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Detecting Driver Drowsiness and Buzzer Alert using CNN Algorithm

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Abstract: *At present, driver fatigue has emerged as a predominant root cause of vehicular accidents on the roads. The phenomenon of drowsiness occurring while driving, particularly during twilight hours, can pose a significant risk to road safety, potentially leading to unforeseen collisions resulting in grave injuries or fatalities. The insufficiency of sleep negatively impacts an individual's capacity to carry out tasks efficiently, thereby resulting in prolonged reaction durations, weakened memory, and impaired decision-making abilities. This augmentation accentuates the likelihood of inflicting harm upon fellow riders and pedestrians on the thoroughfare. In response to the aforementioned difficulty, our proposed resolution leverages a Deep Learning methodology employing a convolutional neural network (CNN) framework, with a focus on treating the detection of drowsiness as an object recognition undertaking aimed at discerning and pinpointing the occurrence of opened and closed eyelids. The object detection process in our proposed methodology utilizes the Inception V3 convolutional neural network architecture.*

Keywords: Detecting Driver Drowsiness

I. INTRODUCTION

Lack of adequate sleep leading to sleep insufficiency can harm driving skills and increase the susceptibility to car crashes. It is comparable to experiencing cognitive impairment. It has an impact on important elements of performance such as retention, judgment, and responsiveness. Recent studies suggest that not getting enoughsleep can have a similar effect on driving abilities as drinking alcohol. Sophisticated deep learning techniques, which employ neural networks with numerous layers for automatic extraction offeatures, are highly effective in resolving this matter.

Deep neural networks known as convolutional neural networks (CNNs) excel in computer vision duties, as they have the capacity to detect patterns and characteristics within visual data. To utilizepre-existing models in CNNs, transfer learning is applied, which involves adapting a model that was pre-trained on comparable tasks, like identifyingdogs in images, to carry out newly encountered tasks such as recognizing cats. The pre-existing model is utilized as a foundation for the fresh model. While the underlying layers acquire fundamental characteristics, the superior layers are educated to confront the novel issue. This methodis particularly advantageous in constructing precise models using small amounts of data, where initiating them from scratch might not be possible.

II. BACKGROUND STUDY

Drowsiness, defined as drowsiness when rest is needed, can cause symptoms that impair performance: slow work hours, forgetfulness or micro-sleep to name a few. In fact, chronic fatigue can lead to poor performance, as can alcohol. Thesesymptoms can be very dangerous while driving.This increases the risk that the driver may miss or exit the license plate, cross into another lane, or collide with a vehicle and cause an accident. When the driver fell asleep at the wheel, the car lost control and collided with other cars and fixed objects. Sleepy drivers should take care to avoid these accidents.

III. METHODOLOGY

Initially, recognize the countenances present in the video footage by implementing facial landmark detection. Subsequently, techniques for forecasting shape are employed to identify crucial facial attributes. The process of recognizing faces involves utilizing a face cascade, while the process of recognizing eyes involves utilizing an eye cascade. OpenCV offers options for both facial and ocular cascade detection. Our model, built on the InceptionV3 architecture of CNN Algorithm and MRL eyes dataset, is capable of detecting eye fatigue. For the purpose of recognizing faces, a cascading classifier is utilized, which is based on HAAR. The main objective of this article is to center on the creation of touch-free mechanisms that can identify exhaustion and signal warnings in a timely fashion. Cameras installed in the system keep a check on the driver's eyes. Algorithms can be created to identify initial symptoms of driver exhaustion in order toprevent mishaps. indication of sleepiness is identified.

IV. EXISTING SYSTEM

The concept of machine's blind vision forms thebasis of the driver-visible sleep detection system design. Unlike many existing systems that use a camera directly pointed at the driver's face tomonitor eye movements for signs of fatigue, our system is designed to be visible to the driver. This approach is particularly relevant for larger vehicles, such as trucks and buses, which require a clear view through wide windshield for safe driving.

