



LIVE DROWSINESS DETECTION ALERT IN WEBCAM USING PYTHON OPENCV

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Abstract: Now a days, drivers drive their vehicle, transport, truck, merchandise vehicle, movers without taking break and they experience the evil impacts of absence of rest. The different investigations and reports states that weakness and tiredness are important sources of serious street mishaps. The elementary motivation behind the developed framework is to detect the driver's facial condition, and to find out that the driver is feeling tired, at that time, the framework will trigger an admonition in such a situation the threat ringers or educate the travelers. The camera ceaselessly records the facial behavioral milestone and development of eyes of the driver due to the consideration that lethargic drivers have longer eye flickering than ordinary person. Through that live video spilling, a foothold is extricated for picture preparing. Pictures are caught ordinarily at a fix outline pace of 20fps. Utilizing the image and comment information collected, the framework comprehends the position the most driver is feeling languid by estimating the directions of the right and left eye. The human visual setting how or another speaks to the element of the scene with two or three significant data in it. The estimation picks unequivocal, perceiving bits of data with reference to a person's face and concentrate those major factor structure the photos. For the premier part, it takes to diminish photos of the article as data, and a brief time later perceives the driver's condition snared in to an ebb and flow condition for sluggishness using the consideration edge extent. Bike drivers are wearing helmet so it not shows their face, so we use spot detection algorithm. The purpose, when the structure recognizes any sporadic improvement of the most driver, it'll alert the most driver, explorer, or naval force controller quite caution, notice pop-ups, alarm sound.

Keywords Python OpenCV, Pop-ups, LSTM.

I. INTRODUCTION

The Driver exhaustion is a noteworthy factor in countless mishaps. Late measurements gauge that yearly 1,200 passing and 76,000 wounds can be credited to fatigue related crashes. Driver drowsiness and fatigue is a major factor which results into numerous vehicle accidents. Developing and maintaining technologies which can efficiently detect or prevent drowsiness at the wheel and alert the driver before any mishap is a major challenge in the field of accident prevention systems [4]. Because of the dangerous that drowsiness can cause on the roads, some methods need to be developed for preventing counteracting its effects.

With the advent of modern technology and real time scanning systems using cameras, we can prevent major mishaps on the road by alerting car driver who is feeling drowsy through a drowsiness detection system the point of this undertaking is to build up a prototype drowsiness detection system [6]. The spotlight will be put on planning a framework that will precisely monitor the open or shut condition of the driver's eyes continuously. By monitoring the eyes, it is believed that the symptoms of driver fatigue can be detected early enough to avoid a car accident. Detection of fatigue [7-9] involves the observation of eye movements and blink patterns in a sequence of images of a face.

II. LITERATURE SURVEY

It is well known that blink, yawn, and heart rate changes give clue about a human's mental state, such as drowsiness and fatigue [1]. In most of the research, image sequences, as the raw data, are captured from smart phones which serve as non-contact optical sensors. Video streams containing subject's facial region are analyzed to identify the physiological sources that are mixed in each image. Then multi-channel second-order blind identification (SOBI) [3] is used to extract blood volume pulse and eye blink and yawn signals as multiple independent sources simultaneously without any other sophisticated processing. This task is complicated as it

needs high-level semantic understandings of both the scenes and underlying motion patterns in video sequences. In practice, cluttered situations have also raised higher demands on the effectiveness and robustness of models. Motivated by these observations, deep learning based framework is developed, which simultaneously performs deep feature learning for visual representation in conjunction with spatio-temporal context modeling. After that, a unified path-planning scheme is developed to make accurate path prediction based on the analytic results returned by the deep context models. The highly effective visual representation and deep context models ensure that deep context model makes a deep semantic understanding of the scenes and motion patterns, consequently improving the performance on visual path prediction task. In experiments, the model's performance is evaluated by constructing two large benchmark datasets from the adaptation of video tracking datasets. The qualitative and quantitative experimental results showed that deep context based approach outperforms the state-of-the-art approaches and owns a better generalization capability. Landmark detection has proven to be a very challenging task in biometrics. In the further research, the task of facial component-landmark detection is addressed [2]. By “component”, it refers to a rectangular sub-region of the face, containing an anatomical component (e.g., “eye”). A fully automated system for facial component-landmark detection based on multi-resolution isotropic analysis and adaptive bag-of-words descriptors incorporated into a cascade of boosted classifiers. Specifically, first each component-landmark detector is applied independently and then the information obtained is used to make inferences for the localization of multiple components. The advantage of this approach is that it has robustness to pose as well as illumination. Obviously, it has a failure rate lower than that of commercial software. Additionally, the initialization of a point landmark detector results superior in performance comparable with that of state-of-the-art methods and all the experiments are carried out using data from a publicly available datasets.

