Scootsure - Making Electric Scooters Safer & Insurable Using AI
Niall Meade Ardscoil Rís, Limerick

Aims

1. Investigate electric scooters in Ireland, why they are illegal and why insurance companies refuse to insure them?

2. Make scooters safer—Helmet Classifier and Terrain classifier.

3. Make scooters more insurable—Scootsure platform consisting of a android mobile app and a web based user interface.

Scooters In Ireland Today

Electric scooters are becoming an increasingly popular mode of transport in Ireland, despite the fact that they are currently not regulated and are technically illegal. As a result of the lack of regulation, the safety concerns associated with them and lack of user data surrounding their usage, Insurance companies are reluctant to insure these vehicles. Scootsure aims to take the first step to both ensure electric scooters are used safely while also collecting scooter users data to aid and improve the insurability of the devices.

Scootsure Platform Overview

The platform consists of a phone application which is connected to the scooter via BLE reading real-time data from the device, a real-time Firebase Database and a web User Interface to display data and calculate insurance groups.

Helmet Classifier

The helmet classifier takes a picture of the driver to make sure he or she is wearing a helmet. The majority of scooter users do not wear helmets, another reason which makes them harder to insure. The classifier runs a pre trained facial classifier, it then aligns a bounding box with the top of the head. There were no datasets available for helmets so my classifier works on the basis of the average colour seen inside this bounding box.
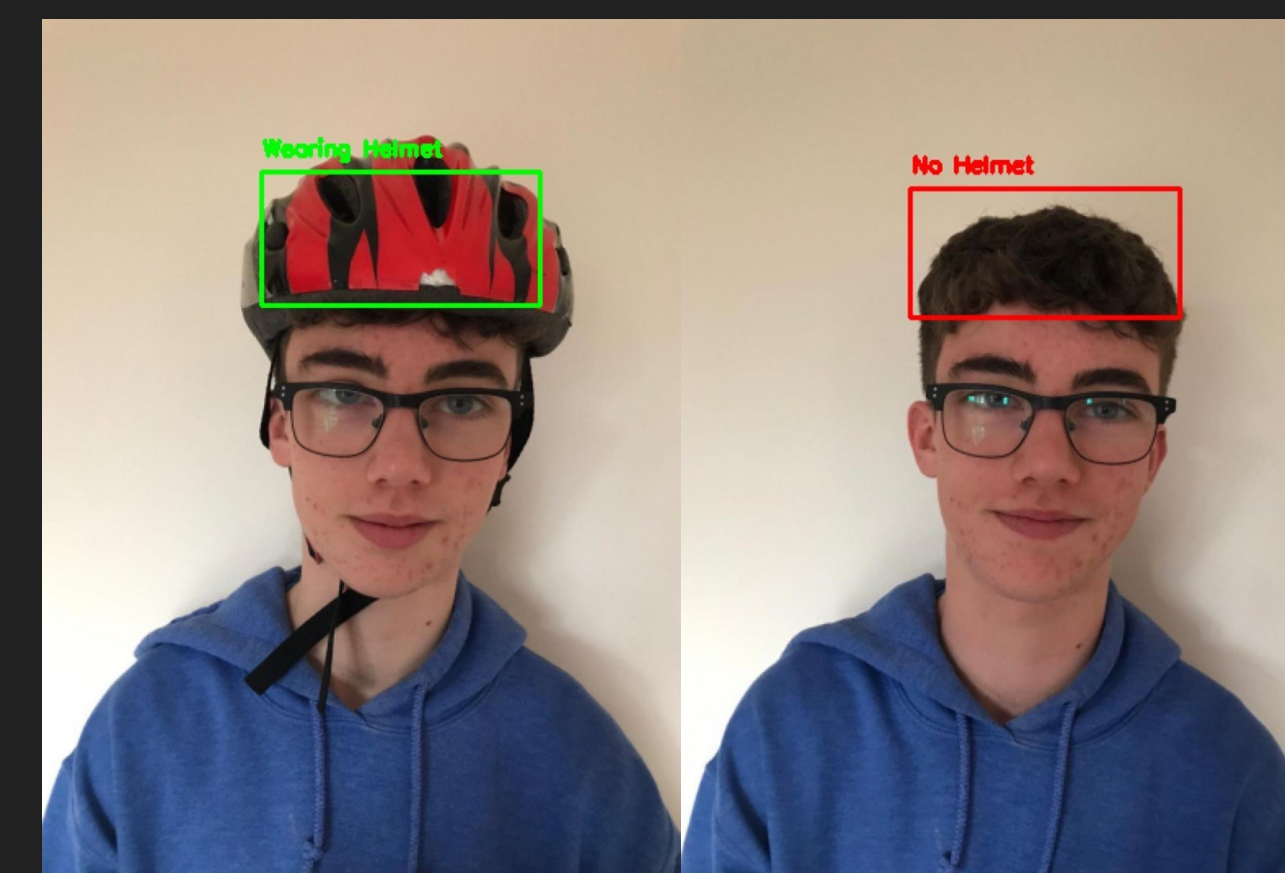
Terrain Classifier

