Road Safety Analysis

Team Members:
Ananya Adiga (PES2UG20CS043)
Amrita Patra (PES2UG20CS040)
Amisha Mathew (PES2UG20CS038)

The Idea

Creating a portal for truck drivers to ensure their road safety while travelling long distances.

Our project contains 2 modules:

- Driver drowsiness detection
- Accident prone zones

More than 3 trillion tonne -km goods are transported via road transport in India every year.

Relevance of the Problem Statement

The trucking industry is an unorganized sector wherein the illegal overloading of vehicles and over-the-limit driving hours pose a serious threat to road users.

Majority of the freight traffic is ferried by Commercial Vehicles (CV) or trucks along these highways and this in turn increases the probability of them being involved in a road accident. The country's economy is forecasted to thrive in the coming years and hence the requirement of CVs is aligned to international categorisation in the supply chain and shall play a pivotal role. In the year 2019, 13,532 road deaths were associated with CV occupants.

We want to come up with a solution for this major issue.

Datasets used (from kaggle)

1. Road-safety-analysis/UK_Accident.csv
2. drowsiness-dataset

The solution

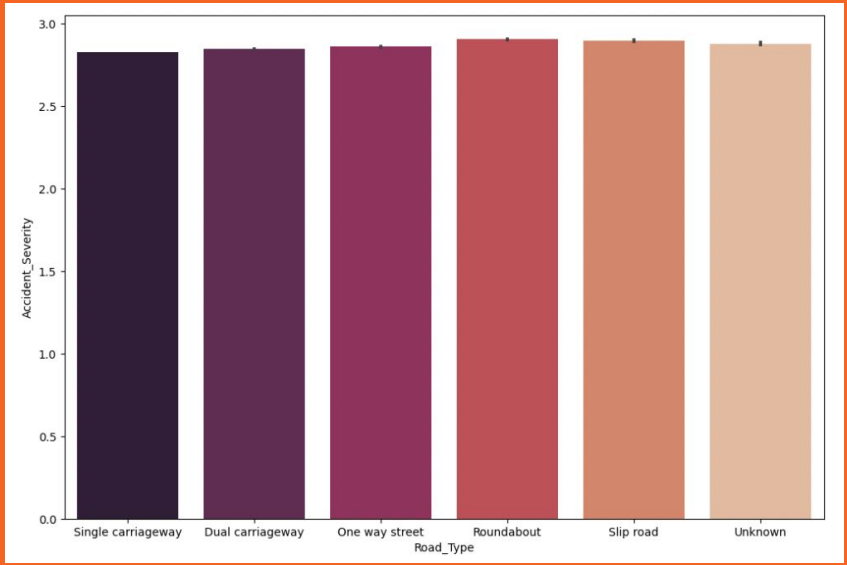
Approach

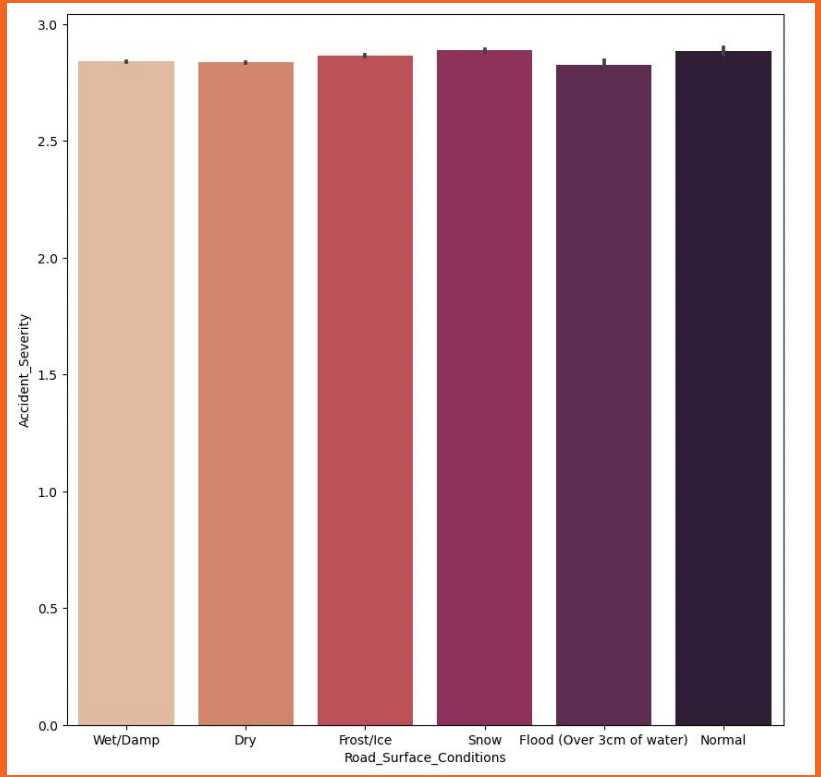
We are developing a solution which predicts the conditions which are more prone to leading to accidents to keep an eye out for.