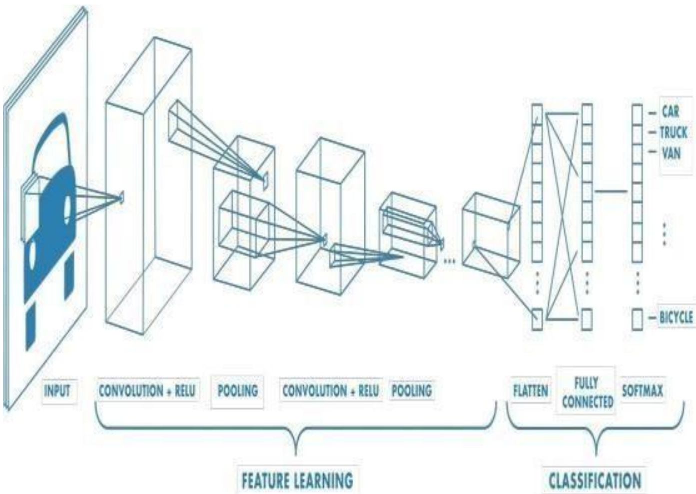
Placing a camera on the windshield poses a challenge as it hinders the driver's clear line of sight of the road ahead. The presence of the camera inside the window frame obstructs the precise capturing of the driver's facial depiction. Photographing a face from a slightly tilted angle can pose difficulties as the Open-CV Eye Detection (CV-ED) system may not reliably identify both eyes.

V. PROPOSED SYSTEM

We are pleased to introduce our innovative approach to designing and implementing areliable and affordable real-time anti-fatigue system for driving. Our primary goal is to improve current algorithms by utilizing the precision and efficiency of deep learning architectures, specifically convolutional neural networks (CNNs), which have demonstrated superior performance in computer vision tasks. Moreover, we strive to optimize the computational resources needed for embedded systems, thereby ensuring affordability. In our research, we leverage the Inception V3 architecture. Our anti-fatigue detection experiments entail training our models to identify open and closed eyes as separate objects.Based on these results, we employ a unique methodology to determine the driver's drowsiness status.

VI. ALGORITHM

We take pleasure in presenting a novel approach towards formulating and executing a genuine,economical, and robust anti-fatigue mechanism explicitly tailored for actual vehicular operation. The primary objective is to devise superior algorithms that draw upon precise and efficient deep learning frameworks. The primary objective of our research is to devise a system that can optimally leverage the unprecedentedprecision offered by convolutional neuralnetworks for conducting computer visioninvestigations. This is achieved by computationally exaggerating the capacity requirements, which facilitates the cost-efficient integration of the system onto embedded platforms.



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The Inception V3 model is utilized during our research. In the context of our anti- fatigue detection research, our models underwent training exercises to enable visual perception both when the eyes were open and when they were closed. The discreteness between open and closed eyes is acknowledged as distinct objects in discourse the present study results led to the adoption of a distinct approach for assessing the likelihood of driver drowsiness.

On the other hand, it offers potential for upgrading precision and decreasing the length of the learning period. Progressed strategies in computer vision and picture handling are utilized within the manufacturing process to carry out real-time examination of facial features and eyes. Facial acknowledgment innovation utilizes classifiers that depend on Haar highlights, and object tracking calculations can be utilized to empower ongoing monitoring of the eyes. The strategy of identifying closed eyes utilizing HAAR-based bracketing is utilized, whereas the OpenCV library offers various assets for recognizing facial and eye components.

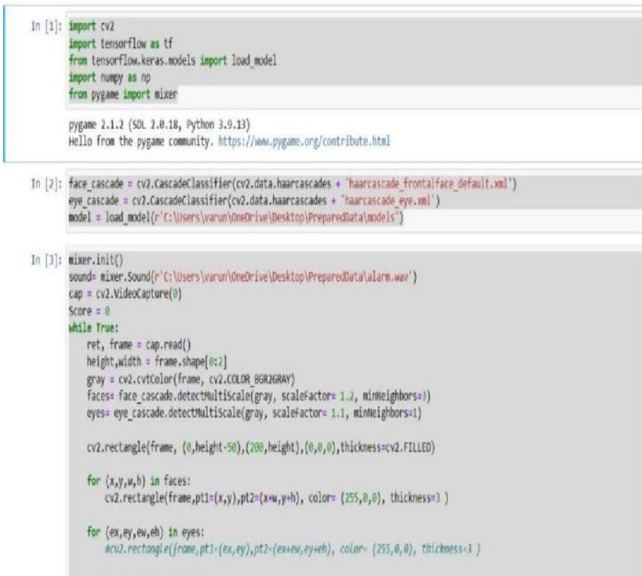
VII. ARCHITECTURE

INCEPTION V3:

