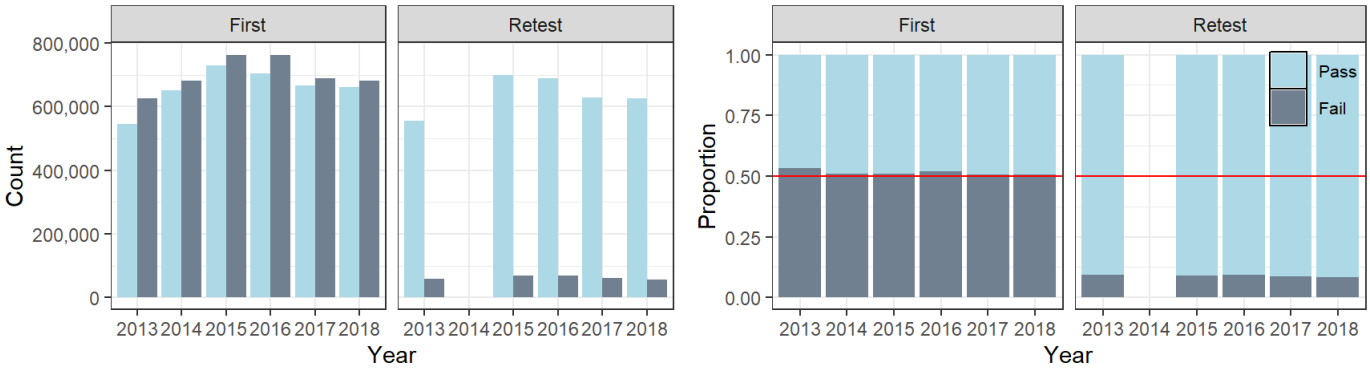
NCT Statistics Report

Pass/Fail overview - Calum | Analysis based on test centres - Amol | Equipment Failure - Japneet | Make/Model analysis - Haojun

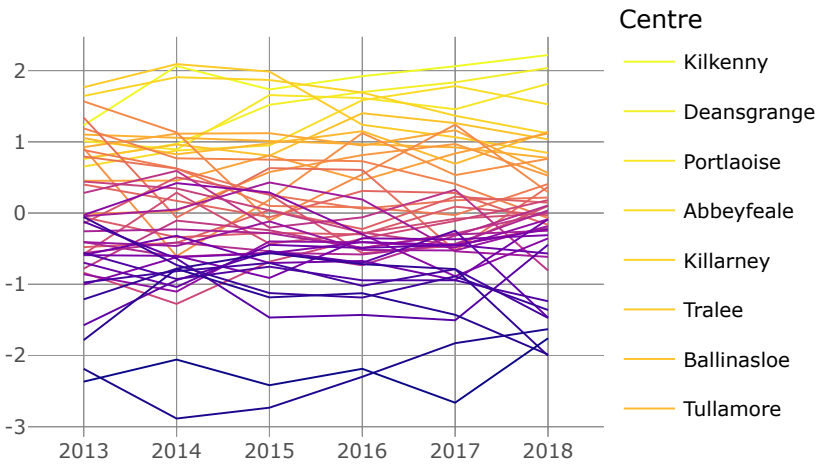
Let us begin with an overview of the data. The NCT is a test that all cars over 4 years of age must undergo to legally drive on roads in Ireland. We have NCT pass and fail data for almost 12 million cars tested from 2013 to 2018. This data was recorded from all 47 test centres scattered across Ireland. This includes both initial test and retest data. Please note retest data was not available for 2014, hence it was omitted from our report. Here's an overview of how this data is distributed.



As you can see the majority fail the first test, however the margins are quite close. As to be expected, the retest has a low fail rate.It is interesting to note that both total number of cars tested and pass proportion per year hasn't fluctuated much. One might expect that as the population increases, so too must the number of cars. One possible explanation for the lack of growth is that more people may be switching to public transport. We would also expect as technology advances cars should become more reliable, yet our data does not support this theory. Perhaps the NCT have included stricter requirements that would balance this increase.

