International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2020): 7.803

Smart Vehicle Connectivity for Safety Applications - Drowsiness Detection and System Alert

Orion P. Fernandes[1], Mohd. Abdul Raheem[2]

School of Electronics Engineering, Vellore Institute of Technology, Vellore, India

Abstract: ***In India, around 1.5 lakh people die per year in road accidents due to drowsiness. Drowsiness or Fatigue is a major cause of road accidents and has extensive implications for street safety. Drowsy drivers can be alerted in advance to prevent disastrous accidents. Drowsiness is a state of sleepiness that abnormally happens during day time or when a personis tired or drunk. A spread of drowsiness detection strategies exists that monitor the driving force's drowsiness state at the same time as driving and alarm the drivers if they're no longer concentrating on driving. The level of drowsiness can be inferred through various facial expressions like a yawn, eye blink, and head movement. The condition of the driver's body is analysed for driver drowsiness detection. So, this utility overcomes the trouble of drowsiness detection whilst riding the use of eye extraction, facial extraction with DLIB.***

Keywords: Eye extraction, DLIB, Facial Extraction, Drowsiness

1. Introduction

Drowsiness or fatigue is one of the important facts that threaten street protection and one of the reasons for excessive accidents, deaths and economical losses. Loss of alertness generated via unconscious transition from wakefulness to sleep, leads to numerous accidents. A driving force fatigue could have more than one reasons including loss of sleep, long adventure, restlessness, alcohol intake and mental stress. Nowadays, avenue rage is the multiples of the past, which causes pressure on drivers. driver drowsiness detection is a vehicle safety undertaking which allows save you injuries because of the driver getting drowsy. Basically, it collects the image of human from webcam, and explores how these statistics can be used to improve the security at the same time as riding. Its photos from stay webcam feed and observe set of rules onphotograph and come across the driver drowsy or no longer. If driving force drowsy the it performs the buzzer alarm and growth buzzer sound in each 2 sec. If driving force isn't wakeup at 5th buzzer them it sends a SMS regarding him situation to the family member.

Figure (a): A drowsy driver

Figure (b): Accident cause by drowsiness

2. Literature Survey

In paper [1], the author implies that road accidents caused by driver drowsiness leads to extreme physical injuries, mortality and economic loss. An effective drowsiness detection system is required that would alert the driver preventing further injury. Researchers have tried to determine driver drowsiness by the following measures - vehicle-based; behavioural and physiological. A detailed review on these measures will provide insight on the present systems, issues associated with them and the enhancements that need to be done to make a robust system

In this paper author planned that [2] these days, there are several systems that are obtainable in market like navigation systems, warning alarm systems etc. to form driver's work simple. Traffic accidents due to human errors cause several deaths and injuries round the world. Drowsiness and sleeping during driving are currently known mutually to be one of the explanations behind fatal crashes and route accidents caused by drivers. Numerous drowsiness detection techniques researched are mentioned during this paper. These techniques are classified and compared with their alternatives. PC vision-based image process techniques is one of them. This uses numerous pictures of the driver to detect drowsiness states from his/her eyes states and facial expressions. This system is on the main target of this survey paper.

In this paper author implies that [3] This vision primarily based intelligent algorithm to detect driver drowsiness. Previous approaches that are typically supported include blink rate, eye closure, yawning, eye brow form and alternative hand designed facial expression. The preferred algorithm makes use of options learnt involving convolution neural networks to expressly capture numerous latent facial expressions and advanced Non-linear feature interactions. A SoftMax layer is employed to classify the driver as drowsy or non-drowsy.

In this paper author proposed [4] numerous investigations to show that drivers' drowsiness is mainly the most causes of traffic accidents. Thus, a countermeasure device is presently needed in several fields for drowsiness related accidents. This paper intends to perform the drowsiness prediction by using Support Vector Machine (SVM) with lid connected parameters extracted from EOG knowledge collected in a driving simulator provided by EU Project SENSATION. The dataset is divided into 3 progressive drowsiness levels, so paired t-test is completed to spot however the parameters are related to the drivers' sleepy condition. With all the features, a SVM drowsiness detection model is constructed. The validation results show that the drowsiness detection accuracy is high particularly once the drivers are extremely sleepy.

In this paper author planned [5] the 3 measures on the sensors used and discuss the benefits and limitations of every. The different ways through which drowsiness has been by experimentation manipulated is additionally mentioned. We tend to conclude that by planning a hybrid drowsiness detection system that fuses on-intrusive physiological measures with alternative measures, one would accurately confirm the drowsiness level of a driver.

Variety of road accidents may then be avoided if associate degree alert is shipped to a driver that's deemed drowsy.

3. Proposed Work

In our Project basically we focused on two main problems related to Vehicle Drowsiness Detection. Basically, Drowsiness is a state of sleepiness which abnormally occurs during day time orwhen someoneis tired or when drunken or driving in night. In India around 1.5 lakh people die per year in road accident due to drowsy. Our aim is to provide an interface where program can automatically detect the drowsiness of driver and save them from accident. Eye detection are applied on testing sets, gathered from totally different pictures of face information with advanced background. The system includes a web camera placed in front of the driver. Firstly, camera records the facial expressions and the head movement of the driver. Then the video is converted into frames and processed individually. The DLIB algorithm detects the face using frames which gives key pointsThe main feature to detect drowsiness is eye blinking which varies from 2 seconds to 2 minutes normally.If drowsiness is detected, an email is sent to a close contact of the driver.