The Initiation v3 design, which may be a convolutional neural organize (CNN) structure, comprises 42 layers and is an overhauled form ofthe starting Beginning show presented back in 2015. Analysts have promised numerous essential models and modifications over the a long time that are consolidated into this show, which has both symmetrical and topsy-turvy components. This setup utilizes different procedures like cruel pooling, most extreme pooling, least pooling, convolution, dropout, cascade, and other layers.

VIII. IMPLEMENTATION

- Procuring info from the MRL eye database
- Splitting data into two bunches wherein one willbe utilized for preparing and the other for testingpurposes
- Training our model using CNN.
- The yield of the demonstrate is obtained through a comprehensive examination handle utilizing the testing information



```
In [1]: import cv2
        import tensorflow as tf
        from tensorflow.keras.models import load_model
        import numpy as np
        from pygame import mixer

        pygame 2.1.2 (SDL 2.0.18, Python 3.9.13)
        Hello from the pygame community. https://www.pygame.org/contribute.html

In [2]: face_cascade = cv2.CascadeClassifier(cv2.data.haarcascades + 'haarcascade_frontalface_default.xml')
        eye_cascade = cv2.CascadeClassifier(cv2.data.haarcascades + 'haarcascade_eye.xml')
        model = load_model(r'C:\Users\varun\OneDrive\Desktop\PreparedData\models')

In [3]: mixer.init()
        sound= mixer.Sound(r'C:\Users\varun\OneDrive\Desktop\PreparedData\alarm.wav')
        cap = cv2.VideoCapture(0)
        Score = 0
        while True:
            ret, frame = cap.read()
            height,width = frame.shape[0:2]
            gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
            faces= face_cascade.detectMultiScale(gray, scaleFactor= 1.2, minNeighbors=3)
            eyes= eye_cascade.detectMultiScale(gray, scaleFactor= 1.1, minNeighbors=1)

            cv2.rectangle(frame, (0,height-50),(200,height),(0,0,0),thickness=cv2.FILLED)

            for (x,y,w,h) in faces:
                cv2.rectangle(frame,pt1=(x,y),pt2=(x+w,y+h), color= (255,0,0), thickness=3 )

            for (ex,ey,ew,eh) in eyes:
                #cv2.rectangle(frame,pt1=(ex,ey),pt2=(ex+ew,ey+eh), color= (255,0,0), thickness=3 )
```

```
        eye= frame[ey:ey+eh,ex:ex+ew]
        eye= cv2.resize(eye,(80,80))
        eye= eye/255
        eye= eye.reshape(80,80,3)
        eye= np.expand_dims(eye,axis=0)
        # preprocessing is done now model prediction
        prediction = model.predict(eye)
        # if eyes are closed
        if prediction[0][0]>0.30:
            cv2.putText(frame,'closed',(10,height-20),fontFace=cv2.FONT_HERSHEY_COMPLEX_SMALL,fontScale=1,color=(255,255,255),
                        thickness=1,lineType=cv2.LINE_AA)
            cv2.putText(frame,'Score'+str(Score),(100,height-20),fontFace=cv2.FONT_HERSHEY_COMPLEX_SMALL,fontScale=1,color=(255,
                        thickness=1,lineType=cv2.LINE_AA)
            Score=Score+1
            if(Score>15):
                try:
                    sound.play()
                except:
                    pass

        # if eyes are open
        elif prediction[0][1]>0.90:
            cv2.putText(frame,'open',(10,height-20),fontFace=cv2.FONT_HERSHEY_COMPLEX_SMALL,fontScale=1,color=(255,255,255),
                        thickness=1,lineType=cv2.LINE_AA)
            cv2.putText(frame,'Score'+str(Score),(100,height-20),fontFace=cv2.FONT_HERSHEY_COMPLEX_SMALL,fontScale=1,color=(255,
                        thickness=1,lineType=cv2.LINE_AA)
            Score = Score-1
            if (Score<0):
                Score=0


    cv2.imshow('frame',frame)
    if cv2.waitKey(33) & 0xFF==ord('q'):
        break

cap.release()
cv2.destroyAllWindows()
```