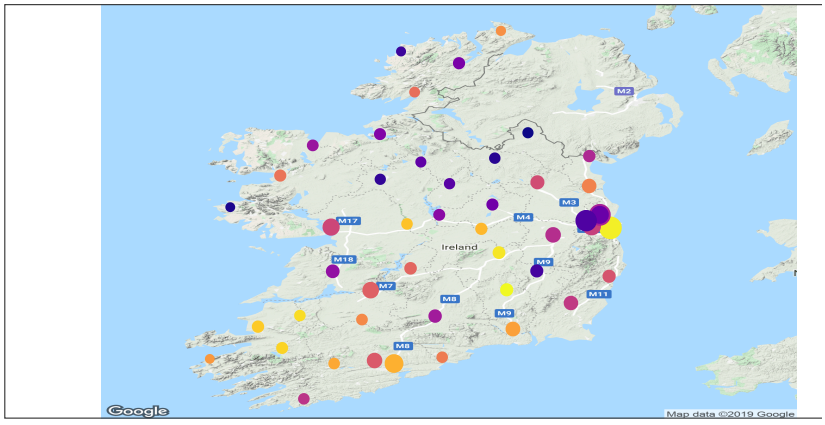
Which test centre should I go to?

To the right we've ranked different centres by their first test pass proportions. Using an exponentially weighted mean we prioritized more recent results in our calculation. The top shows centres with relatively high pass rates and the bottom shows the centres with the lowest. Notice how consistent the scores are. This could be dues to higher quality vehicles in more affluent areas or it could indicate a bias in the testing centres. Our recomendations are if you live in Monaghan, take a weekend trip to Kilkenny for your car test, you may end up saving money.



Is location a factor?

To test the above theory we created the map to the right. The colour represents the same scale as above, with size representing the total volume of cars in 2018. There is a large cluster of low ranking centres in north-central and north-west Ireland. This may support our affluency theory. If we look at the Dublin area there are low ranking centres to the north and higher ranking centres to the south. This could be a reflection of the northside - southside distribution of wealth. It is intriguing that Kerry has some of the highest ranked centres, despite being a more rural county. Traffic volume seems less significant there are large centres and small centres at either end of the spectrum.



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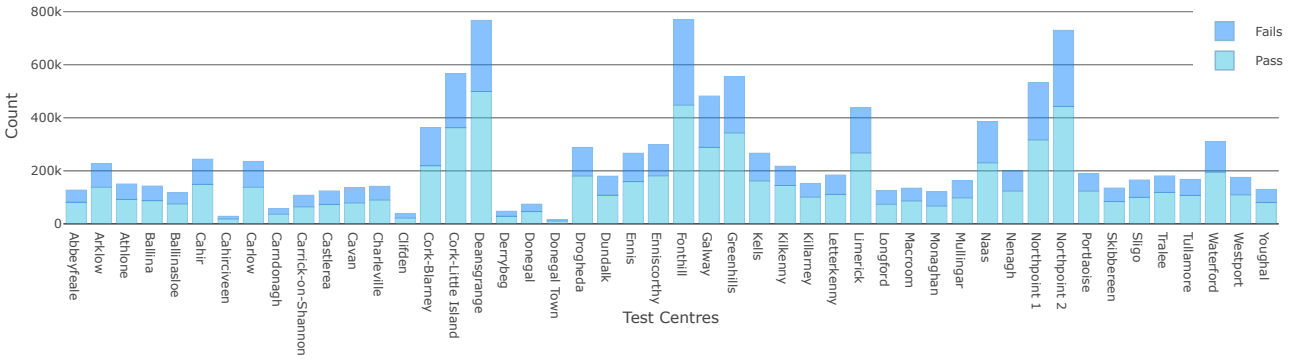
In this section we will analyse data from 2013 till 2018 about each test centre. As shown in the map (https://github.com/NanawareAmol/R-project_Road-safety/blob/master/Result/loc_spread_across_ireland.JPG), the test centres are spread across the Ireland and the number of centres is more in highly populated areas such as dublin, cork etc. The bar chart shows the total number of tests that each centre performed and the total pass and fail counts as well as percentages. So, based on the test counts, the top 3 test centre are, *Fonthill(770685)*, *Deansgrade(767484)*, and *Northpoint 2(729661)*. The botton 3 centres which performed less tests are, *Donegal Town(16315)*, *Cahirciveen(28806)* and *Clifden(38683)*.