Many scooter accidents happen by traveling too fast on unsuitable surfaces. I trained a Convolutional Neural Net using a terrain dataset I scraped from the internet. A CNN is basically trained to look for certain patterns in images and makes classification decisions based on these. I achieved a testing accuracy of around 60%. The reason it was not higher was because the dataset is not fully clean containing images other than just terrains. A max speed could be set for each surface on the scooter through the app.
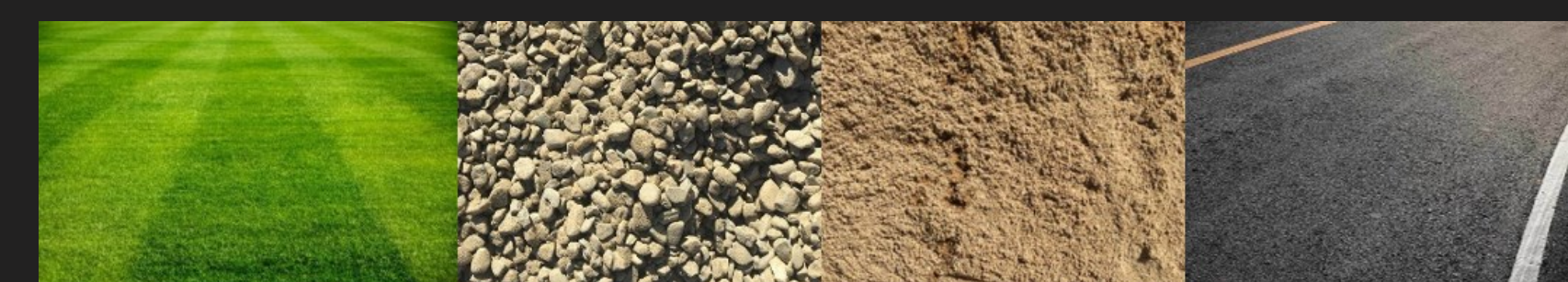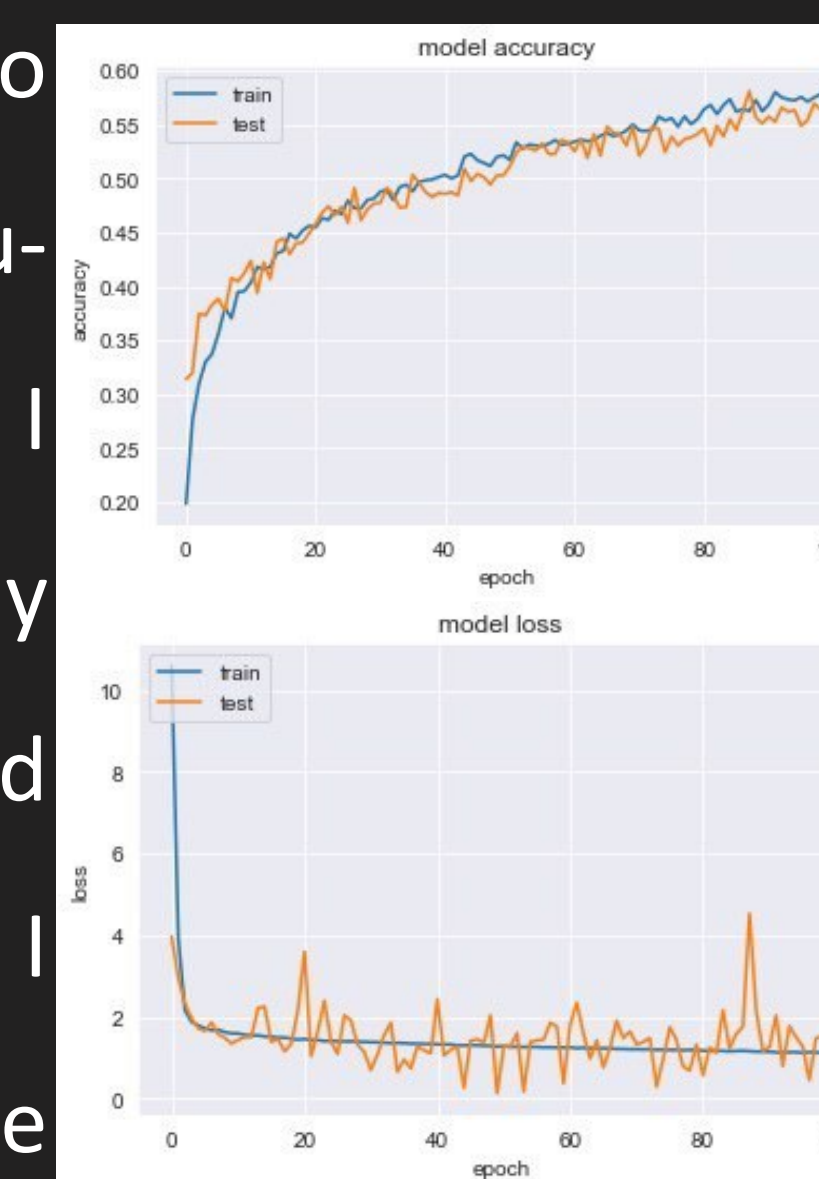
Firebase Real-Time Database