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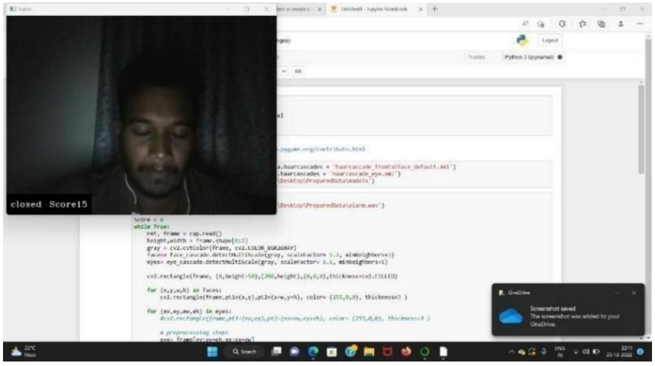
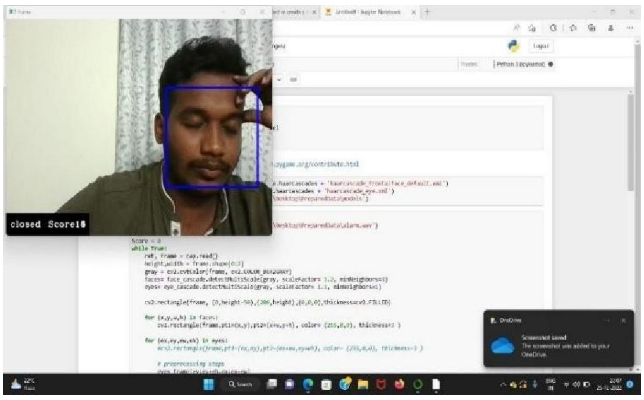
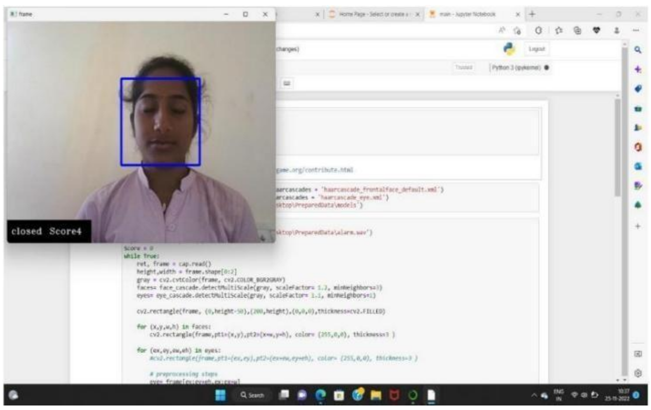
- Accuracy of model.

```
In [14]: acc_test, loss_test = model.evaluate_generator(test_data)
         print(acc_tr)
         print(loss_tr)

C:\Users\varun\AppData\Local\Temp\ipykernel_16540\3655471885.py:1: UserWarning: `Model.evaluate_generator` is deprecated and wi
ll be removed in a future version. Please use `Model.evaluate`, which supports generators.
  acc_test, loss_test = model.evaluate_generator(test_data)

0.13574892282485962
0.9471620917320251
```