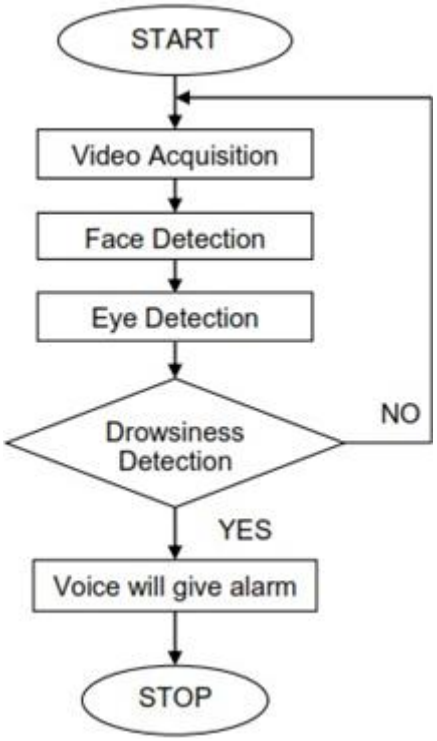

Figure c: Flow of Drowsiness Detection

Video Acquisition
Video acquisition is the process of converting an analogue video signal, produced by a video input device to digital video and sending it for further processing.

Face Detection
Face detection may be a technology getting used in an exceedingly type of applications that identifies human faces in digital pictures. Face detection algorithms specialize in detecting human faces. It's analogous to image detection during which the image of someone is matched bit by bit.

Eye Detection
When face finding next step is to detect eye detection. To find and track eye pictures with advanced background, distinctive options of user eye blink used. It has a tendency to used horizontal projection obtained from face region, to separate a part containing eye and supercilium.

DLIB
DLIB is an open supply gadget getting to know library. Basically, DLIB library used to detect the landmarks of face. it's far used in both industry and academia in an extensive variety of domain names together with robotics, embedded gadgets, cell phones, and big excessive-performance computing environments. DLIB is a modern-day C++ toolkit containing gadget gaining knowledge of algorithms and equipment for creating complex software program in C++ to resolve actual critical issues.

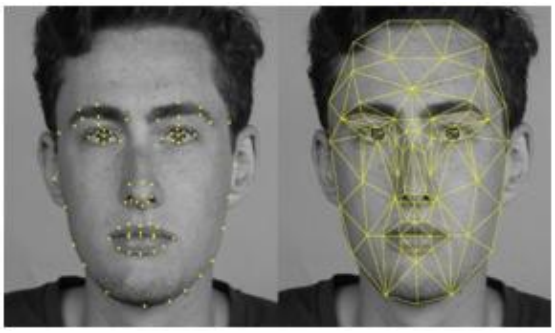

Figure d: Extracting keys points of face using DILB

4. Conclusion

On this work, we attempted to detect drowsy drivers using supervised gadget gaining knowledge of algorithms. Because of the time-collection nature of the data, we needed to do aggregation over the time-collection to generate capabilities. The principal idea of drowsiness detection machine it detects and provide details of behavioural, vehicular and physiological parameters primarily based on it. It appears that inside the moments earlier than falling asleep, drivers yawn less, not more, frequently. These examples excellently demonstrate the fatigue and drowsiness conditions in which subjects certainly fall sleep.

Even though the accuracy rate of the usage of physiological measures to discover drowsiness is excessive, these are fairly intrusive. But this intrusive nature can be resolved by way of the usage of contactless electrode placement. As a result, it would be worth merging physiological measures, together with DLIB, behavioural and vehicle-primarily based measures towards the improvement of a drowsiness detection device. Furthermore, it is vital to not forget using the environment to achieve optimal effects.

References

[1] Rajneesh, “Real Time Drivers Drowsiness Detection and alert System by Measuring EAR,” International Journal of Computer Applications (0975 – 8887) Volume 181 – No. 25, November- 2018.

[2] Jay D. Fuletra., “A Survey on Driver’s Drowsiness Detection Techniques” International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169 Volume: 1 Issue: 11 ,2013.

[3] Hu Shuyan, “Driver drowsiness detection with eyelid related parameters by Support Vector Machine., School of Astronautics, Beijing University of Aeronautics ,2012

[4] Arun Sahayadhas “Detecting Driver Drowsiness Based on Sensors: A Review, Sensors 2012, 16937-16953; doi:10.3390/s121216937

[5] Kartik Dwivedi, Kumar BiswaranjanDrowsy Driver Detection using Representation Learning In: Hindawi Publishing Corporation International Journal of Vehicular Technology, Volume 2013, Article ID 263983, 11 pages

[6] D.Jayanthi, M.Bommy.: Vision-based Real-time Driver Fatigue Detection System for Efficient Vehicle Control. In: International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-2, Issue-1, October 2012

[7] Artem A. Lenskiy and Jong-Soo Lee.: Driver’s Eye Blinking Detection Using Novel Color and Texture Segmentation Algorithms. In: International Journal of Control, Automation, and Systems (2012) 10(2):317-327 DOI 10.1007/s12555-0120212-0 ISSN:1598-6446 eISSN:2005-4092

[8] Marco Javier Flores • José María Armingol • Arturo de la Escalera.: Real-Time Warning System for Driver Drowsiness Using Visual Information. In: Springer Science + Business Media B.V. 2009

[9] Behnoosh Hariri, Shabnam Abtahi, Shervin Shirmohammadi, Luc Martel.: A Yawning Measurement Method to Detect Driver Drowsiness. In: Distributed and Collaborative Virtual Environments Research Laboratory, University of Ottawa, Ottawa, Canada

[10] Global Status Report on Road Safety 2009; World Health Organisation (WHO): Geneva, Switzerland, 2009.