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Real-Time Monitoring In Driver Drowsiness Detection System Using CNN

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Abstract**—** This Paper delineates the real time tracking of driver drowsiness using CNN algorithm. Drivers may get drowsy due to long hours of travelling, lack of sleep, fatigue.This may lead to fatal accidents if not considered solemnly. So there must be continuous tracking of drivers State by the Driver Drowsiness Detection System that whether he is in normal circumstances to drive so that the if anything erroneous is detected driver will be alerted and accidents can be avoided.

Keywords**—**Driver,Accidents,Drowsiness Detection , CNN, ROI, Image,score,deep learning.

INTRODUCTION

Driver exhaustion can be significant variable in an expensive number of vehicle accidents.It can be seen that there are around 2700 road accidents taking place frequently.This type of accidents in india cause economic losses around 9.34 billion each year.

.It was uncovered that driving execution quickly drop with expanded tiredness which result in making more than 20% of all vehicle accidents. Less attention and focus while driving, heads the driver to being distracted and the likelihood of street accident goes high.

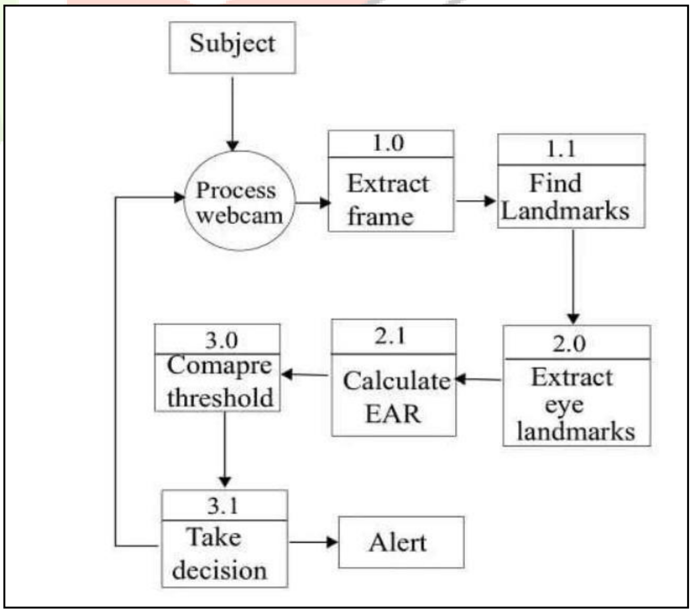
Drowsiness related accidents have all the earmarks of being more serious as the driver isn’t capable of taking any preventive measures at that moment. Also it is important to design a system which is adaptive to individual driver behaviour, learning their patterns and idiosyncrasies over time to provide more accurate drowsiness alerts.

Different strategies for driver drowsiness monitoring can be partitioned into two classifications .The techniques in the first gathering recognizes the level of the tiredness focused around the physiological changes of the body. Eye status, speech properties, and the time interval between the eye being closed, head position are simply a couple of illustrations of the strategies in the classification.

PURPOSE OF THE RESEARCH

The number of deaths due to road accidents are mostly due to driver getting drowsy , moreover 25% of road accidents are caused due to this reason ,so there is a need to find a solution for this problem and increase transportation safety.

Flowchart for the process of the system is given down below:



METHODOLOGY

System description : In this Python project we will be using OpenCV for gathering the iamges from continous tracking throught webcamera and add those into deep learning modelwhich will then identify whether the eyes are “Closed” or “Opened”

The Steps for the algorithm are as follows:

- Step 1 – Take image as input from the camera.
- Step 2 – Detect the face in the image and create a Region Of Interest(ROI).
- Step 3 – Detect the eyes from ROI and add into the classifier.
- Step 4 – Classifier will categorize whether eyes are "Open" or "Closed".
- Step 5 – Calculate score to check whether the person is drowsy or not.

DETAILS IN METHODOLOGY

1) What is CNN Algorithm?

A convolutional neural network or CNN is a subset of machine learning. It is one of the various types of artificial neural networks, which are used for different applications and data types. A CNN is a kind of network which is mainly used for image recognition and images with pixel data. This makes them highly suitable for computer vision tasks and for applications where object recognition is significant,such as self driving cars and facial recognition.

