DRIVER DROWSINESS DETECTION SYSTEM

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ABSTRACT -
This document presents a system developed to detect driver drowsiness in order to prevent accidents due to driver fatigue and drowsiness. Artificial intelligence is the field that allows computers to understand and interpret images or visual data. In this article, we propose the CNN algorithm, which offers high accuracy as it is efficient in detecting patterns and features in image, video and audio signals. Accurately detecting fatigue and preventing potential traffic accidents is a tedious and nearly impossible process. Therefore, this paper proposes to build a driver drowsiness detection system that uses a behavioral approach to warn drivers before an accident occurs.The system can help reduce tr affic accidents and savedrivers' lives. The work trained a convolutional neuralnetwork and used it to determine w hether a driver's eyes were closed or open. This dataset c ontains images obtained from most MRL eye datasets. P rior to training, theproposed model processes images fro m the dataset using computer vision techniques such as e dge detection, grayscale conversion, and dilation.

Key Words: Drowsiness, Artificial Intelligence, CNN Algorithm

INTRODUCTION

Drowsiness refers to drowsiness and fatigue. This is a security issue that, largely due to its nature, has not been addressed indepth by any country in the world. Although the state of drowsiness lasts only a few minutes, the

consequences can be disastrous. The reason for entering t his state is often attributed to fatigue, which reduces

levels of concentration and alertness. Drowsiness can

occur on long trips without getting enough sleep or when the driver is sleeping normally.In this case, the mai n problem is the inattentiveness of the drowsy driver, wh ich results in a slow reaction to any event on the road that can lead to an accident.In general, sleepiness is difficult to measure or observe, unlike alcohol and drugs, which h ave welldefined key indicators and readily available tests . Arguably, the best way to address this problem is to rais e awareness of fatiguerelated crashes and encourage driv ers to recognize fatigue when needed. For this, drowsiness must be detected correctly.

LITERATURE REVIEW

According to available statistics, nearly 1.3 million people are killed in traffic accidents each year and about 50 million people suffer non-fatal injuries as a result of Traffic accidents. If the driver falls asleep at the wheel, the car may lose control and strike another vehicle or a stationary object. Driver drowsiness levels must be moni tored to prevent these fatal accidents.

The following tools have been widely used for drowsines s tracking: 1) Vehicle based measurements:
factors such as lane change, steering wheel rotation, and accelerator pedal pressure are tracked continuously, and any change above a predetermined level indicates driver drowsiness.

2) Behavioral Measurements: The camera tracks driver movements such as eye closure, eye twitching, head posture and yawning, and alerts the driver if any of these signs of drowsiness are observed.

3) Physiological measurements: Many studies have look ed at the relationship between physiological signals (ECG, EMG, EoG, EEG) and driver drowsiness. One of t he important safety features is drowsiness detection, which can prevent accidents caused by drowsy drivers. T he purpose of this research is to detect and alert a person when their eyes have not been opened for some time. Th e system warns the driver when drowsiness is detected.

METHODOLOGY

Driver fatigue and drowsiness are major factors in many crashes. In the field of collision avoidance systems, designing and maintaining technologies capable of effectively recognizing or avoiding drowsy driving and warning drivers before a collision is a major challenge. We use OpenCV to capture images from a webcam and f eed those images to a deep learning algorithm that can de termine if someone's eyes are closed or open.

In this case, we are looking for the person face and eyes.

Step 1: Take the image as input from the camera.

We will use a camera to take a photo frames as input. But to access the webcam, we create an infinite loop to capture each frame. We use the cv2 method given by OpenCV. VideoCapture(0) (cap) is used to access the camera and capture the object.Usingcap.read(), which reads each image, then stores the image in a variable.

Step 2: Create ROI by locating faces in the image.

To segment the faces in the captured image, we first convert it to a grayscale image because the OpenCV object detection algorithm only accepts grayscale image as input. To detect objects, we don't need color details. We use Haar cascade classifiers to detect faces.

The classifier face= cv2.Cas is set here.

for (x,y,w,h)infaces, we use cv2.rectangle(frame, (x,y), (x+w, y+h), (100,100,100), 1

Step 3: Use the ROI to find the eye and pass it to the classifier.

This detects eyes with the same technique as ears. Cascading classifiers are used for left eye and right eye. Then use left_eye=leye.detectMultiScale(gray) to detect eyes.

We only extracted eye details from the captured images. This can be done by first removing the bounding box fro m the eye and then using this code to remove the eye ima ge from the image.

l_eye = frame[y: y+h, x: x+w]

This information is given to CNN, which decides if the e yes are closed. The right eye is also depicted in the manner above.

Step 4 – Eyes open or close determination by classifier.

Eye states are predicted by feeding images into the mode l using a CNN classifier, as the model needs correct measurements to start. We first convert the color image to grayscale.

r_eye=cv2.cvtColor(r_eye, cv2.COLOR_BGR2GRAY)

Then, since the model is trained on images with a resolut ion of 24*24 pixels, we scale the images to 24*24 pixels cv2.resize(r_eye, (24,24)).

