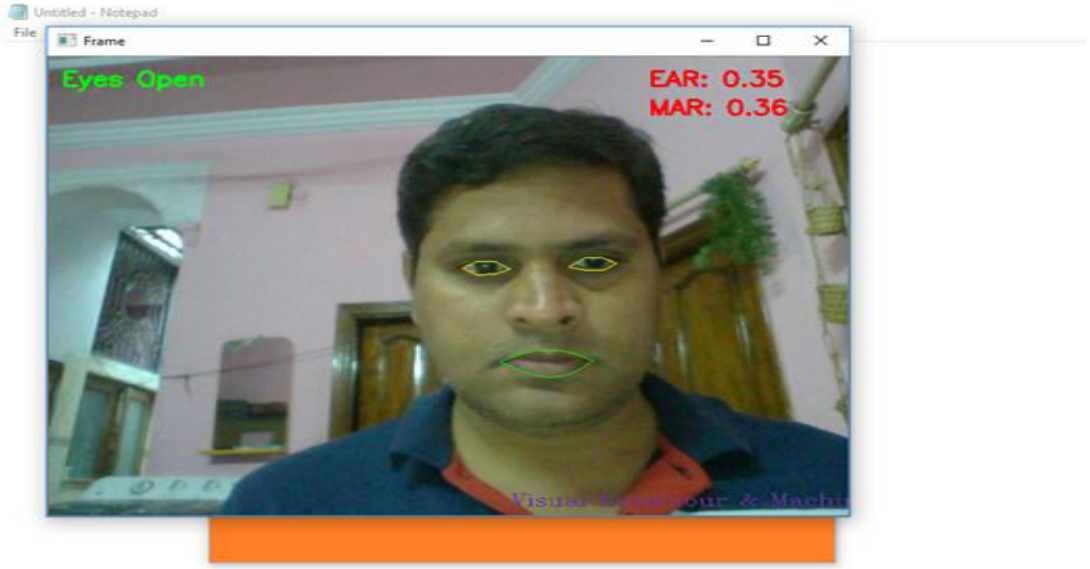
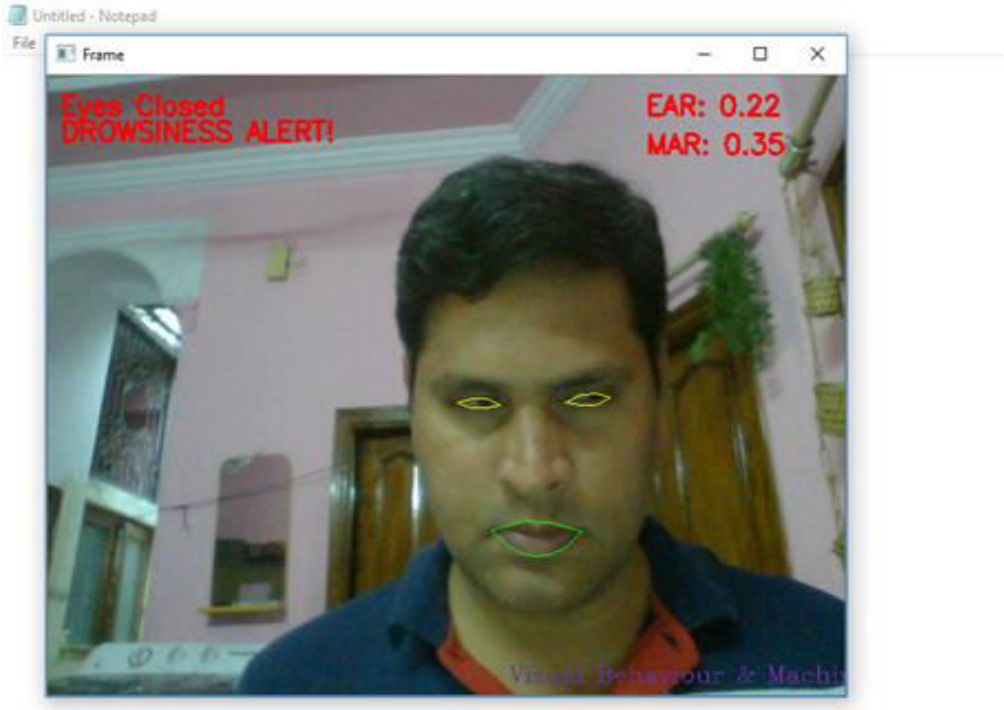