III. SYSTEM MODEL

In the existing system, an effective, low-cost driving fatigue detection system was used to sense driver's nodding movements using commodity RFID. The system measures the phase difference between two RFID tags attached to the back of a hat worn by the driver. To accurately extract nodding features, an effective approach is used to mitigate the environment noise, the interference caused by surrounding movements, and the cumulative error caused by the frequency hopping offset in FCC compliant RFID systems. A long short-term memory (LSTM) auto encoder is utilized to detect nodding movements using calibrated data. The detection performance of the proposed system is validated by extensive experiments in various real time driving scenarios.

The proposed unsupervised driving fatigue detection system is illustrated in Figure 1. This system is composed of four main modules, including data sensing, movement feature extraction, offline training, and online drowsiness detection. In the data sensing module, head movement is captured by received phase values from the tags attached to the driver's hat. Then, the nodding features are distinguished from other head movements in the movement feature extraction module. The phase difference between two RFID tags is estimated to mitigate the influence of vehicle vibration. Derivative calculation is proposed to remove the cumulative error caused by the real time frequency hopping. Finally, an unsupervised learning model is used to learn the nodding features, and the online nodding detection is executed with the well-trained model. Nodding will be detected by calculating the divergence between the input and output signals of the auto encoder model.

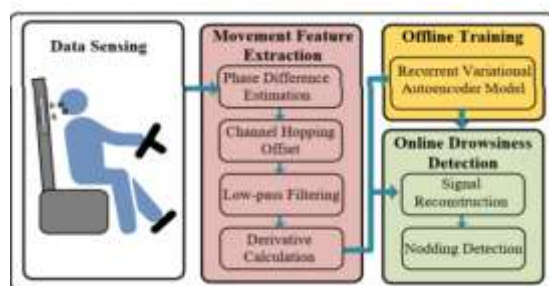


Fig. 1 Architecture of the System

Various drivers drive their vehicle, transport, truck, merchandise vehicle, movers during day and getting dull, and a few of the time, they experience the evil impacts of absence of res. The different investigations and reports state that the weakness and tiredness are a number of the most sources of serious street mishaps. The elemental motivation behind the framework is to detect the driver's facial condition, and to find out the driver is feeling tired, at that time, the framework will trigger an admonition in such a situation

the threat ringer or educate the travelers. The camera ceaselessly records the facial behavioral milestone and development of eyes of the driver due to the lethargic drivers have longer eye flickering than ordinary person.

Algorithmic steps

- The overall algorithm is pretty straightforward one.
- First, camera is setup at desirable position in a car that looks for faces stream.
- If face gets detected, the facial landmark detection task is applied and region of eye is extracted.
- Once reached the eye region, the Eye Aspect Ratio is calculated to find out if the eye-lids are down for a substantial amount of time and if it is down then the alert will sound noisy to wake the driver up. For the functionalities of the system and to make it work efficiently OpenCV, Dlib and Python have been used.
- The implementation of the drowsiness detection system includes machine learning algorithms which is included in OpenCV ML algorithms. The proposed model works well overall and can also be used to detect any type of objects with the required software.

IV. IMPLEMENTATION

- First, a new file drowsy_detect.py is created. Then, for calculating the eye aspect ratio, the Euclidean distance between the facial landmarks points is calculated and in order to do this SciPy package is imported in python script..
- Also the package named imutils is needed for image processing and computer vision functions to assist OpenCv. The thread class is imported so that the alarm can be beeped and this thread class ensured that script doesn't stop/pause execution while the alarm beeps. In order to play a beep sound, sound library is also imported in the script.