Normalized dates for better convergence.

r_eye = r_eye /255

Load the model with model=load_model('models/cnnCat2.h5')

Now each eye is predicted with the proposed model.

lpred=model.predict_csses(l_eye)

If lpred[0] = 1, it means eyes are open,

if lpred[0] = 0, it means eyes are closed.

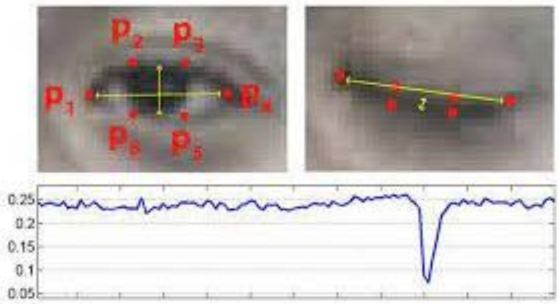

Figure1: Detection of Eyes using OpenCV

Step 5: Score calculation.

The score is basically a number that we will use to determinehow long an individual has been blindfolded. Accordingly, we will start counting if both eyes are closed, but count down if both eyes are open. We use the cv2.putText() function to draw the result to the screen, showing the status of the driver or the person.

cv2.putTxt(frame,"Open",(10,height20),font,1,(255,255,255),1,cv2.LINE_AA)

Set a standard, such as a score greater than 15, indicating that the eyes of the driver have been closed for a long time. Then the alarm goes on.

Step 6: Export the file.

You can open a command prompt or navigate to the directory containing our "drowsiness detection.py" key file, as shown above, using the following command: Python "drowsiness detection.py"

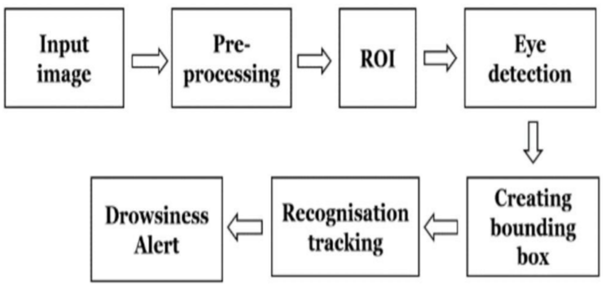

Figure 2.1: General Block Diagram

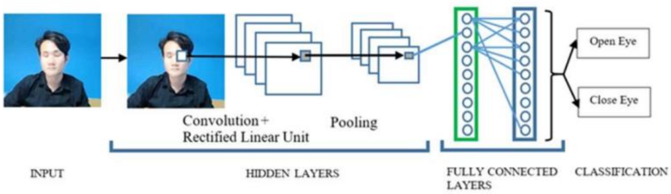

Figure 2.2: Block Diagram for Drowsiness Detection Using CNN

4. RESULTS AND DISCUSSIONS

The first image output shows the normal state of the person, with no signs of drowsiness, so the score value i s 0. As with the second image, the score value exceeds 1 5,so the detection system alerts the human by generating bounding box with a sound alert.

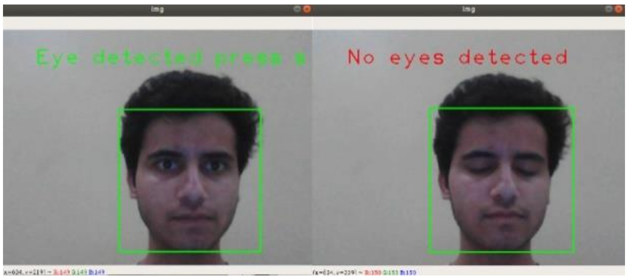

Figure 3: Drowsiness Detection

5. CONCLUSION

A drowsiness detection system based on the driver's ey e closure can distinguish between normal eye twitching and drowsiness, as well as detect drowsiness while driving. The proposed diet will help prevent injuries caused by drowsy driving. Using a Haar cascade classifier, OpenCV is used to detect faces and eyes, then a CNN model is used to predict the state. A warning signal is transmitted when the eyes are closed for an extended period. A continuous eye enclosures is used t o determine the driver's level of alertness.

For future work, this tracking system could be realized with hardware with advanced capabilities.

REFERENCES:

[1] ZuopengZhao,LanZhang,Hualin Yan, Yi Xu, and Zhongxin Zhang, Driver Fatigue Detection Based on Convolutional Neural Networks Using EM -CNN, 2020.

[2]MiluPrince, NehaSanthosh, NehaSanthosh, Reshma Sudarsan& Ms.AnjusreeV.K,Rajagiri School of EngineeringAnd Technology – Eye Movement Classification Using CNN.

[3] Anjith George and Aurobinda Routray Dept. of Electrical Engg., IIT Kharagpur Kharagpur, 721302, India – “Real-time Eye Gaze Direction Classification Using Convolutional NeuralNetwork”.

[4] Venkata Rami Reddy Chirra, Srinivasulu Reddy Uyyala& Venkata Krishna Kishore Kolli, Department of Computer Applications, National Institute of Technology, Tiruchirappalli 620015, India – “Deep CNN: A Machine Learning Approach for Driver Drowsiness Detection Based on Eye State”.

[5] Ambeth Kumar.V.D et.al. .A Survey on Face Recognition in Video Surveillance. Lecturer Notes on Computational and Mechanism, Vol. 30, pp: 699-708, 2019