Eyes Open Screen



Eyes Closed Drowsiness Alert

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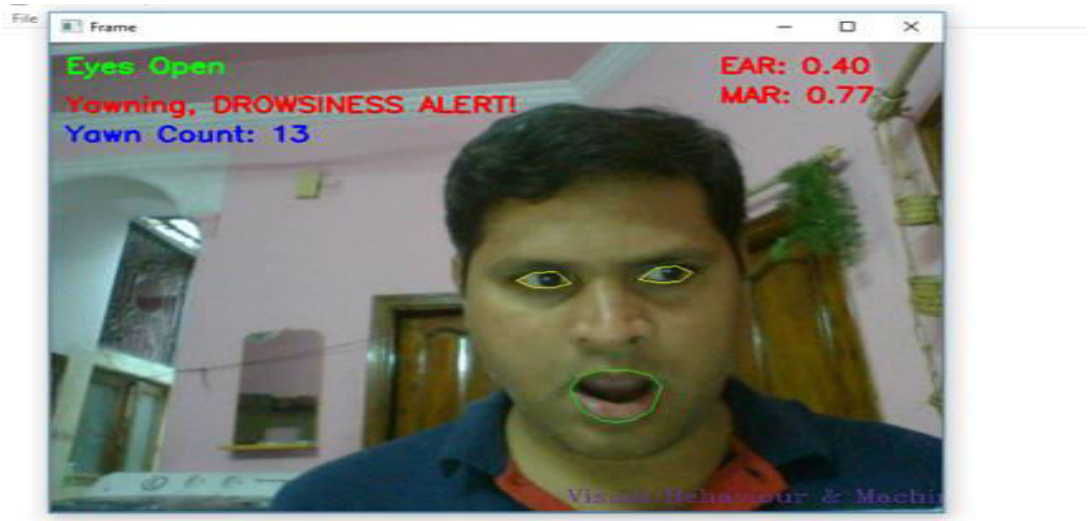

Eyes Open and Yawn Drowsiness Alert

Eyes Closed Drowsiness Alert

V. CONCLUSION

This project a real-time, low-cost driver face detection system based on machine learning and visual behavior. Here, streaming video from a webcam is used to compute aspects of visual behavior such as eye aspect ratio, mouth opening ratio, and nose length ratio. A real-time method for detecting driver intoxication has been created using adaptive thresholding. With the generated synthetic data, the built system performs precisely. The feature values are then saved, and machine learning methods are applied to categorize the data. A pilot study involving drivers will be conducted to validate the developed system before it is implemented in hardware to make it portable for automobile systems.

REFERENCES

[1] W. L. Ou, M. H. Shih, C. W. Chang, X. H. Yu, C. P. Fan, "Intelligent Video-Based Drowsy Driver Detection System under Various Illuminations and Embedded Software Implementation", 2015 international Conf. on Consumer Electronics - Taiwan, 2015.

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[2] W. B. Horng, C. Y. Chen, Y. Chang, C. H. Fan, "Driver Fatigue Detection based on Eye Tracking and Dynamic Template Matching", IEEE International Conference on Networking,, Sensing and Control, Taipei, Taiwan, March 21-23, 2004.

[3] S. Singh, N. P. papanikolopoulos, "Monitoring Driver Fatigue using Facial Analysis Techniques", IEEE Conference on Intelligent Transportation System, pp 314-318.

[4] B. Alshaqaqi, A. S. Baquhaizel, M. E. A. Ouis, M. Bouumehed, A. Ouamri, M. Keche, "Driver Drowsiness Detection System", IEEE
International Workshop on Systems, Signal Processing and their Applications, 2013.

[5] M. Karchani, A. Mazloumi, G. N. Saraji, A. Nahvi, K. S. Haghighi, B.
M. Abadi, A. R. Foroshani, A. Niknezhad, "The Steps of Proposed Drowsiness Detection System Design based on Image Processing in Simulator Driving", International Research Journal of Applied and Basic Sciences, vol. 9(6), pp 878-887, 2015.

[6] R. Ahmad, and J. N. Borole, "Drowsy Driver Identification Using Eye Blink Detection," IJISET - International Journal of Computer Science and Information Technologies, vol. 6, no. 1, pp. 270-274, Jan. 2015.

[7] A. Abas, J. Mellor, and X. Chen, "Non-intrusive drowsiness detection by employing Support Vector Machine," 2014 20th International Conference on Automation and Computing (ICAC), Bedfordshire, UK, 2014, pp. 188- 193.

[8] A. Sengupta, A. Dasgupta, A. Chaudhuri, A. George, A. Routray, R. Guha; "A Multimodal System for Assessing Alertness Levels Due to Cognitive Loading", IEEE Trans. on Neural Systems and Rehabilitation Engg., vol. 25 (7), pp 1037-1046, 2017.

[9] K. T. Chui, K. F. Tsang, H. R. Chi, B. W. K. Ling, and C. K. Wu, "An accurate ECG based transportation safety drowsiness detection scheme,"343 IEEE Transactions on Industrial Informatics, vol. 12, no. 4, pp. 1438- 1452, Aug. 2016.

[10] N. Dalal and B. Triggs, "Histograms of Oriented Gradients for Human Detection", IEEE conf. on CVPR, 2005.

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