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An Image processing Drowsiness Detection Model for Vehicles

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Abstract

Long distances and motorway driving can be tiring and monotonous. In recent years, drowsiness and fatigue have become the supreme reasons for causing severe road accidents in India and worldwide as well. The significant increment in the percentage of road accidents due to drowsiness and fatigue seized the researcher's attention. It has also been observed that driver's performance also deteriorates with increase in drowsiness. In NHAI's studied those during the mid-night 90% accidents are due the driver's drowsiness and fatigue. With this view, the creation of intelligent vehicles has been exponentially increased. This paper proposes an image processing model to detect the drowsiness of the driver and provide an alert message through a beep sound. The alarm will be beeping until the driver's eye position changes. The efficiency of the model is also verified and found to be 90% accurate.

Keywords

Drowsiness, Eye Aspect Ratio (EAR), Camera, Threshold value, Model

This paper is divided into Introduction, literature survey, proposed model and results.

1. Introduction

In long distance routes motorway driving can be tedious and repetitive and people who drive for long way can get drowsy easily which in turn decreases the driver's performance and sometimes even there may be a chance of getting accident.

"Drowsiness detection model" is an application for Vehicles where a driver will get an alert when he/she gets drowsiness. In the proposed work, It is implemented to detect the drowsiness and fatigue of a driver in real-time based on the image captured. The work is based on driver's behavior, camera installation and conventional algorithm to detect the possible coordinate to identify eyes. Existing state of art methods are computationally complex as compare to the proposed methodology

Cameras are embedded to monitor and capture to extract frames one by one and generate the alerts accordingly. Each extracted frame is analyzed at time to study the pattern of facial features. EAR values exceed their respective threshold values, a blink and a yawn is considered respectively.

To build the proposed system python programming language is used as a backend purpose and Visual studio code environment is used for execution. Mainly there will be three modules namely preprocessing module, Implementation of algorithm to generate eye aspect ratio and a module for analysis and alert.

2. Literature Survey

A.Sahayadhas, k sundar raj and M murugappan [1] propose a method for detecting driver drowsiness through sensors which can be identified using different physical sensors.

A. S. Baquhaize l and et al [2] explains a system to detect sadness of a person and re identification of the person through histogram using non over lapping camera network.

In [3] the authors explain how to identify eyes and face in an IR camera through marking technologies to identify drowsiness in a driver.

S. Vitabile, A. De Paola, and F. Sorbello. [4] In the paper bright pupil detection technology is discussed by the authors and they have even discussed about real time devices in detection of drowsiness.

A. M. Malla, P. R. Davidson, P. J. Bones, R. Green, and R. D. Jones. [5] In this paper the authors have discussed about automated video-based measurement of eye closure for detecting behavioural micro sleep based on which different frames are considered.

In [6] the authors have discussed how eeg can be used through svm to detect drowsiness while driving.

D. Dinges and M. Mallis. [7] In this paper the author has discussed about how fatigue must be identified while addressing drowsiness issue which in term will help to identify fatigueness while driving.

R. Lienhart and J. Maydt. Proceedings.[8]In this paper the authors has explained about how Haar classification is used for identifying set of data and predicting the boundaries of the object and detecting different aspects of an image.

J. A. Horne and L. A. Reyner[9]In this paper we can see how sleepiness is a major reason in obstructing concentration of the driver or a machine operator in work which in term results in major disturbance for the driver or the operator.

From [1-9] it is understood that various image processing techniques and various algorithms can be applied to detect the drowsiness of the driver. Different sensors and devices are also used by the authors and the accuracy in detecting the drowsiness is also studied. These devices and sensors were costly to use and were not affordable. These systems did not specify the details of detection of stagnant images.

The next section gives the details of the proposed model.

3. Proposed Model

The proposed model is built in three phases namely phase I captures and preprocess the image, phase II- Implementation of the algorithm, phase III - analysis and alert of the images. The following figure 3.1 explains the model in details

Phase 1– It's a process where live image will be captured in the camera and the image will be converted to text format and the output of this phase is given as the input for the next phase where Eye aspect ratio is considered for the prediction of drowsiness.

Phase 2 – It's a process of generating Eye aspect ratio from the obtained live image which in term is converted to text format where several frames will be considered for the prediction of Eye aspect ratio for the obtained data.

Phase 3– It's a process of analyzing Eye aspect ratio with the threshold value of it and making analysis as the person is drowsy and it will give an alert in sound format and the alarm will not stop till the driver open the eyes.

