DRIVERS DROWSINESS DETECTION

NALLA SHRUTHI, Mrs. Kiran Pakmode

UG Student, Department of Electronics and Computer Engineering, JBIET, India.

Assistant professor, Department of Electronics and Computer Engineering, JBIET, India.

ABSTRACT

Driver fatigue is one of the major causes of accidents in the world. Detecting the drowsiness of the driver is one of the surest ways of measuring driver fatigue. In this project we aim to develop a prototype drowsiness detection system. This system works by monitoring the eyes of the driver and sounding an alarm when he/she is drowsy. The system so designed is a non-intrusive real-time monitoring system. The priority is on improving the safety of the driver without being obtrusive. In this project the eye blink of the driver is detected. If the drivers' eyes remain closed for more than a certain period of time, the driver is said to be drowsy and an alarm is sounded. In this project, we propose and implement a hardware system which is based on infrared light and can be used in resolving these problems. In the proposed method, following the face detection step, the facial components that are more important and considered as the most effective for drowsiness, are extracted and tracked in video sequence frames. The system has been tested and implemented in a real environment.

INTRODUCTION

Driverdrowsinessdetection isa carsafety technologywhichhelpspreventaccidents caused by the driver getting drowsy. Various studies have suggested that around 2 all road accidents are fatigue-related, up to 50% on certain roads.

The drowsiness detection system is capable of detecting drowsiness quickly.

The driver behaviors are noticed in many conditions such as wearing spectacles an in the dark condition inside the vehicle.

The system is capable of detecting the drowsiness condition within the duration of than two seconds. After the detection of abnormal behaviors, it is alerted to the dr through alarms and the parking lights will be on that will stop the vehicle which red the accidents due to drowsiness of the driver.

A deep learning Architecture detects the face and eyes, based on the status of the the eyes are closed more than usual time, it generates an alarm, intimating the dri

Neglecting our duties towards safer travel has enabled hundreds of thousands of t to get associated with this wonderful invention every year.

In order to monitor and prevent a destructive outcome from such negligence, man researchers have written research papers on driver drowsiness detection systems. times, some of the points and observations made by the system are not accurate e Hence, to provide data and another perspective on the problem at hand,

in order to improve their implementations and to further optimize the solution, thi project has been done.

LITERATURE REVIEW

This survey is done to comprehend the need and prerequisite of the general popul and to do as such, we went through different sites and applications and looked for fundamental data. Based on these data, we made an audit that helped us get new and make different arrangements for our task. We reached the decision that there need of such application and felt that there is a decent extent of progress in this fie

There are some research on Driver's Drowsiness Detection, for the proper outcom subject and usage of it. The researches use different approaches for the applicatio the requirement processes.

Drowsiness Detection Based On Driver Temporal Behaviour(31-March 2021, F.

Faraji, F. Lotfi, J. Khorramdel, A. Najafi, A. Ghaffari). In this research YOLOv3 CNN is applied as a pretrained network, which is proved to be utilized as a powerful mean object detection.LSTM (Long-Short Term Memory) neural network is employed to l driver temporal behaviors including yawning and blinking time period as well as

sequence classification. One of the main factors of the temporal behavior is that th

driver becomes gradually diverted from the road and road traffic. Hence detection always accurate.

A Survey on State of The Art Driver Drowsiness Detection Techniques(1st December

2020, FHikmat Ullah Khan).The detection system includes the processes of face im

extraction, yawning tendency, blink of eyes detection, eye area extraction etc. The

percentage of the eyelid closure of the algorithms over the pupil over time is relati very low

Driver Drowsiness Detection(21-09-2020, V B Navya Kiran, Raksha R, Anisoor Rahman, Varsha K N, Dr. Nagamani N P).The detection system includes the processes of face image extraction, yawning tendency, blink of eyes detection, eye area extraction etc. This paper provides a comparative study on papers related to driver drowsiness detection

and alert system. It is designed in such a way where system does not

continuously record

This paper analysesthemethodusedto detectdriver'sdrowsiness andproposesthe results & solutions on the

limited implementation of the various techniques that ar in such embedded systems.

Driver Drowsiness Detection System(May 2019,Muhammad Faique Shakeel and Nabita Bajwa). In this article, they propose a novel deep learning methodology bas

Convolutional Neural Networks (CNN) to tackle the Project. In the trained model, w only use 250 low-light images

PROJECT DESCRIPTION

EXISTINGSYSTEMANDDISADVANTAGES

Vision based techniques:

NO EYE DETECTION – most critical sign of drowsiness Yawning and nodding

are not always practical. Varies from person to person – some may not yawn when they are sleepy sometimes.