Total test passed for each test centre

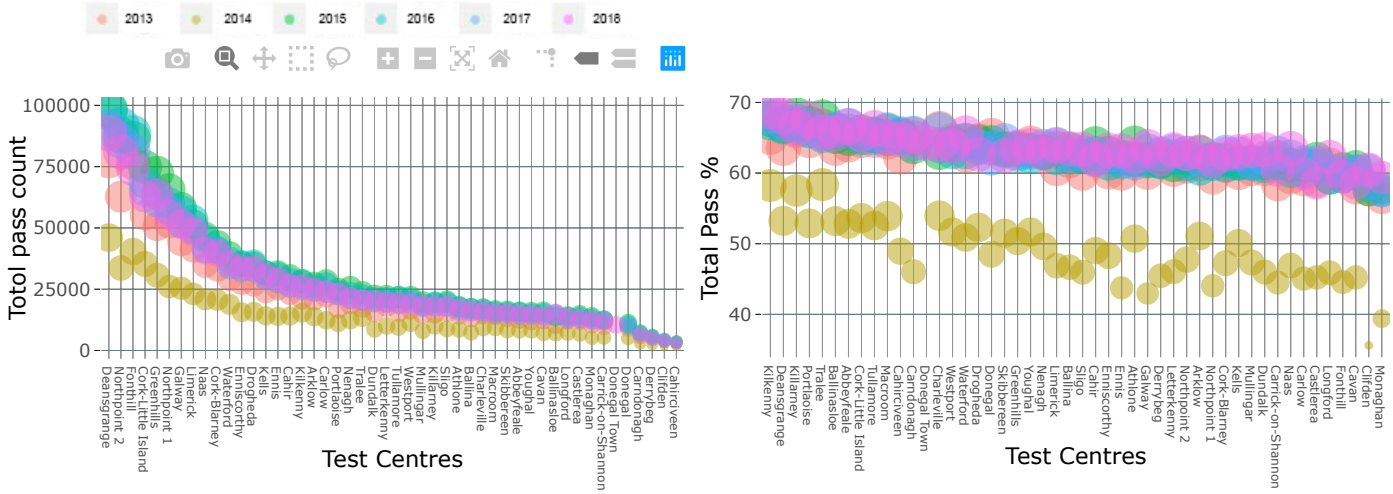
The following scatter plot shows the total test pass count for each test centre from the year 2013 till year 2018. The questions that can be answered by this graph are,

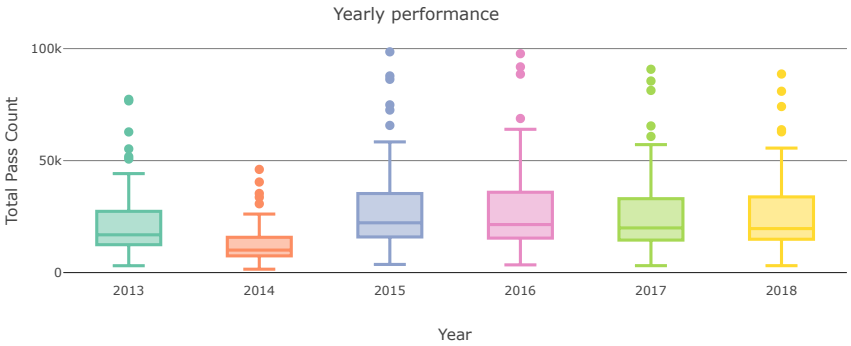
1. which are the top 3 and last 3 centres based on total pass count?
   (Deansgrade, Northpoint 2, Fonthill and Cahirciveen, Clifden, derrybeg resp.)
2. Which year has the highest and lowest total pass count?
   2015 and 2013 respectively

But, in this graph we are not considering the total tests performed by the test centres which shows the actual performance of the tests. For this we will plot another graph.

