Track: Computer Vision

Team name: I_SEE_HACK

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Idea Overview

The goal is to develop and test a Deep Learning model that can analyse video feeds from a camera set-up in a car and detect instances for drivers such as -

- drowsiness,
- uneasiness,
- lethargy

The objective is to develop a fully functional prototype that can be fitted into automobiles to improve road safety.

Beeping noise produced if driver is found to be drowsy or inactive to alert them.

Technical Overview

Building Model:

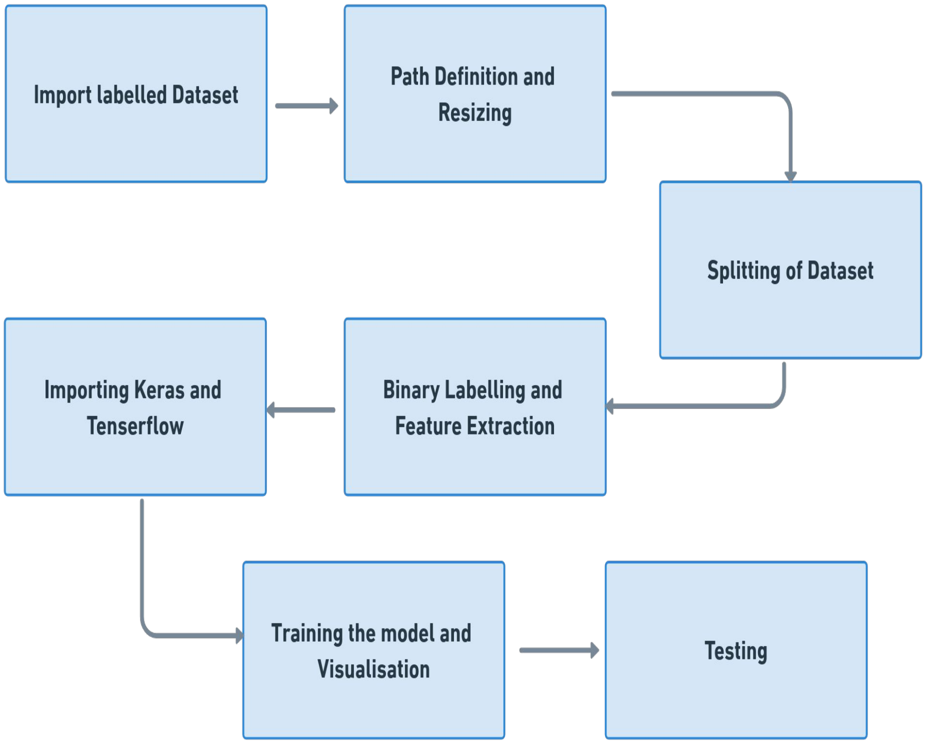
Using keras, an open source deep learning library, for training the dataset. **Keras** provides a user-friendly and faster means for data training and visualisation than using other models.

The processing of the Video feed will be done using **MicroPython** on a **kernel level.** This will increase the processing speed drastically which will be helpful to prevent life-threatening situations.

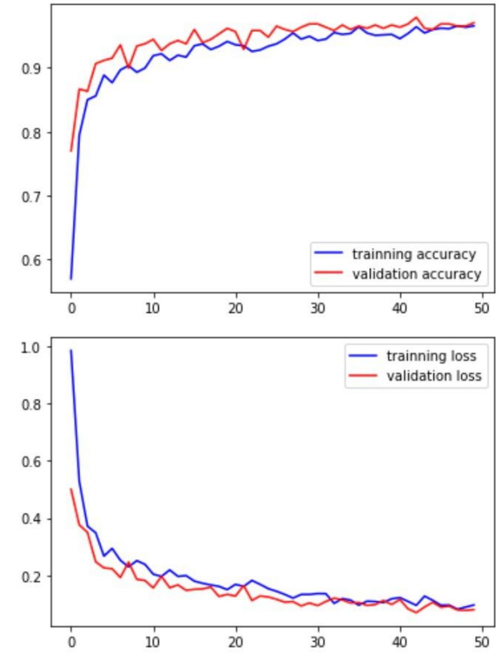
A **faster** and more **efficient** deployment of the algorithm will **reduce processing power** required and the time taken to analyse the data.

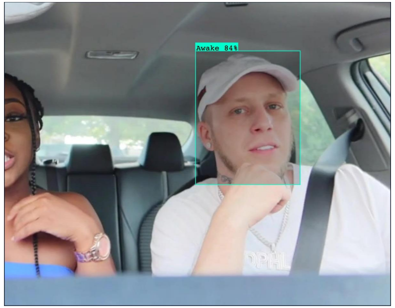
Execution

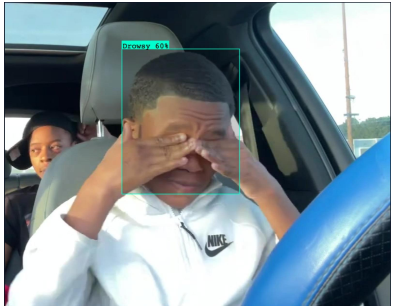
Model:



Model Output







Model Output

```
1 from sklearn.metrics import classification_report
2 print(classification_report(np.argmax(y_test, axis=1), predictio
```

```
              precision    recall  f1-score   support

        yawn       0.81      0.90      0.86        63
     no_yawn       0.87      0.89      0.88        74
      Closed       0.93      0.95      0.94       215
        Open       0.99      0.93      0.96       226

    accuracy                           0.93       578
   macro avg       0.90      0.92      0.91       578
weighted avg       0.93      0.93      0.93       578
```

```
Epoch 23/50
43/43 [==============================] - 190s 4s/step - loss: 0.1825 - accuracy: 0.9258 - val_loss: 0.1124 - val_accuracy: 0.9585
Epoch 24/50
43/43 [==============================] - 189s 4s/step - loss: 0.1687 - accuracy: 0.9280 - val_loss: 0.1285 - val_accuracy: 0.9585
Epoch 25/50
43/43 [==============================] - 189s 4s/step - loss: 0.1539 - accuracy: 0.9339 - val_loss: 0.1247 - val_accuracy: 0.9481
Epoch 26/50
43/43 [==============================] - 188s 4s/step - loss: 0.1446 - accuracy: 0.9376 - val_loss: 0.1167 - val_accuracy: 0.9654
Epoch 27/50
43/43 [==============================] - 188s 4s/step - loss: 0.1336 - accuracy: 0.9451 - val_loss: 0.1068 - val_accuracy: 0.9602
Epoch 28/50
43/43 [==============================] - 188s 4s/step - loss: 0.1211 - accuracy: 0.9547 - val_loss: 0.1088 - val_accuracy: 0.9567
Epoch 29/50
43/43 [==============================] - 192s 4s/step - loss: 0.1337 - accuracy: 0.9451 - val_loss: 0.0936 - val_accuracy: 0.9637
```

Market Prospects

- **Potential**: Can save lives and drastically reduce road instances happening due to driver drowsiness and lethargy.
- **Cost**: It is cost effective, requiring just an initial investment for a pi-camera.
- **Time efficien**t: The processing will be done on a low-level so that it is much faster and highly scalable.
- **IoT and Connectivity:** With Internet of Things (IoT) and vehicle connectivity, it's easier to collect and analyze real-time data from in-car systems.

Future Scope

- Work can be done on model using data with drivers wearing spectacles/ glasses.
- Position and angling of face can affect the alert system, an angling/rotating camera can be used.
- The solution is highly scalable as it requires low processing power.