IX. OUTPUT SCREENS







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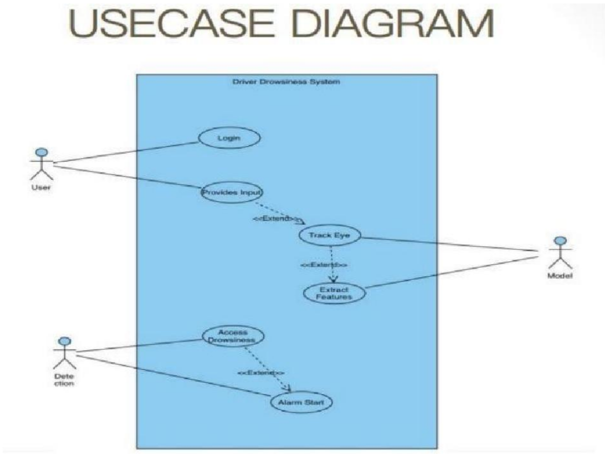
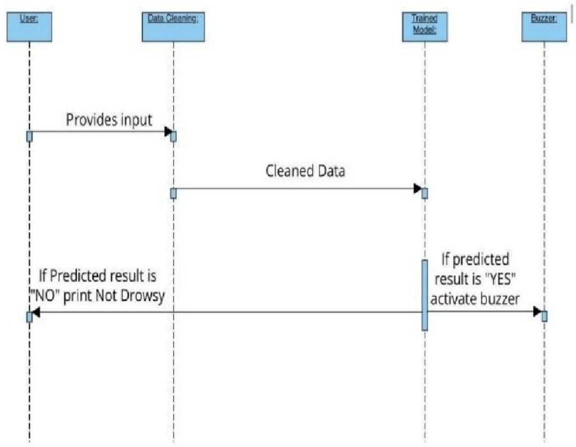
X. UML DIAGRAMS

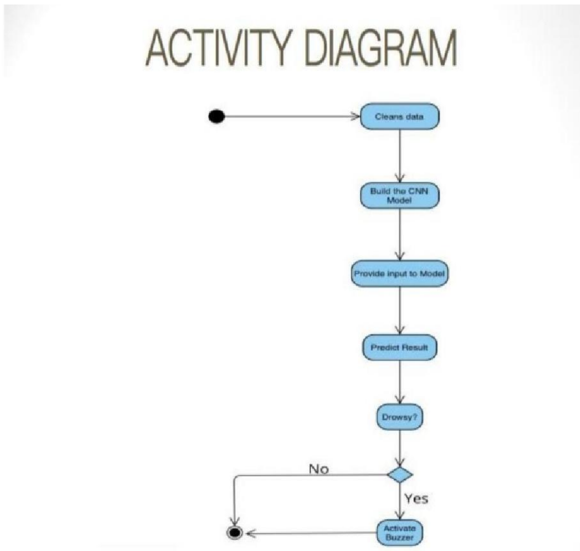
Use case Diagram



Sequence Diagram



Activity Diagram



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XI. ADVANTAGES

1. In case the driver experiences apathy, the signaling contraption will sound off to educate them.
2. The opportunity is shown to guarantee the survival of voyagers.
3. A practical procedure to ensure steady movement improvement is to decrease the repeat of incidents.
4. This leads to a decrease inside the rate of passing.

XII. CONCLUSION

Our group imaginatively created a framework that utilizes progressed innovation to quickly identify depleted drivers by distinguishing signs of tiredness whereas driving. This framework utilizes progressed checking of the driver's eye developments, with a particular accentuation on recognizing between standard squinting and the closing of eyelids due to languor. Our arrangement is outlined to anticipate mishaps caused by driver weakness by precisely evaluating the level of tiredness amid driving in a proactive way.

By optimizing the illumination and ensuring the driver is using the appropriate corrective eyewear, our exclusive image processing algorithms can gather comprehensive data on the head and eyes, thus enabling maximal efficiency.

REFERENCES

[1]. https://doi.org/10.1016/j.tra.2013.01.011
[2]. https://doi.org/10.1016/j.trc.2018.01.014
[3]. https://doi.org/10.1109/TIM.2018.2826842
[4]. https://doi.org/10.1016/j.jvcir.2019.102619
[5]. https://doi.org/10.1080/15472450.2018.1493303