Physiological sensors:

 More accurate solutions

Needs to be attached to the human body

- If driver forgets to wear it?

- May hesitate to wear

Easy wear biosensors are developed.

- Head bands, headphones (Signal-Channel EEG)

- Portal glasses for EOG

- Hand bands for PPG

SYSTEM DESIGN

ThemodelweusedisbuiltwithKerasusing ConvolutionalNeuralNetworks(CNN).

A convolutional neural network is a special type of deep neural network which perf extremely well for image classification purposes. A CNN basically consists of an inp layer, an output layer and a hidden layer which can have multiple numbers of laye convolution operation is performed on these layers using a filter that performs 2D multiplication on the layer and filter.

The CNN model architecture consists of the following layers:

- Convolutionallayer;32nodes,kernelsize3

- Convolutionallayer;32nodes,kernelsize3

- Convolutionallayer;64nodes,kernelsize3

- Fullyconnectedlayer;128nodes

The final layer is also a fully connected layer with 2 nodes. In all the layers, a Relu activation function is used except the output layer in which we used Softmax.

Python Project on Steps for Performing Driver Drowsiness Detection

Download the Python project source code from the zip and extract the files in your system: PythonProjectZipFile
The contents of the zip are:

|	Name	Type	Compressed size	Password p...	Size		Ratio	Date modified
⭐ Quick access								
🖥 Desktop	Drowsiness detection	File folder						12-05-2021 09:59
⬇ Downloads	haar cascade files	File folder						12-05-2021 09:58
📄 Documents	models	File folder						12-05-2021 09:58
🖼 Pictures	alarm.wav	WAV File	893 KB	No	996 KB		11%	12-05-2021 09:58
Captures	drowsiness detection.py	PY File	2 KB	No	4 KB		64%	12-05-2021 09:58
Documents_CTS_On	image.jpg	JPG File	91 KB	No	91 KB		1%	12-05-2021 10:14
junior_project	model.py	PY File	1 KB	No	3 KB		56%	12-05-2021 09:58
Screenshots	test.ipynb	IPYNB File	2 KB	No	6 KB		67%	12-05-2021 10:03

1. The"haarcascadefiles"folderconsistsofthexmlfilesthatareneededtodetect objects from the image. In our case, we are detecting the face and eyes of the person.

2. Themodelsfoldercontainsourmodelfile"cnnCat2.h5"whichwastrainedon convolutional neural networks.

3. We have an audio clip "alarm.wav" which is played when the person is feeling drowsy.

4. "Model.py"filecontainstheprogramthroughwhichwebuiltourclassification model by training on our dataset. You could see the implementation of convolutional neural network in this file.

5. "Drowsiness detection.py" is the main file of our project. To start the detectio procedure, we have to run this file.

BLOCK DIAGRAM
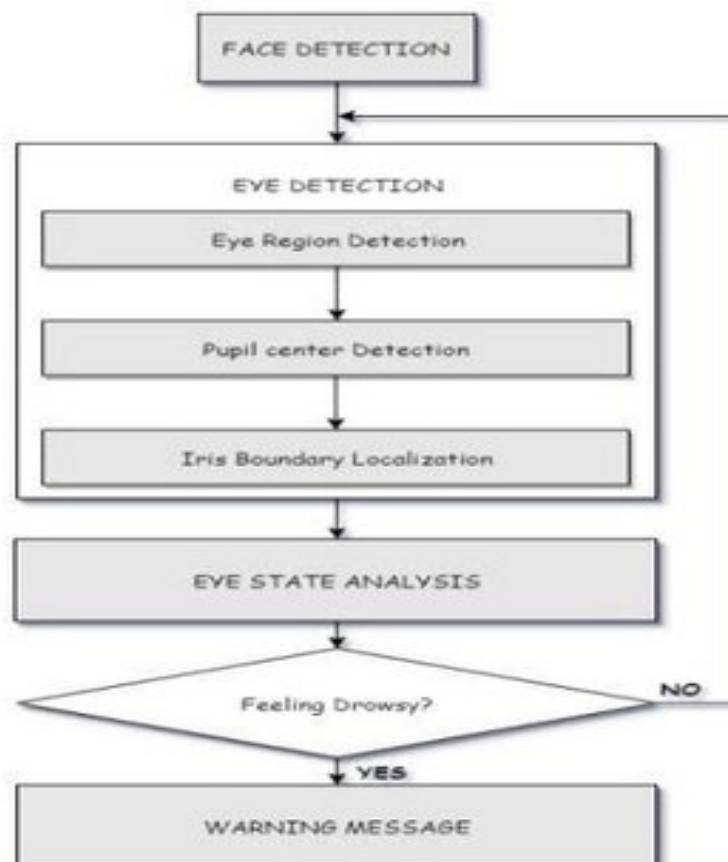
The system will be continuously monitoring the movement of the driver's eye by a live camera and all the monitored signals are pre - processed. A Black Boxwiththesoftwareinstalledisusedto detect the driverdrowsiness and alertsthe driver withbuzzer,if driver isaffectedby drowsiness.

