

Driver Drowsiness Detection System

(Deep Learning Model Project Report)

SDAIA Data Science Bootcamp(T5)

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Description of project goals:

Many people drive on the highway at night and 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 drowsiness detection System using Python, OpenCV, and Keras which will alert the driver when he feels sleepy.

Dataset:

- The data consists of training and testing sets[closed-open eyes].
- The size of the data is 175.84 MB
- Training dataset was 2517 images, while the testing dataset was 418 images.
- The source of the data was from
<https://www.kaggle.com/serenaraju/yawn-eye-dataset-new>

Hardware and Software requirements:

1. Hardware Required

- PC
- Webcam

2. Software Required

- OpenCV Face Eye Detection
- Tensorflow-Keras uses To build our Classification Model
- Pygame-to play alarm sound
- Google Colab and Jupiter Environment

The Model Architecture:

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.

The CNN model architecture consists of the following layers:

- Convolutional layer; 32 nodes, kernel size 3
- Convolutional layer; 32 nodes, kernel size 3
- Convolutional layer; 64 nodes, kernel size 3
- Fully connected layer; 128 nodes

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

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 22, 22, 32)	320
max_pooling2d (MaxPooling2D)	(None, 22, 22, 32)	0
conv2d_1 (Conv2D)	(None, 20, 20, 32)	9248
max_pooling2d_1 (MaxPooling 2D)	(None, 20, 20, 32)	0
conv2d_2 (Conv2D)	(None, 18, 18, 64)	18496
max_pooling2d_2 (MaxPooling 2D)	(None, 18, 18, 64)	0
dropout (Dropout)	(None, 18, 18, 64)	0
flatten (Flatten)	(None, 20736)	0
dense (Dense)	(None, 128)	2654336
dropout_1 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 2)	258

Results:

Epoch 10	Train data	Accuracy	99%
		loss	0.0243
	Test data	Accuracy	94%
		loss	0.2196

demo test:



Conclusion:

In this project, we presented the conception and implementation of a system for detecting driver drowsiness based on vision that aims to warn the driver if he is in drowsy state. As we said before, we built our system with Keras using CNN model and it showed us the best results that will help drivers to be awake and prevent accidents. In the future, we will consider vibration mode in future works for the driver seat or car steering wheel. Also, we can Study facial expressions of the driver like eyes blinking and head movements to detect driver drowsiness.