Test performance for each test centre

The graph gives the overall idea of the test performance based on pass rate and the year. As per the graph we can say that for year 2013, 2015, 2016, 2017 and 2018, the pass rate is higher that 55%. And the highest and lowest performance found in Kilkenny and Monaghan test centres respectively. The case with the 2014 being less in number is because of the incomplete data available from the NCT website and it can be processed in the same manner if we have the complete set.





Total pass count limits per year

The box plot shows the total pass count against each year. With this we can fetch the details on maximum and minimum pass counts per year, the median pass count and the outstanding pass count values which are shown as outliers (points) per year with the test centre name.

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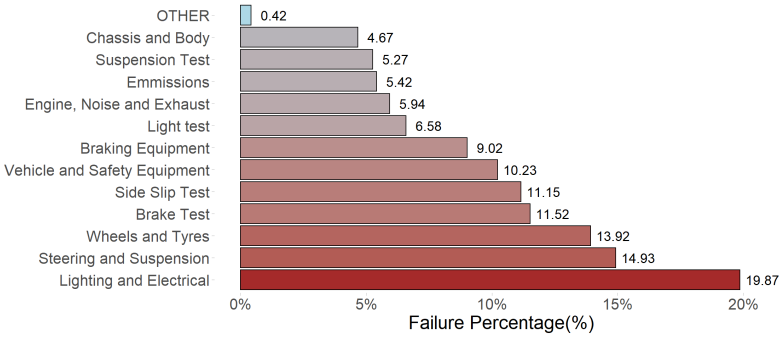
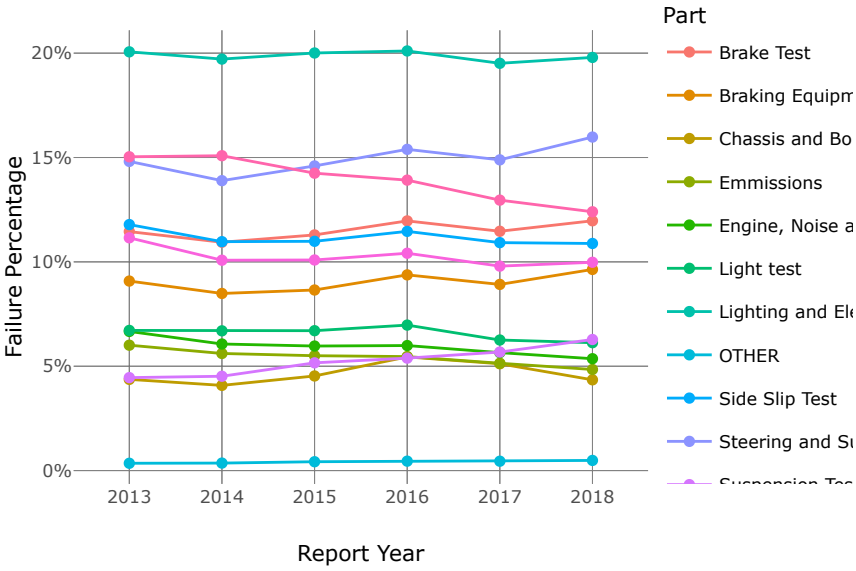
Equipment Failure - An Overview

The barplot, resulting from the exploratory data analysis, arranges the different vehicle item categories in decreasing order of their failure percentage over a span of 6 years altogether. Overall, Lighting and Electrical is the most failed item category with a failure percentage of 19.87 whereas Body and Chassis being the least failed known category with a failure percentage of 4.67. The category Other being the least failed item category, overall, includes the parts that are not covered in the major 12 categories and hence is the area of least interest for this analysis.