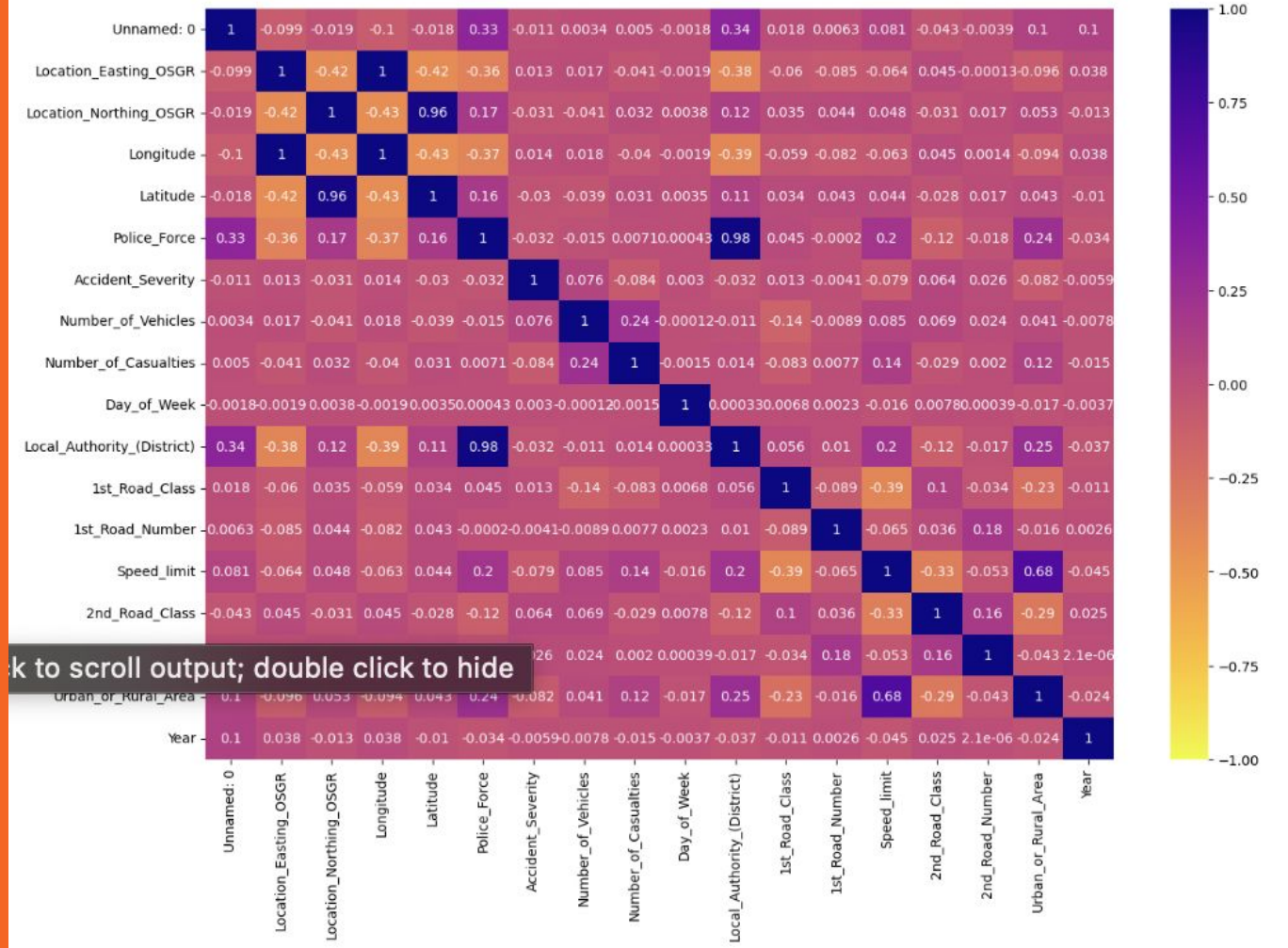
We have developed a model that evaluates the number of accidents that has occurred and the different conditions which led to them.

The accident severity is checked with respect to speed-limit and weather and light conditions and the attributes which are not relevant are eliminated to obtain a linear regression model.