The database is structured with user and journey data. Each entry is keyed with a time stamp and stored in JSON format. The database can be easily integrated into a mobile or web platform using a simple API.
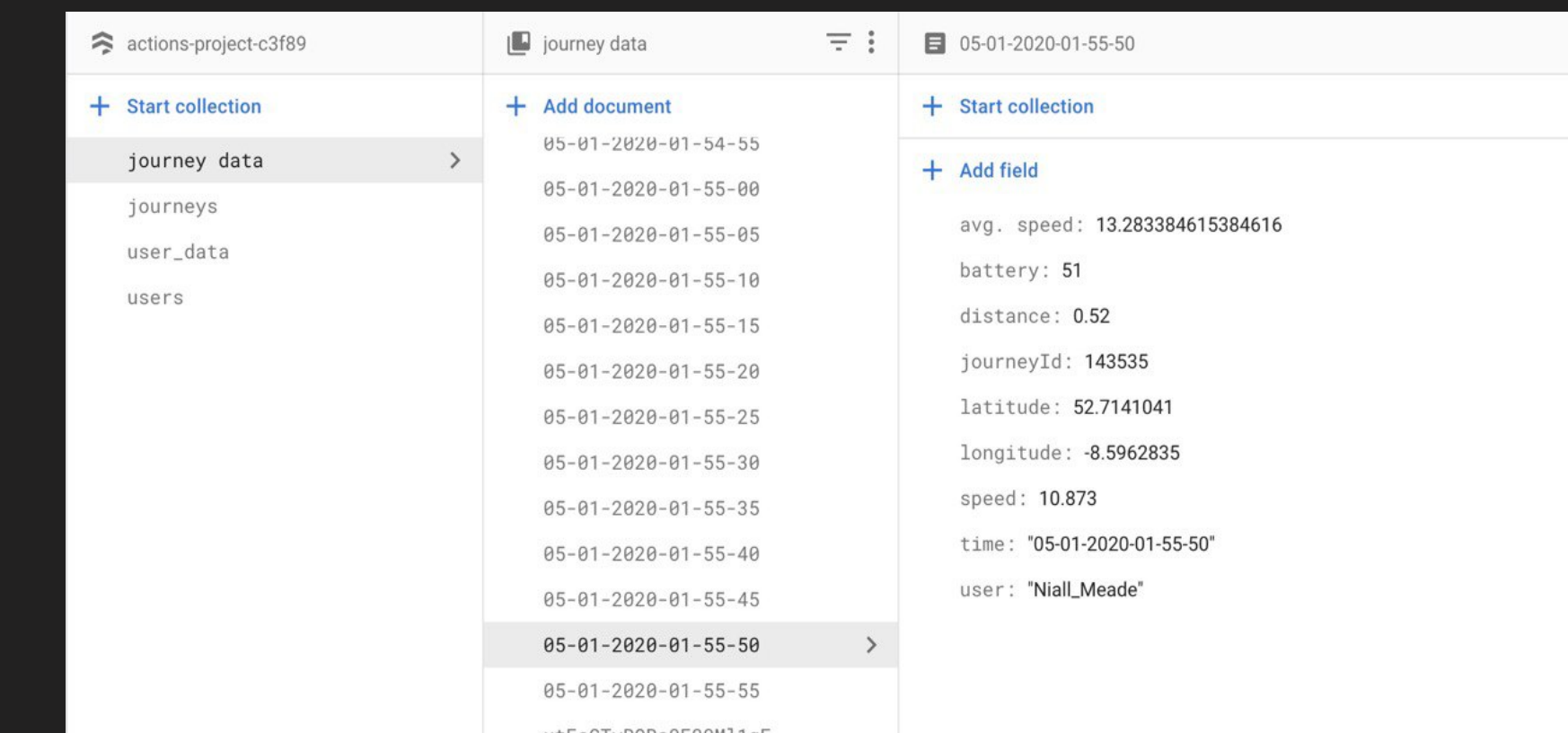
Determining Insurance Groups