USE CASE DIAGRAM
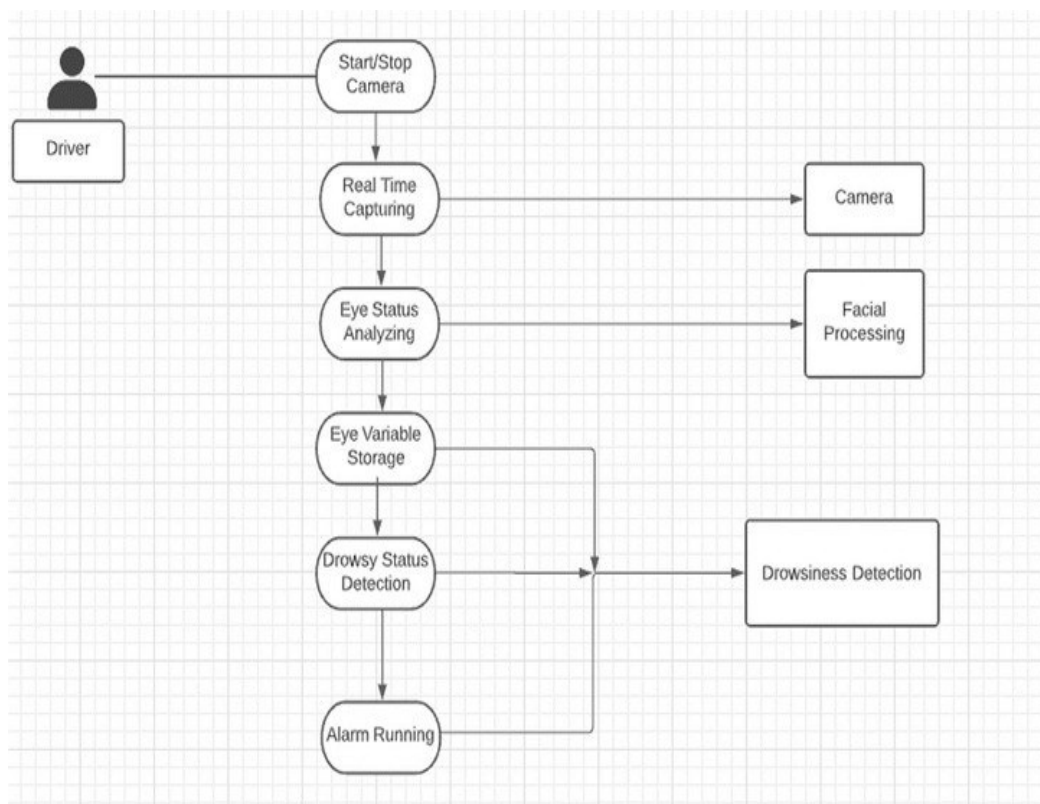
Drowsiness detection is a safety technology that can prevent accidents that are ca drivers who fell asleep while driving. The project is to build a drowsiness detection system that will detect that a person's eyes are closed for a few seconds. This syste alert the driver when drowsiness is detected. In this Python project, we will be usin OpenCV for gathering the images from webcam and feed them into Deep Learning a modelwhichwillclassifywhethertheperson'seyesare'Open'or'Closed'.

PROJECT REQUIREMENTS

Software Requirements

Python: Python is the basis of the program that we wrote. It utilizes many of the py libraries.

Python 3

Libraries:

Numpy

Tensorflow

opencv, keras

MODULES DESCRIPTION

Webcam Capturing Face and Eye Detection Drowsiness Detection (with Alert Message and Alarm Sound) With

a webcam, we will take images as input. So to access the webcam, we made a infinite loop that will capture each

frame. We use the method provided by OpenCV, cv2.VideoCapture(0) toaccess the camera and set the capture

object (cap). cap.read() willreadeachframeandwestoretheimageinaframevariable

Camera appears and starts to capture the image.

MODULE: 2

Face and eye detection:

■ The "haar cascade files" folder consists of the xml files that are needed to objects from the image (in machine learning). In our case, we are detecting the face and eyes of the person.

