Driver Drowsiness Detection System

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***Abstract*—Hitherto, The Driver Drowsiness Detection System is a highly advanced technology in computer vision. It is challenging to implement due to factors such as lighting, facial expression, and positioning. It involves identifying individuals from live video footage captured by a camera. Essentially, it is a system that automatically recognizes whether a person from a still image or video is in a state to drive a vehicle or not. A countless number of people drive on the highway day and night. Taxi drivers, bus drivers, truck drivers, and people traveling long-distance suffer from lack of sleep. Due to this, it becomes hazardous to drive when feeling sleepy. The majority of accidents happen due to the drowsiness of the driver. So, to prevent these accidents we will build a system using Python, OpenCV, and Keras which will alert the driver when he feels sleepy.**

***Index Terms*——Driver Drowsiness Detection**

I. Introduction and literature review

We are trying to make a drowsiness detection system. A countless number of people drive on the highway day and night. Taxi drivers, bus drivers, truck drivers, and people traveling long-distance suffer from lack of sleep. Due to which it becomes very dangerous to drive when feeling sleepy.
The majority of accidents happen due to the drowsiness of the driver. So, to prevent these accidents we will build a system using Python, OpenCV, and Keras which will alert the driver when he feels sleepy.
In this Python project, we will be using OpenCV for gathering the images from webcam and feed them into a Deep Learning model which will classify whether the person's eyes are 'Open' or 'Closed'. The approach we will be using for this Python project is as follows :

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) Calculate score to check whether the person is drowsy.
6) We will be trying different Algorithms if possible and get the best Algorithm for best Accuracy.

II. Dataset

The Dataset used for this model taken by kaggle. The Dataset consist of 2900 images which include both normal and yawning images. In the normal Image dataset is divided into Open Eye and Closed Eye and in Yawning images it is divided into yawn and No yawn. Dataset is divided into training and testing, which is used in the projects for training and testing respectively.

The model we used is built with Keras using Convolutional Neural Networks (CNN). A convolutional neural network is a special type of deep neural network which performs extremely well for image classification purposes. A CNN basically consists of an input layer, an output layer and a hidden layer which can have multiple layers. A convolution operation is performed on these layers using a filter that performs 2D matrix multiplication on the layer and filter.

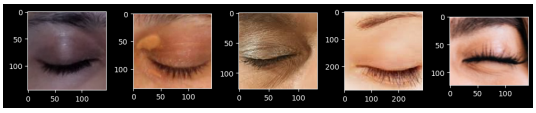

Fig. 1: Image of closed Eye

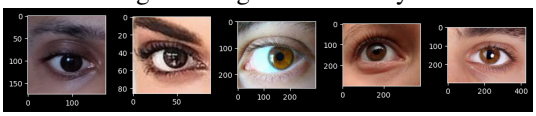

Fig. 2: Image of Open Eye

Fig. 3: Image of No yawn

Fig. 4: Image of yawn

III. Model Architecture

The model we used is built with keras using convolutional neural network(CNN). The CNN model architecture consists of the following layers:

1. Convolution Layer
2. Max Pool
3. Convolution Layer - 1D
4. Max Pool - 1D
5. Convolution Layer - 2D
6. Max Pool -2D
7. Flatten
8. Dense
9. Dense 1

IV. Experimental results

A. Training

The training process involve images from the dataset as they were divided into four category there are open eye, closed eye, yawn, noyawn.//

1) Training Parameters:
Training parameters are used in this model are:

1) Trainable params: 8,481,604.
2) No of Epochs: 10
3) Activation function: RELU
4) Optimizer: ADAM
5) Loss Function: Cross Entropy

B. Results

The architecture of the CNN model which we have developed for the purpose of drowsiness detection is shown in the below figure.

Accuracy: 0.8392
Loss: 0.3308

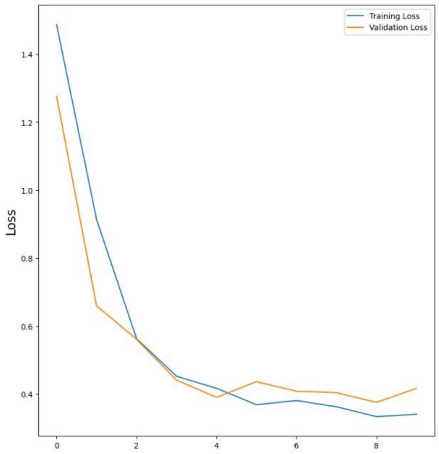

Fig. 5: Loss v/s Epochs

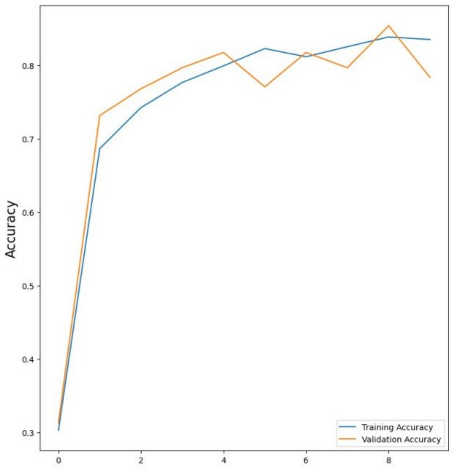

Fig. 6: Accuracy v/s Epochs

V. Problem formulation

VI. Model Approach

VII. Detail 1

VIII. Detail 2

IX. Experimental results

X. Conclusion

Driver drowsiness detection is an important task in the field of computer vision and machine learning, as it can help prevent accidents caused by fatigue and drowsiness while driving. Using a CNN model for driver drowsiness detection involves training the network on a dataset of images of drivers with varying levels of drowsiness, and then using the trained model to classify new images as either drowsy or awake. In conclusion, driver drowsiness detection using a CNN model is an effective and important application of computer vision and machine learning, and has the potential to greatly reduce the number of accidents caused by drowsy driving. With further development and research, this technology could become a standard feature in cars and other vehicles to ensure safer driving for everyone.