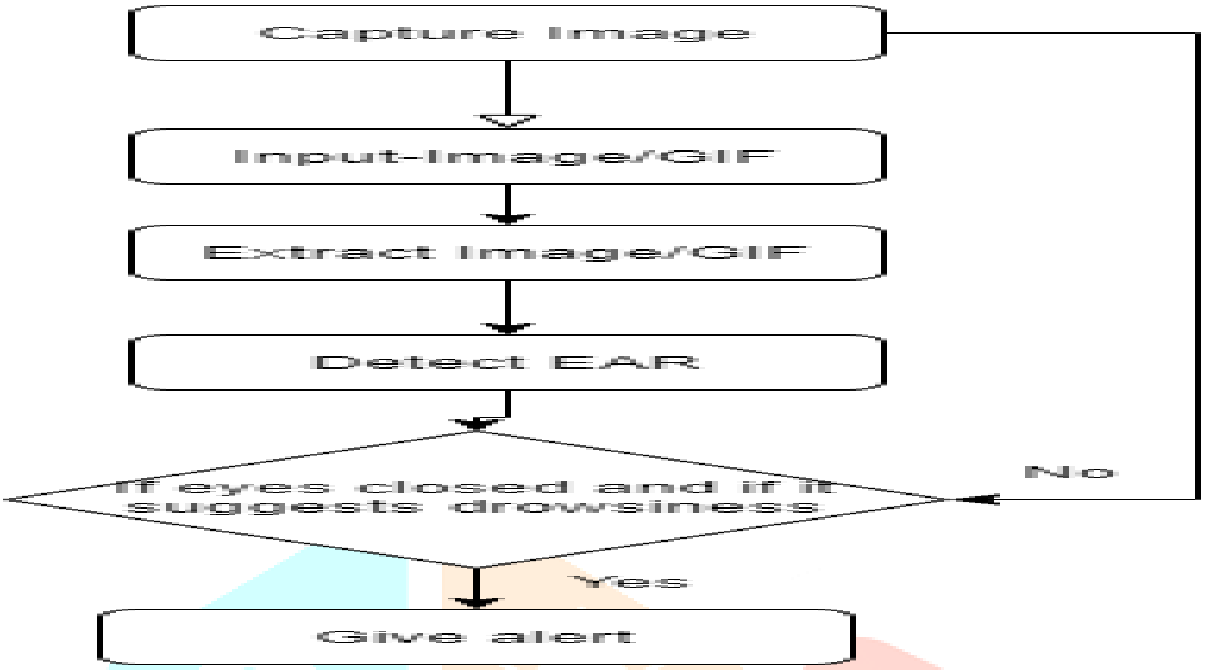
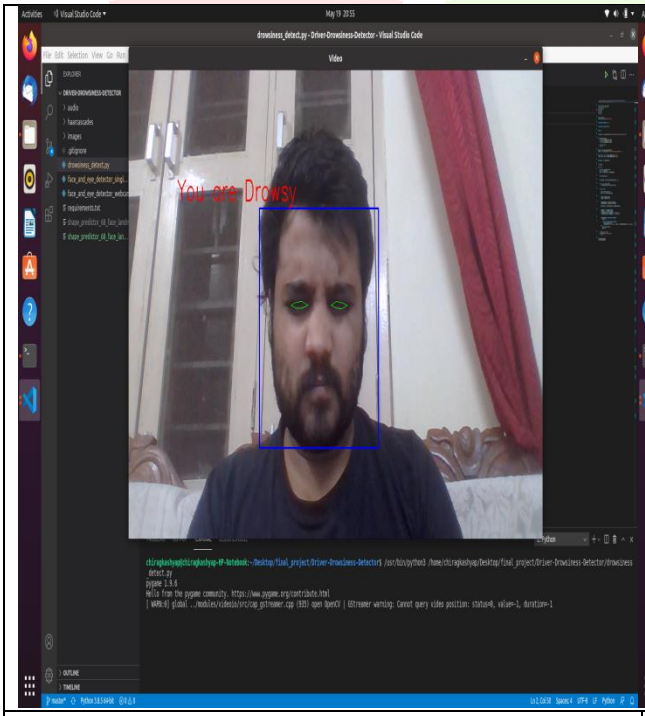
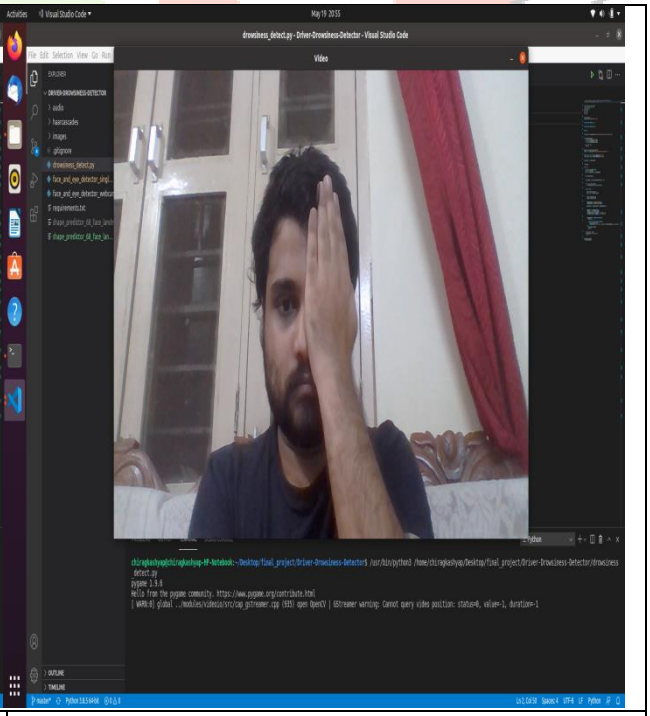


Fig 3.1- Model Workflow



Detection of Drowsiness

Fig 3.2



System is not detecting eyes and face

Fig 3.3

With regard to above images in the first image the system detected the drowsiness of the driver based on driver's eye moment and Eye aspect ratio and a stagger alarm rang till the driver opened eyes completely. In the second image the system did not detect the face because the driver's eyes were not visible so the system could not predict any result.

4. Conclusion

This paper was an attempt to discuss when a driver gets drowsiness or feel sleepy while driving the vehicle there may be a minimal chance of an accident. Hence to avoid this situation driver will get an alert with a triggering alarm catching the attention of the driver will be caught and alertness of the driver will be improved when the drowsiness is detected and an alert is sent to the driver. The algorithm is tested for 100 images and found to be 90% accurate.

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