To calculate an insurance premium you have to calculate risk. To determine what group you fall into as a scoot user the Scootsure platform looks at 3 key pieces of information; average speed, average distance (per day) and a route danger rating which accesses the GPS co-ordinates to determine the risk associated with the route you took on your journey. I plotted 200 random pieces of data in a 3D plot and used a simple k-means algorithm to split the data into 3 distinct clusters. Future users can be accessed and compare to this plot. Blue is the highest premium, then yellow and finally pink.
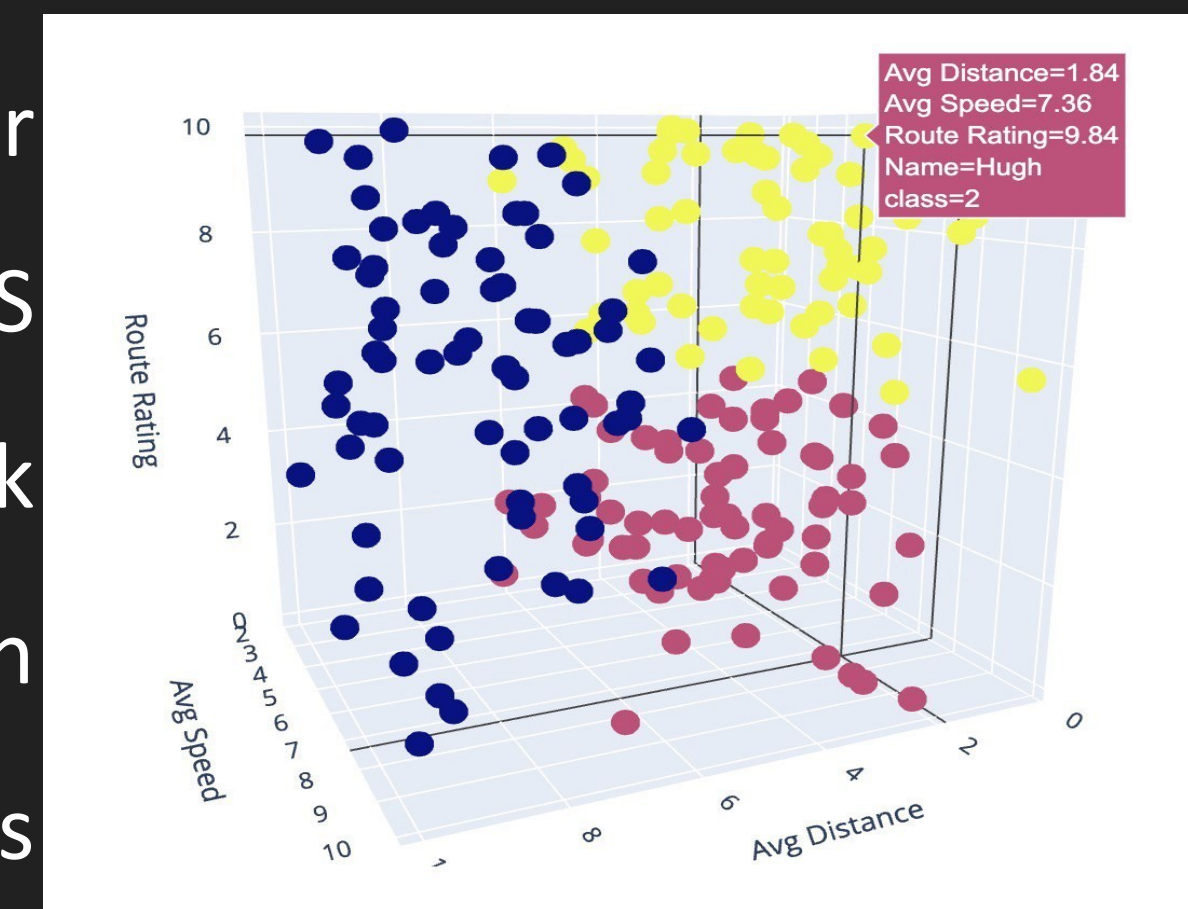
Testing and Conclusions

I built a prototype of Scootsure system and tested it successfully. I implemented the following features:

. Recognise suitable terrain for the scooter

. Identify if a helmet is being worn by the driver

. Central database for all scooter journey data

. k-mean clustering of data for insurance group calculation

. Extract real-time data from the scooter via BLE.

In the future I hope to implement the classifiers directly into the phone app. I would like to sincerely thank On Semi for their kind sponsorship of the scooter!