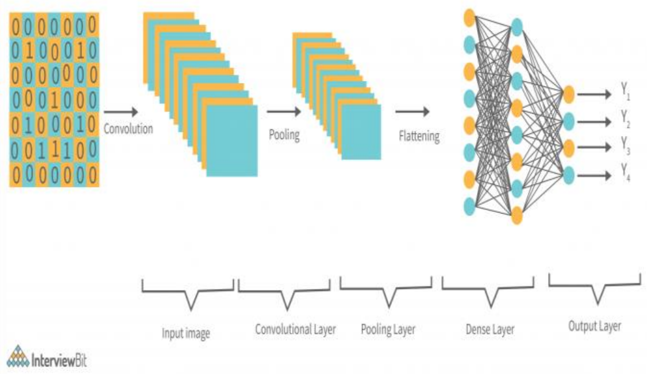


Fig. 1. Typical convolutional neural network with it's layers

The CNN model architecture consists of the following layers:

- Convolutional layer
- Activation layer
- Pooling layer
- Fully connected layer

STEPS INVOLVED IN CNN ALGORITHM:

Step 1 – Take Image as Input from a Camera : With the webcamera , we will take images.So as to access the webcamera, we made an infinite loop that will capture each frame.We use the method provided by Open CV,cv2.VideoCapture(0) to access the camera and set the capture object(cap).cap.read() will read each frame and we store the image in a frame variable.

Step 2 – Detect Face in the Image and Create a Region of Interest (ROI) :To detect the face the image,we need to first convert the image into grayscale as the OpenCV algorithm for object detection takes grayimages in the input.We don't need color information to detect the objects.We will be using cascade classifier to detect faces.This line is used to set our classifier face=cv2.CascadeClassifier(' path to our haar cascade xml file'). Then we perform the detection using faces =face.detectMultiScale(gray). It returns an array of detections with x,y coordinates, and height, the width of the boundary box of the object. Now we can iterate over the faces and draw boundary boxes for each face. for (x,y,w,h) in faces: cv2.rectangle(frame, (x,y), (x+w, y+h), (100,100,100), 1)

Step 3 – Detect the eyes from ROI and feed it to the classifier: The same procedure to detect faces is used to detect eyes. First we set the cascade classifier for eyes in leye and reye respectively then detect the eyes using left eye=leye.detectMultiScale(gray).Now we need to extract only the eyes data from the full image.

This can be achieved by extracting the boundary box of the eye and then we can pull out the eye image from the frame with this code.l_eye = frame[y : y+h, x : x+w] l_eye only contains the image data of the eye. This will be fed into our CNN classifier which will predict if eyes are open or closed. Similarly, we will be extracting the right eye into r_eye

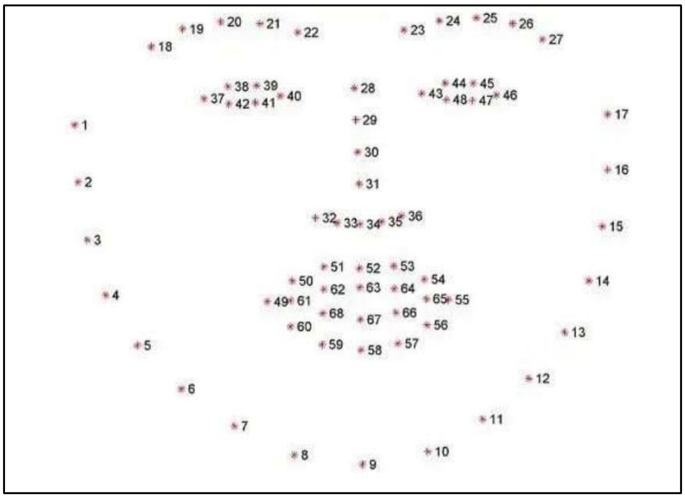
Step 4 – Classifier will Categorize whether Eyes are Open or Closed : We are using CNN classifier for predicting the eye status. To feed our image into the model, we need to perform certain operations because the model needs the correct dimensions to start with. First we convert the color image into grayscale using r_eye=cv2.cvtColor(r_eye,cv2.COLOR_BGR2GRAY).Then we resize the image to 24*24 pixel images cv2 .resizer(r_eye,(24,24)),We normalize our data for better convergence r_eye=r_eye/255(All values will be between 0 and 1.Expand the dimension to feed into our classifier.We loaded our model using model=load_model('models/cnnCat2.h5)'.Now we predict each eye with our model

Ipred=model.predict_classes(l_eye).If value of lpred[0]=1,it states that eyes are open,if value of lpred[0]=0 then,it states that eyes are closed.

