IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

IOT-BASED SMART ALERT SYSTEM FOR FATIGUE DRIVER DETECTION

Sakthi P [1] , Kamali N [2] , Karthika M [3] , Logeshwari S [4], Madhumitha S [5]

Assistant Professor, Department of C.S.E, Jansons Institute of Technology, Coimbatore, India[1]

UG Students, Department of C.S.E, Jansons Institute of Technology, Coimbatore, India [2 – 5]

ABSTRACT

Now a days many terrible accident which cause death and harmful effect has been happened due to drowsiness of the drivers. The drowsiness is caused due to lack of sleep and more tiredness. This system detecting drowsiness of the drivers and then alert him with suction pump, alarm sound. The camera takes the live video of drivers face, detect the eye movement and then compare it with template matching. If eyes are closed for more than 4 seconds, message will be sent to the management. GPS will track current location of the bus and sent it to the management through message. Object detection using HAAR feature-based cascade classifiers is an effective object detection method.

KEYWORDS

face recognition, eye detection, fatigue detection, internet of things(IOT), vehicular accidents, wearable devices.

INTRODUCTION

Drowsiness of the drivers is one of the key issues for majority of road accidents. Drowsiness threatens the road safety and causes severe injuries sometimes, resulting in fatality of the victim and economical losses. Drowsiness implies feeling lethargic, lack of concentration, tired eyes of the drivers while driving vehicles. Most of the accidents happen in India due to the lack of concentration of the driver. Performance of the driver gradually deteriorates owing to drowsiness. To avoid this anomaly, we developed a system that is able to detect the drowsiness nature of the driver and alert him immediately. This system captures images as a video stream through a camera, detects the face and localizes the eyes. The eyes are then analysed for drowsiness detection using Haar cascade algorithm. Based on the result, the driver is alerted for drowsiness through an alarm system.

Measuring the drowsiness of the driver based on the physical conditions of the driver fall under this category. Such parameters may be respiration rate, heart-beat rate, body temperature and many more.

Based on the desired result accuracy, any approach can be used. Physiological approach includes wearing of the equipment on the driver's body. This equipment includes electrodes to detect the pulse rate of the driver which might make the driver uncomfortable while driving. This also can't be assured that the driver always wears such equipment while driving which may result in inefficient results. Hence there is a hindrance using the physiological approach. Vehicular- based approach is always based on the efficiency of the driver and his condition. There are also constraints like the road condition and the type of vehicle which may change regularly. Hence it is best to follow the behavioural based approach through visual assessment of the driver from a camera. There shall be no equipment attached to the driver. Hence this technique is always the best approach and can be implemented in any vehicle without any modifications.

PROBLEM STATEMENT

Many of the road accidents will occur due to drowsiness of the driver. Drowsiness can be detected by monitoring the driver through continuous video stream with a mobile or camera. The general objective is to create a model that will indicate whether a person is feeling drowsy or not. The model takes image for every second and check for eye blinking and calculate the time for eye closed by Haar cascade algorithm. If the blinking is high and eye is closed for certain amount of time then it will indicate driver through a sound.

Driver Drowsiness System based on non-intrusive machine-based concepts. The system consists of a web camera which is placed in front of the driver. Online videos as well as saved videos for simulation purposed are considered. Firstly, camera records the facial expressions and head movements of the driver. Then the video is converted into frames and each frame is processed one by one. Face is detected from frames using Viola-jones algorithm. Then the required features like eyes, mouth and head from face are extracted using cascade classifier. Region of interest on face is indicated by rectangles. Here the main attribute of detecting drowsiness is eyes blinking, varies from 12 to19 per minute normally and indicates the drowsiness if the frequency is less than the normal range. Instead of calculating eye blinking, average drowsiness is calculated. The detected eye is equivalent to zero (closed eye) and non-zero values are indicated as partially or fully open eyes. An IoT-based system is designed to avoid countless mishaps due to drowsy drivers' behavioral and psychological changes by focusing on driver's eye movements. In addition to monitoring the intensity of the collisions impacts during road accidents, it is a required to keep records of the location for taking supportive action.