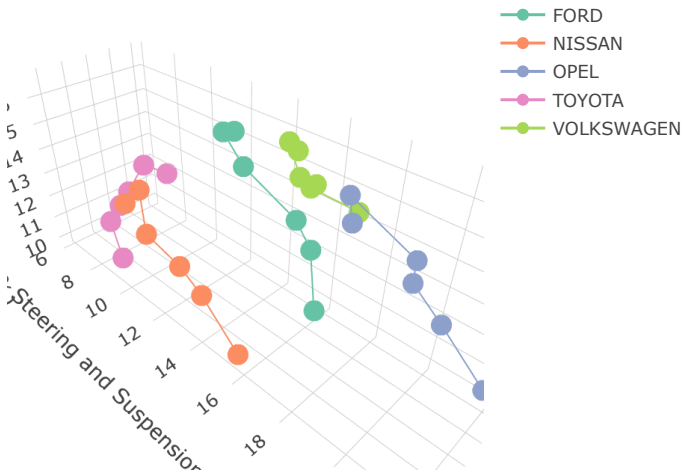
Analyzing Part Failures Per Report Year

Diving further, we derive interesting insights on analyzing the item failure for each report year. Among the top 3 failure items overall, the Lighting and Electrical holds the topmost position throughout the entire span with a fail percentage hovering just around 20. However, the failure percentage for Steering and Suspension follows an increasing trend from 2014 to 2018 with an increase of 2.089%, which moves it up the list from third position in 2014 to a second position in 2015. A corresponding decrease in failure percentage of wheels and Tyres is observed which moves it down the list to become the third most failed item in 2018.



Is there Any Relationship between Top Vehicle Makes and Top 3 item failure categories?

Certainly Yes. TOYOTA seem to have the lowest failure percentage among all the vehicle makes for all the three item categories. Collectively, all the top 5 makes have improved their 'Wheels and Tyres' over the 6 report years. However, an increase in failure percentage for 'Light and Electrical' and 'Steering and Suspension' is observed for almost all the makes with NISSAN and VOLKSWAGEN being an exception with a slight decrease of 0.348% for NISSAN and that of 2.154% for VOLKSWAGEN in failure percentage of 'Light and Electrical' parts.



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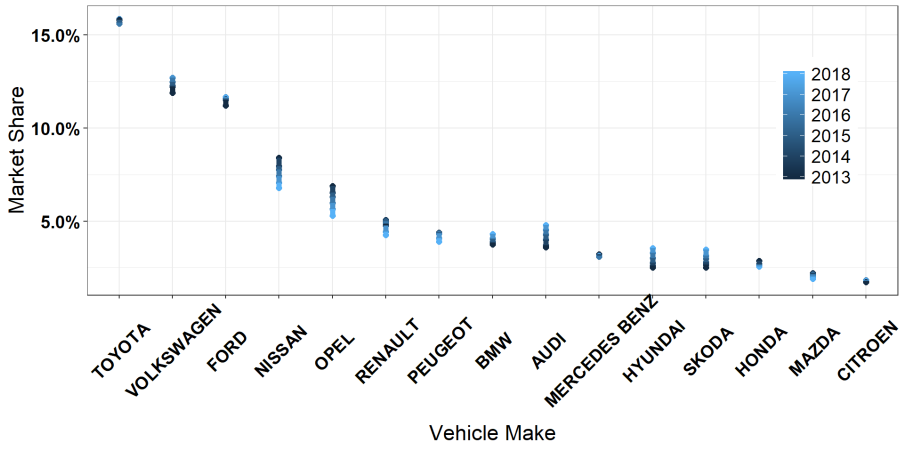
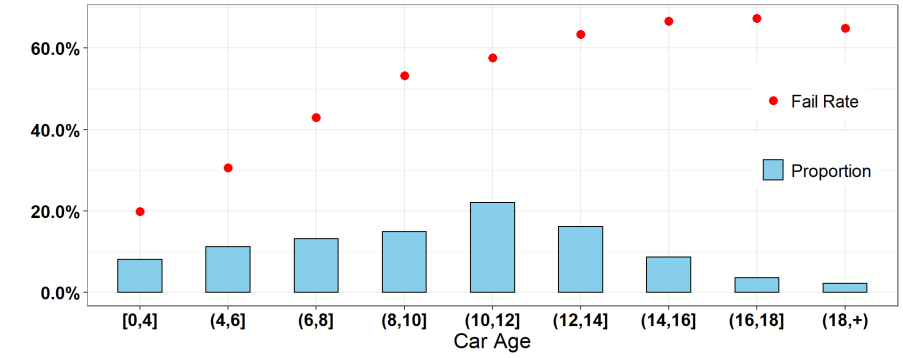
Market Share of Car Makes