The accuracy achieved was 85.1%


3.0
2.5
2.0
1.5
1.0
0.5
0.0
Accident_Severity
Single carriageway
Dual carriageway
One way street
Roundabout
Slip road
Unknown
Road_Type


3.0
2.5
2.0
1.5
1.0
0.5
0.0
Accident_Severity
Wet/Damp
Dry
Frost/Ice
Snow
Flood (Over 3cm of water)
Normal
Road_Surface_Conditions

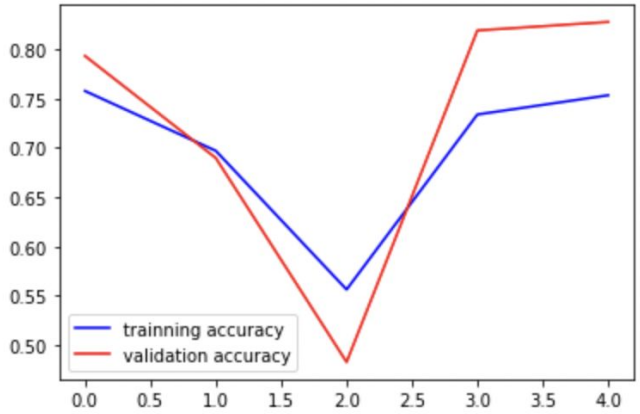

Unnamed: 0
Location_Easting_OSGR
Location_Northing_OSGR
Longitude
Latitude
Police_Force
Accident_Severity
Number_of_Vehicles
Number_of_Casualties
Day_of_Week
Local_Authority_(District)
1st_Road_Class
1st_Road_Number
Speed_limit
2nd_Road_Class
2nd_Road_Number
Urban_or_Rural_Area
Year
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

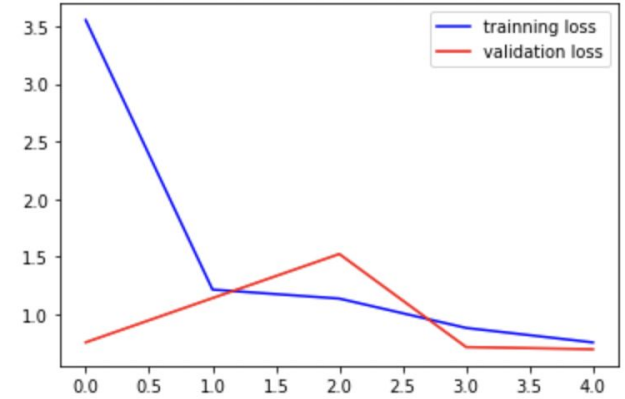
To the second part of our solution, we have created a driver drowsiness detection model which detects based on four labels. Labels are with respect to yawning and the closing of the eyes.

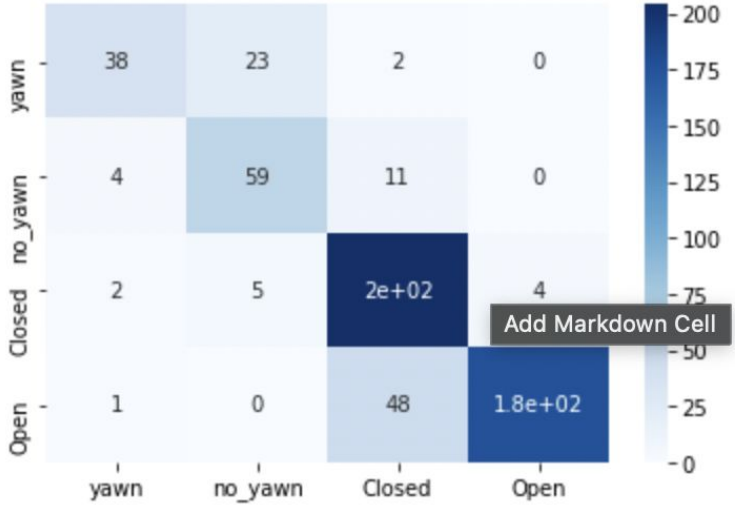
We have used the cascade classifier to train the model and tensorflow-keras models for testing.

Relu and softmax activation functions are used, along with the adam optimiser and is run over 5 epochs.

An accuracy of 82.69% is achieved through this model.


trainning accuracy
validation accuracy
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0


trainning loss
validation loss
3.5
3.0
2.5
2.0
1.5
1.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0


yawn
no_yawn
Closed
Open
38
23
2
0
4
59
11
0
2
5
2e+02
4
1
0
48
1.8e+02
yawn
no_yawn
Closed
Open
200
175
150
125
100
75
50
25
0
Add Markdown Cell

Individual contributions

Amisha Mathew

Preprocessing and cleaning the datasets for both the modules

Amrita Patra

Linear regression model for detecting accident prone zones

Ananya Adiga

Tensorflow-keras model for driver drowsiness detection