■ Todetectthefaceintheimage,weneedtofirstconverttheimageintograyscaleas the OpenCV algorithm for object detection takes gray images in the input. We don't need color information to detect the objects. We will be using haar cascad classifiertodetectfaces.Thislineisusedtosetourclassifier .

■ ThecascadesthemselvesarejustabunchofXMLfilesthatcontainOpenCVdata used to detect objects. You initialize your code with the cascade you want, and then it does the work for you. ▪ Itloadsfacecascadeintomemoryandreadthemageand convertintograyscale. (many operations are done in grayscale as we need not define Green , Red and Blu colours here) Haar cascade approach
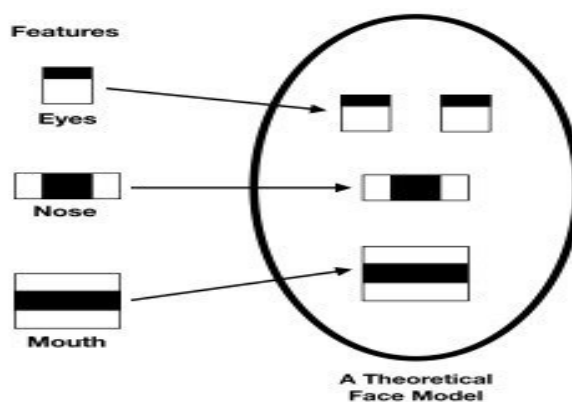
MODULE 3 :

Drowsiness Detection
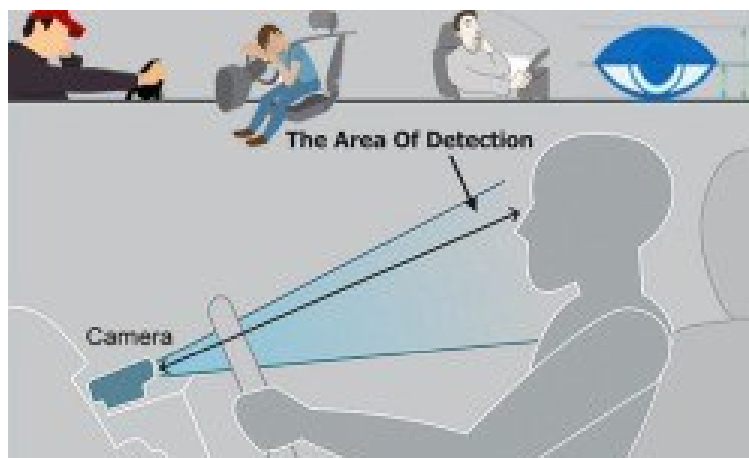
Thevaluewewillusetodeterminehowlongtheperson   has closed his eyes

is threshold value. So if both eyes are closed, we will keep on increasing

score and when eyes are

open, we decrease the score. We are drawing the result on the screen

using cv2.putText() function which will display real time status of the person.

- A threshold is definedforexampleifscorebecomesgreaterthan15thatmeansth person's

eyes are closed for a long period of time. This is when we beep the alarm using sound.play().

- Allthreeofusworkedoncode

IMPLEMENTATION

1. Take image as input from a camera.

2. Detect the face in the image and create a Region of Interest(ROI).

3. Detect the eyes from ROI and feed it to the classifier.

4. Classifier will categorize whether eyes are open or closed.

5. Calculatescoretocheckwhetherthepersonisdrowsy.
   First we have used a camera which is setup at desirable position in a car that loo faces stream.

   If face gets detected, the facial landmark detection task is applied and region of is extracted.

   Once we get the eye region, we calculate the Eye Aspect Ratio to find out if the eye-lids are down for a substantial amount of time.

On the off chance that the Eye Aspect Ratio demonstrates that the eyes are shut fo considerably long measure

of time, the alert will sound noisy to wake the driver up the functionalities of the system and to make it work efficiently we have used Ope dlib and Python. The implementation of the drowsiness detector system includes learning algorithms which are in turn included in OpenCv ML algorithms. There are numerous ML algorithms but for our purpose we required only the face detector algorithm. It works efficiently well overall. It can also be used to detect various diffe types of objects with the required software
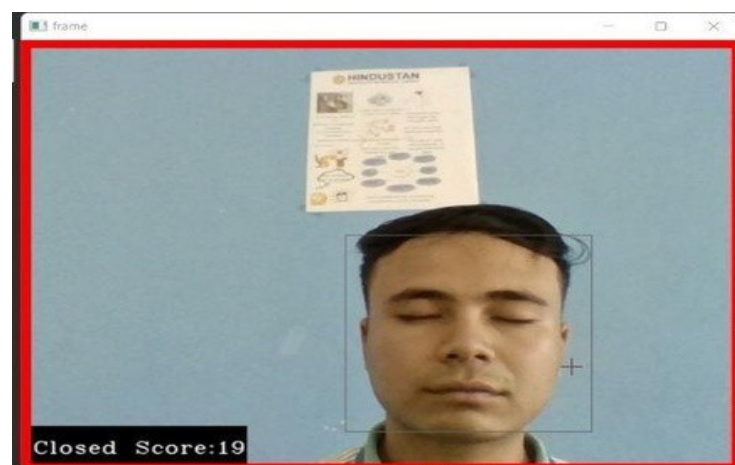
RESULT AND ANALYSIS