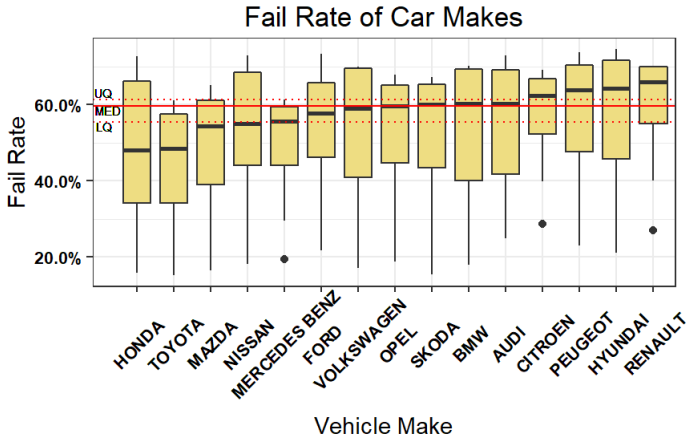
The plot shows the top 15 market share of car makes,which occupy more than 85% of the total market in Ireland. Toyota, Volkswagen and Ford rank top 3 market share in recent six years and have kept stable.The market share of Nissan, Opel and Renault have declined significantly from 2013 to 2018.But for Audi,Hyundai and Skoda, it has increased gradually.

Fail Rate and Proportion of Car Ages

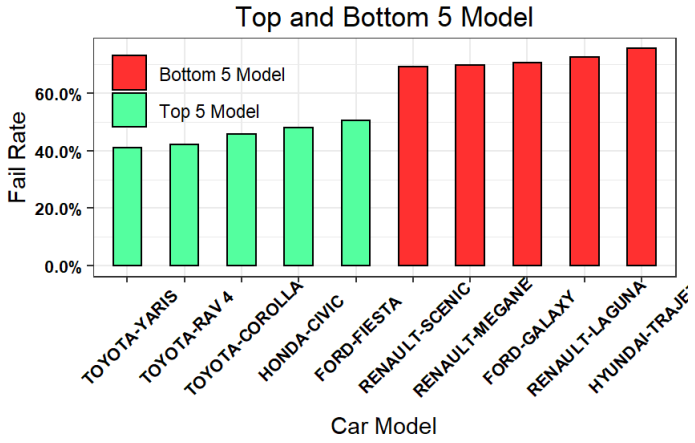


The bar chart is the distribution of car ages, which shows the largest proportion of cars are between 8 and 14 years old. The point above the bar represents the fail rate of cars of this age in the first test. As the car age increase, fail rate rises linearly.

Car Makes and Models Recommended



The box plot shows fail rates of different car ages of vehicle makes. The red lines are upper quartile, median and lower quartile fail rate in different car age groups of vehicle makes. Honda, Toyota and Mazda have a better quality, but Renault, Hyundai, Peugeot and Citroen are easy to fail in test.



The bar chart shows top 5 and bottom 5 models in fail rates. These models are selected from most popular 50 models of car between 10 and 12 years old, which occupy more than 85% market share in Ireland. TOYOTA-YARIS,TOYOTA-RAV 4,TOYOTA-COROLLA,HONDA-CIVIC and FORD-FIESTA are the most recommended models. Potential buyers of RENAULT-SCENIC,RENAULT-MEGANE,FORD-GALAXY,RENAULT-LAGUNA and HYUNDAI-TRAJET should be aware they have the least reliable rates.