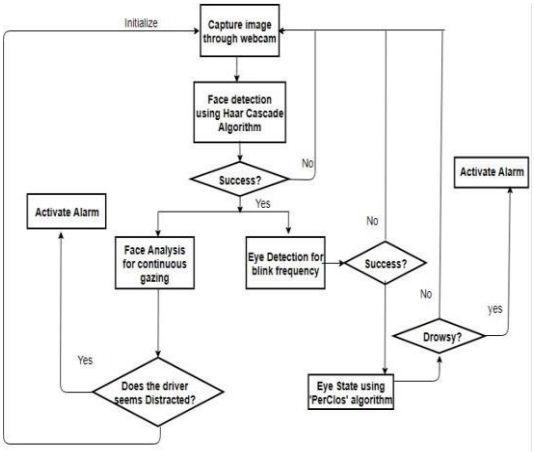
LITERATURE SURVEY

There are several steps to calculate the ROI area and we have to calculate ROI for each and every region of interest.In this algorithm the faces are detected by using local binary patterns histograms (LBPH). The first computational step in lbph is to create an intermediate images that describes the original image in a binary format. The image is converted into matrix form and we need to take a central value of the matrix to be used as and threshold value. This value is used to define neighbouring values which can be set to to either 0 or 1. The values which are 1 in the matrix form are to be considered and the remaining values are discarded. The values represent each pixel.

EXISTING SYSTEM

The current drowsiness detection systems include the usage of the devices that detect the respiration rate, heart rate, blood pressure, etc. These devices can cause the driver to be uncomfortable for driving. Cannot be assured that the drivers wear these devices all the time while driving. May get lost or improper functioning which may lead to low accuracy in the result. The existing system does not produce good results in low light conditions. If the light conditions are dark or too low it is unable to detect the face and eyes of the driver which results in lower accuracy.Road accidents have become common in the present era, causing the severe damage to the property and also to the lives of people travelling. There are many reasons of road accidents like: rash driving, inexperience, ignoring signboards, jumping signal etc. To address the issues, Katyal *et al.* proposed the Drivers' Drowsiness Detection system. The system works in two phases: firstly, detects lane based on Hough transform. Secondly, detects the drivers' eyes to detect the drowsiness. For eye detection, firstly use viola jones method to detect face, then do the image segmentation, after that otsu thresholding is done and canny edge detection is applied. The obtained results is integrated with the circle detection hough transform method to detect eyes to detect the fatigue level. It will also work in low lightning conditions. Result shows that the proposed system is useful for the drivers travelling on lengthy routes, driving late night, drivers who drink and drive. The time taking to detect a person whether he is sleepy or not is around 3 to 5 seconds. When the driver is distracted it will alert him by raising an alarm. The system detects as distraction if the driver's eyes is not detected. If the driver seems to be observing somewhere else other than the road then it gives alert in form of message and the sound. This can be done by using face detection algorithm and if the face is not detected for some amount of time then it gives an alert to the driver.

PROPOSED SYSTEM



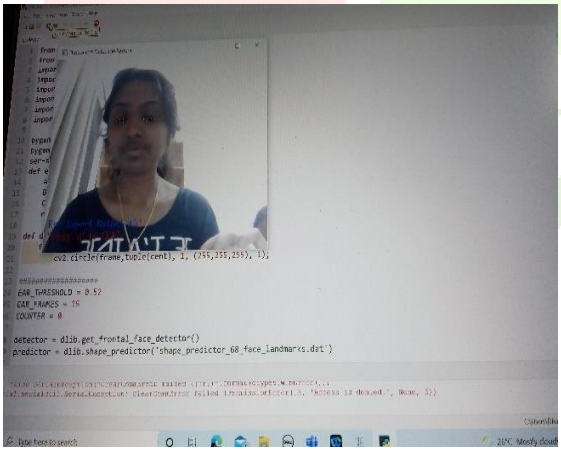
First of all the system captures images through the webcam and after capturing it detects the face through haar cascade algorithm. It uses haar features which can detect the face. If the system founds it as face the it will proceed for next phase i.e eye detection. The eye is also detected using haar cascade features and it is used for blink frequency. The state of eye will be detected using Haar cascade algorithm. Through this algorithm we can find the percentage of time the eye lids remains closed. If it found eyes in closed state then it detects driver in drowsy state and alerts him by an alarm. In some cases distraction can be measured by continuous gazing..

HAAR CASCADE

HAAR CASCADE is defined as the proportion of time for which the eyelid remains closed more than 70-80% within a predefined time period. Level of drowsiness can be judged based on the Haar

cascade threshold value.Haar cascade is a drowsy detection measure used to calculate the percentage of eyelid closure over the pupil over time. It is used by various real-time drowsiness detection systems and is able to yield effective results. Developers use different set of hardware to capture the closure movement of the eyelids for developing the accuracy of the system. This project uses camera mounted on the dashboard of the vehicle and is set up in such a way that the driver is visible on the camera. This helps in better detection of the face and calculating the eyelid closure frequency using Haar cascade measure. A total of six points are marked for each eye and the Euclidean distance is calculated for each eye. The eye aspect ratio for each eye are then calculated for average eye-aspect ratio.