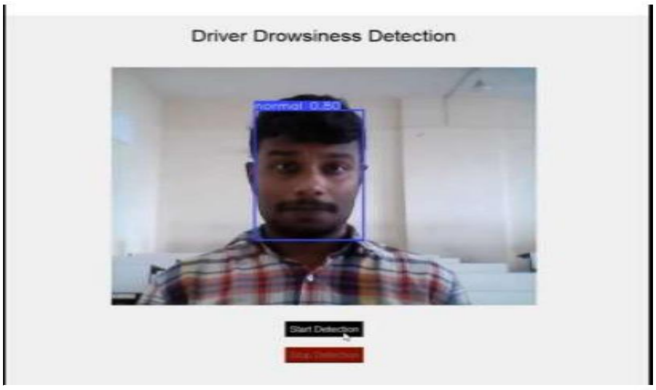
Step 5-Calculate Score to check whether person is Drowsy:

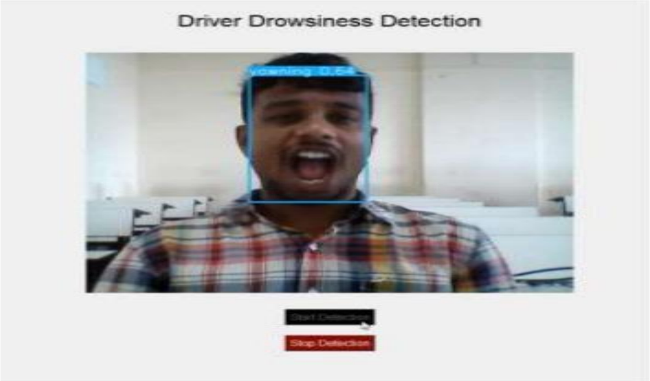
The score is basically value we will be using to find how long the person has closed his eyes.So if both eyes are closed ,we will keep on increasing score and when eyes are open,we decrease the score.we are finding the result on the screen using cv2.putText() function which will show real time state of the person.cv2.putText(frame,"Open",(10,height-20)font,1,(255,255,255),

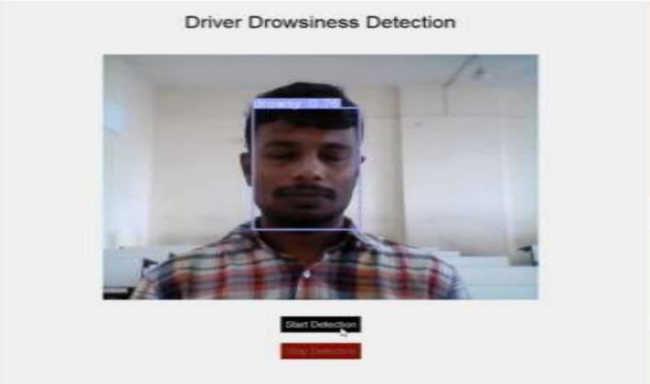
1,cv2.LINE_AA)a threshold is defined for example if score becomes greater than 15 that means the persons eye are closed for longer time and here we will beep the alar to alert him using sound.play()

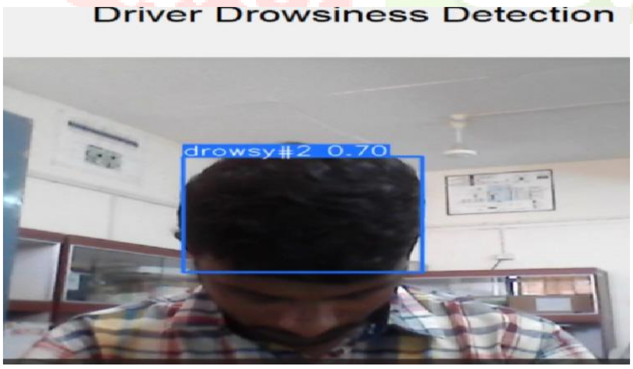


RESULT OBTAINED









FUTURE WORK

1.School bus drivers or the labours working in hazardous industry can be alerted if they are being prone to drowsiness..

2. Future work may be used for detecting alcohol pulse detection whether the person is normal or drunk.

3.Also the camera with more advance features can be used which will zoom on the eyes and many other features which will give more accurate results.

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