DRIVER BEHAVIOUR PROFILING

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ABSTRACT

Driver behaviour has an impact not only on the self but also on the entire traffic around the vehicle. Hence, it is important for the driver to maintain control over self and the vehicle. But sadly this is not always followed. Every year thousands of road-accidents are caused due to driver error, leading to loss of life and property. This project aims to mitigate some part of this problem by carefully analysing the driver behaviour and further reporting the results to either the driver or the concerned authorities.

1 INTRODUCTION

The way drivers behave in traffic is a determining factor for high accidents rates on roads. Reports suggest majority of the accidents are caused due to the drivers mistake, it could be over speeding, drunken driving or driver is feeling sleepy or is distracted. In such situations analysing the drivers behaviour and create mechanisms to positively influence his behaviour can make driving safer and reduce the number of accidents. In today's world, smartphones are equipped with a lot of sensors like GPS(Global Positioning System), accelerometer, gyroscope, magnetometer. Our project focuses on determining the drivers action using some of the above mentioned sensors of a smartphone and draw meaningful information from it and take the appropriate actions. This project is more logic based rather than implementation of the solution.

2 ROADMAP

Here is the initial overview of the project:

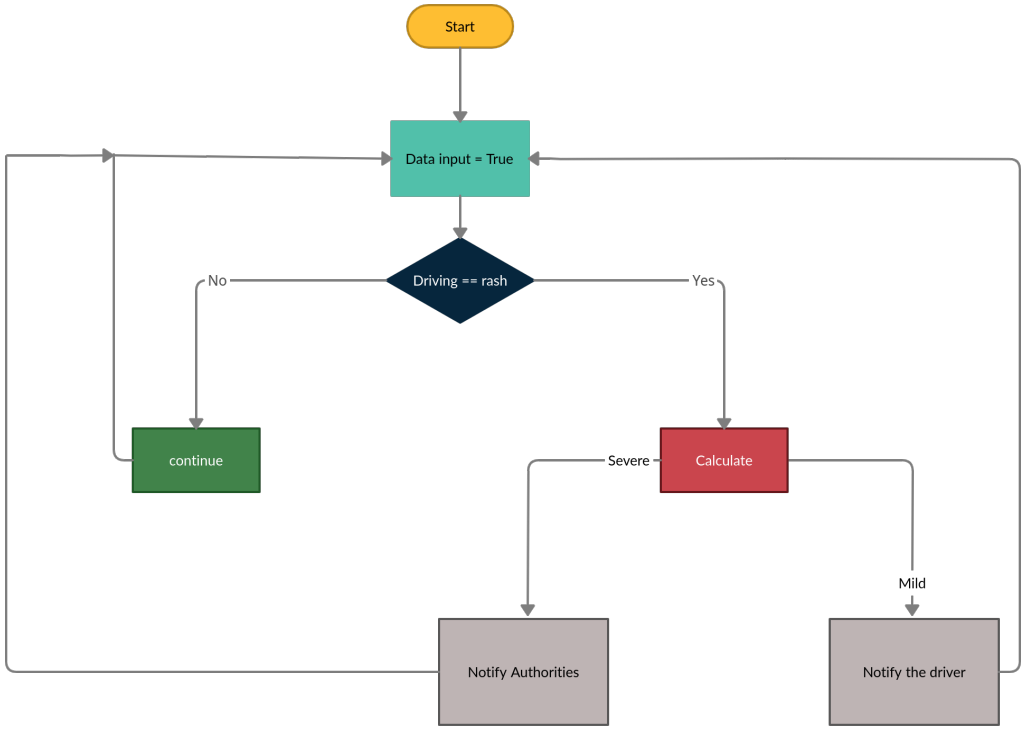
First, we need a classifier that is appropriately trained with acceptable accuracy. This classifier will classify the available data into various classes. And based on this, a score will be calculated that with serve as a metric for the driver's behavioral analysis.

For the classifier, we would require a dataset that contains the sensor values. Since it might not be feasible to collect the data by ourselves, we plan to use publicly available datasets for this project.

For getting the data we would require two sensors, namely accelerometer and gyroscope. Both these sensors are available in any modern-day smartphone and we will be using the same.

Once the classifier and the data source is ready, we would need a metric that would serve as a threshold for the algorithm to take the necessary actions. For this, we plan to consider a simple yet efficient formula that can be as simple as the weighted-mean of all the instances of all behaviours.

For the demo, we will manually steer the smartphone, mimicking the vehicular movement and demonstrate the capability of the algorithm.



3 MILESTONES

1. February end:
   We plan to achieve the basic structure of the project. Also, we aim at properly cleaning and labelling the data for ease in the future.
   After cleaning the data, we will try out a basic machine learning model and generate predictions on test data.
2. March end:
   By now, we aim at completing the model training and initiating the data collection process with the use of smartphone sensors. After this, we will aim at making basic predictions by manually moving the smart phone.
3. April end:
   By this time we will be finishing up with the project and will start documenting the procedure and findings. Also, we will try out the project in a real environment by actually going in a vehicle and documenting the results.

4 DIVISION OF LABOR

The dataset we have found is a collection of smartphone sensors measured for driving events. Data of sensors like accelerometer, gyroscope, linear acceleration are recorded while the driver was executing a particular driving event. The experiment was performed in 4 car trips each of duration 13 minutes. The motion sensors sampling rate varies from 50Hz to 200Hz depending on the sensor.
One team member will be working on pre-processing of the data ie. data cleaning and labelling and the other team member will be working on training the data and building the machine learning model. For getting the data both will be working on setting up the environment to capture data from smartphones. At the end, we will separately generate predictions and compare the results to confirm the generalizability of the algorithm.