MODULAR DIVISION



.

Face Detection

This module takes input from the camera and tries to detect a face in the video input. The detection of the face is achieved through the Haar classifiers mainly, the Frontal face cascade classifier. The face is detected in a rectangle format and converted to grayscale image and stored in the memory which can be used for training the model.

Eye Detection

Since the model works on building a detection system for drowsiness we need to focus on the eyes to detect drowsiness. The eyes are detected through the video input by implementing a haar classifier namely Haar Cascade Eye Classifier. The eyes are detected in rectangular formats.

Face Tracking

Due to the real-time nature of the project, we need to track the faces continuously for any form of distraction. Hence the faces are continuously detected during the entire time.

Eye Tracking

The input to this module is taken from the previous module. The eyes state is determined through Haar cascade algorithm.

Drowsiness Detection

In the previous module the frequency is calculated and if it remains 0 for a longer period then the driver is alerted for the drowsiness through an alert from the system.

CONCLUSION

The current study developed an automated system for detecting drowsiness of the driver. The continuous video stream is read from the system and is used for detecting the drowsiness. It is detected by using haar cascade algorithm. The haar cascade algorithm uses haar features to detect face and eyes. Haar features are predefined are used for detecting different things. The haar features are applied on the image and blink frequency is calculated using Haar cascade algorithm. If the value remains 0 for some amount of time then it detects as sleepy and alerts driver by activating an alarm. If the value remains constant for longer periods then the driver is said to be distracted then also an alarm is activated.

FUTURE WORK

The work can be extended by extracting the features of mouth where the driver can be detected as drowsy through yawning. If the driver yawns repeatedly for more number of times then we can say that he is in sleepy mode. If the number exceeds a limit then we can alert the driver. This work can also be extended by implementing in full night light using IR web cam. It is camera which uses infrared radiations to detect whether the person is drowsy or not.

While this is a research project, there is scope when this completely turns out to be developed into an application which can be run by the end users on their own for their own purposes on their own systems.

REFERENCES

[1] Dwivedi, K., Biswaranjan, K., & Sethi, A. (2014). Drowsy driver detection using representation learning. 2014 IEEE International Advance Computing Conference (IACC).

[2] Yan, J.-J., Kuo, H.-H., Lin, Y.-F., & Liao, T.-L. (2016). Real-Time Driver Drowsiness Detection System Based on HAAR CASCADE and Grayscale Image Processing. 2016 International Symposium on Computer, Consumer and Control (IS3C).

[3] Alshaqaqi, B., Baquhaizel, A. S., Amine Ouis, M. E., Boumehed, M., Ouamri, A., & Keche, M. (2013). Driver drowsiness detection system. 2013 8th International Workshop on Systems, Signal Processing and Their Applications (WoSSPA).

[4] Subbarao, A., Sahithya, K. (2019) Driver Drowsiness Detection System for Vehicle Safety, International Journal of Innovative Technology and Exploring Engineering (IJITEE).

[5] Tayab Khan, M., Anwar, H., Ullah, F., Ur Rehman, A., Ullah, R., Iqbal, A., … Kwak, K. S. (2019). Smart Real-Time Video Surveillance Platform for Drowsiness Detection Based on Eyelid Closure. Wireless Communications and Mobile Computing, 2019.

[6] RamalathaMarimuthu, A. Suresh, M. Alamelu and S.Kanagaraj “Driver fatigue detection using image processing and accident prevention”, International journal of pure and applied mathematics, vol. 116, 2017.

[7] Assari, M. A., & Rahmati, M. (2011). Driver drowsiness detection using face expression recognition. 2011 IEEE International Conference on Signal and Image Processing Applications (ICSIPA).

[8] Tianyi Hong, Huabiao Qin, & Qianshu Sun. (2007). An Improved Real Time Eye State Identification System in Driver Drowsiness Detection. 2007 IEEE International Conference on Control and Automation.

[9] Tripathi, D.P., Rath, N.P.(2009). A novel approach to solve drowsy driver problem by using eye-localization technique using CHT. International Journal of Recent Trends in Engineering.

[10] Dwivedi, K., Biswaranjan, K., & Sethi, A. (2014). Drowsy driver detection using representation learning. 2014 IEEE International Advance Computing Conference (IACC).