InthisPythonproject,wehavebuilta drowsydriveralertsystem thatyoucanimplement in numerous ways. We used OpenCV to detect faces and eyes using a haar cascade classifier and then we used a CNN model to predict the status.

ANALYSIS:

Opened Eyes Detection:
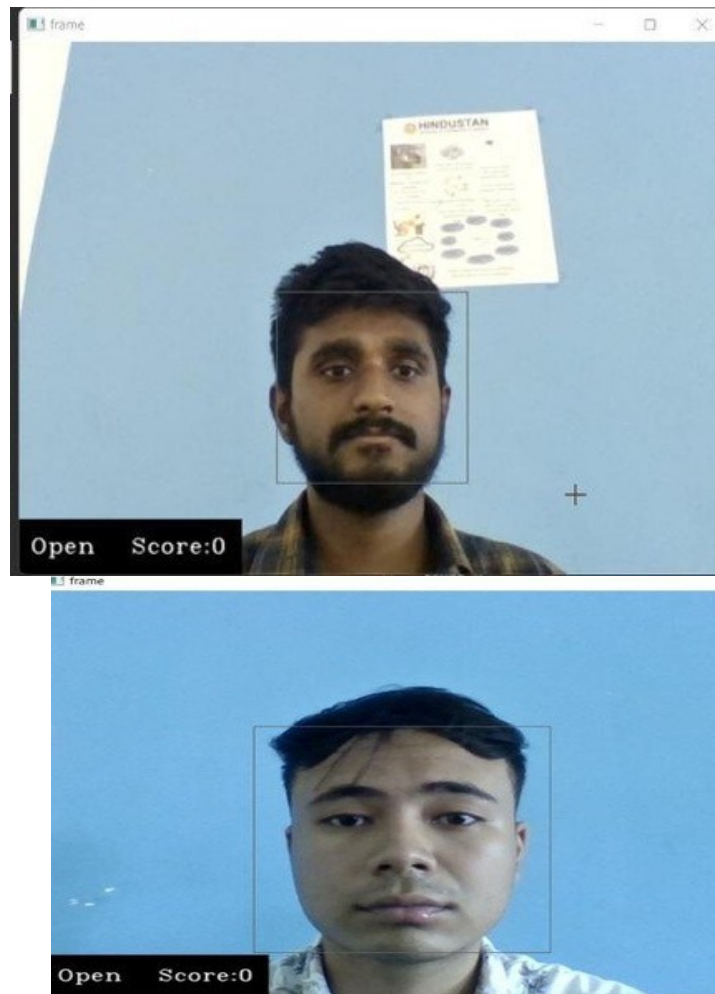
CONCLUSION

It completely meets the objectives and requirements of the system. The framework has achieved an unfaltering state where all the bugs have been disposed of. The framework cognizant clients who are familiar with the framework and comprehend it's focal points and the fact that it takes care of the issue of stressing out for individuals having fatigue-related issues to inform them about the drowsiness level while driving. The ultimate goal of the system is to check the drowsiness condition of the driver. Based on the eye movements of the driver, the drowsiness is detected and according to eye blink, the alarm will be generated to alert the driver and to reduce the speed of the vehicle along with the indication of parking light. By doing this, many accidents will be reduced and provides safety to the driver and vehicle. A system that is driver safety and car security is presented only in luxurious costly cars. Using eye detection, driver security and safety can be implemented in normal car also.

FUTURE WORK:

The model can be improved incrementally by using other parameters like blink rate, yawning, state of the car, etc. If all these parameters are used it can improve the accuracy by a lot. We plan to further work on the project by adding a sensor to track the heart rate in order to prevent accidents caused due to sudden heart attacks to drivers. Same model and techniques can be used for various other uses like Netflix and other streaming services can detect when the user is asleep and stop the video accordingly.

It can also be used in application that prevents user from sleeping.

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