Facial landmarks and eye aspect ratio calculation

For detecting and localizing facial landmarks, there is a need to import Dlib package. Eye_aspect_ratio function is defined to calculate the distance between the eye landmarks which are measured from vertical and horizontal direction. So, when the eye is open, the value of eye aspect ratio will be constant approximately. Then the value will rapidly decrease and reaching zero in case of an eye blink. When the eye is closed, eye aspect ratio again reaches to an approximate constant value which is very smaller compared to when the eye is open. Therefore, the dip in the aspect ratio indicates blink of the eyes. The Dlib library served as a facial landmark detector as well as facial landmark predictor.

Major variables in the script

Eye_Ar_Thresh

It's a threshold value for the eye aspect ratio. If ratio becomes lower than this value, counter starts for the number of frames the eyes remain closed.

Eye_Ar_Consec_Frames

If the value for the number of frames for which the eyes remain closed exceeds this value, the alarm gets activated.

V. RESULTS AND DISCUSSION

To get the outcome a large no of human faces were taken and their accuracy in deciding eye flickers and drowsiness was tried. For this venture, 5 megapixel webcam associated with PC is utilized. The webcam has inbuilt white LEDs to show that it is working. In real time scenario, infrared LEDs ought to be utilized rather than white LEDs. Inbuilt speaker is utilized to deliver sound output so as to awaken the driver when drowsiness is detected. The framework was tried for various samples taken at different lighting conditions such day time and night time images. At the point when the webcam backdrop illumination was turned ON and the face is kept at an ideal distance, at that point the framework can identify blinks and drowsiness with overall 95% accuracy. This is a decent outcome and can be executed by real time systems as well. Sample outputs of experimental work have been populated in Table 5.1.

Table 5.1 Results

Sample	Eyes Detection Accuracy	Drowsiness Accuracy
Sample 1	100%	87.5 %
Sample 2	95%	100%
Sample 3	80%	62.5%
Sample 4	100%	87.5%
Sample 5	100%	100%
TOTAL	95%	87.5%

Numerous examples with shifting exactness's were assembled and consequently a table plotted for them. Every individual who volunteered for the test will be approached to squint multiple times and act languid multiple times amid the test procedure. The eye squinting exactness was determined by beneath referenced recipe,

$$\text{Eye Detection Accuracy} = \frac{\text{total number of times eyes detected}}{\text{total no.of eyes detected} + \text{total no of times eyes not detected}} \quad (5.1)$$

$$\text{Drowsiness Detection Accuracy} = \frac{\text{total no.of times alarm sounds}}{(\text{total no.of times alarm sounds} + \text{total no of times alarm not sound})} \quad (5.2)$$

Face or eyes sometimes might not be detected due to lack of ample ambient light. It will in general be seen from the above table that in case model 3 isn't mulled over, at that point the framework has an accuracy of about 80%. That said; the high proportion of disappointments in test 3 exhibits that the framework is slanted to botch and has certain obstacles. In test 3 we didn't utilize ample backdrop lights for the webcam. The subsequent poor lighting conditions gave a very error prone result.

VI. CONCLUSION

Thus successfully designed and developed Driver Live Drowsiness Detection system using Python OpenCV. The landmark prediction algorithm is used to calculate the left and right eye edges to show value of the eye position points. The face object detection algorithm used to detect the objects in face based on HOG. SPOT detection algorithm is used further for detecting eyes when people wore transparent glass and helmet. The system is developed with an intention of avoiding accidents in roadways at night and day times. Most of the commercial transactions are carried out with the help of trucks or lorry services particularly at night time [5], so the proposed technique would be helpful to wake up sleepy drivers to avoid night time road accidents. Moreover, the framework is implemented by using various python libraries such as NumPy, playsound, imutils, OpenCV, threading, time, distance etc. and the proposed framework has achieved a greater accuracy rate of 95% and 87.5% for detecting eyes and drowsiness respectively. This framework can be stretched out further to have abundant security highlights, object removal techniques can be used to detect the eyes with sunglasses. In less light intensity areas, eye is not clearly visible and detected, it will be rectified using some led lights.

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