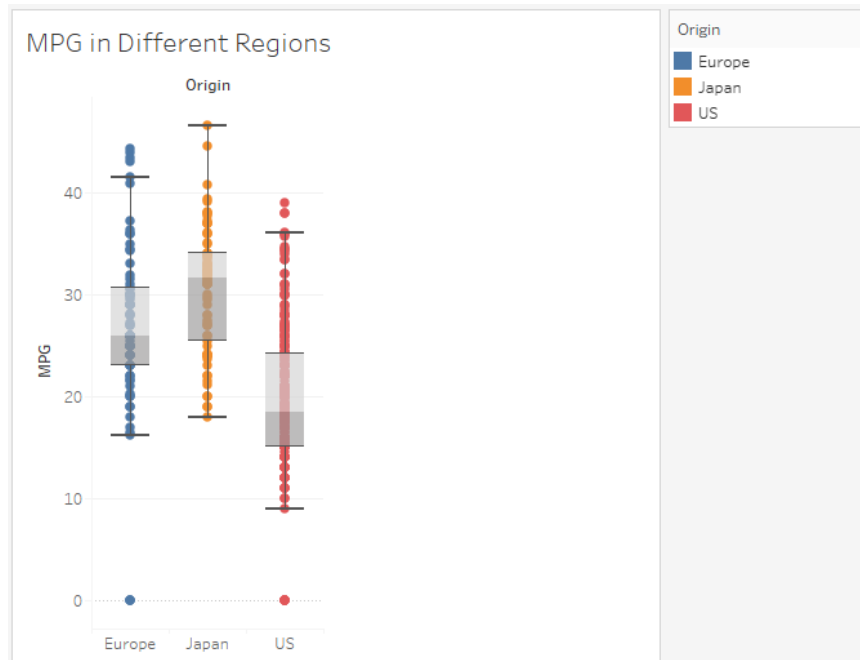


Exploratory Visual Analysis (Cars)

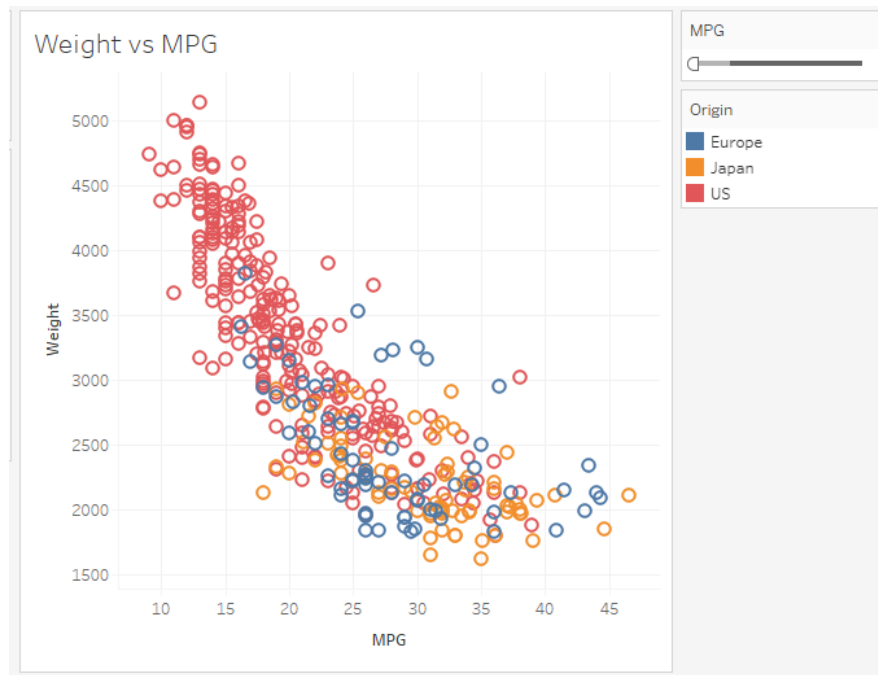
For this assignment, I chose to analyze the cars dataset. The dataset provides information on 406 cars along with their MPG, number of cylinders, displacement, horsepower, weight, acceleration, model, and origin.

What region has the best MPG for cars?



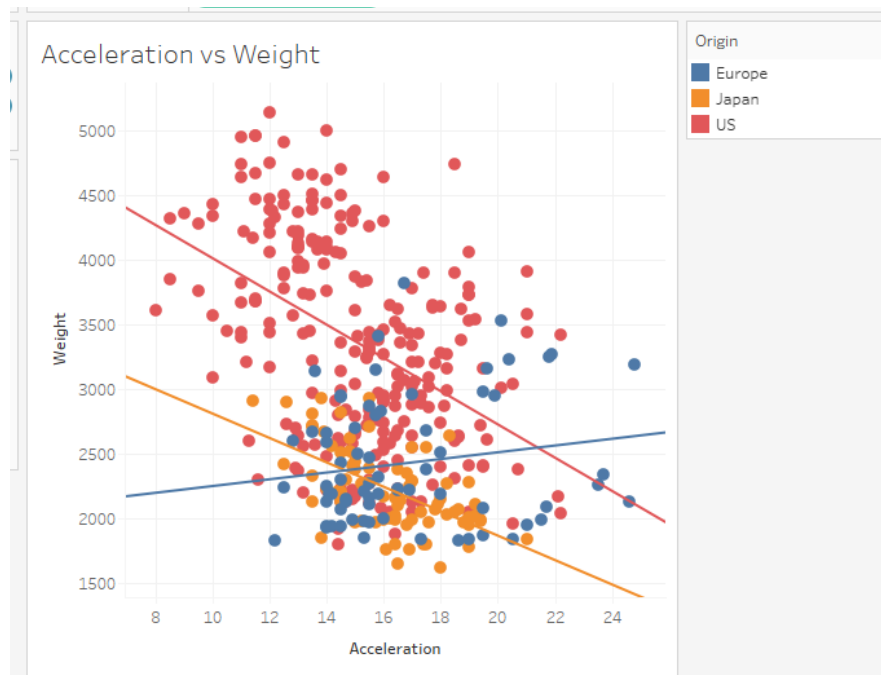
I began by comparing the MPG of the cars by region to see which of the regions had the cars with the best mpg. I created a side-by-side boxplot of the cars separated by the regions. Based off the visual, one can see that Japan has the best, and highest mpg, followed by Europe, with the US coming in last. So, now we know that Japan has the higher mpg of the regions, but we don't know why. Some further analysis can be done to see the relationships MPG has with the other characteristics. For example, what is the relationship between MPG and weight? What about MPG and number of cylinders? If there are relationships, do they support in claiming that Japan has the better MPG in cars?

Is there a relationship between MPG and weight?



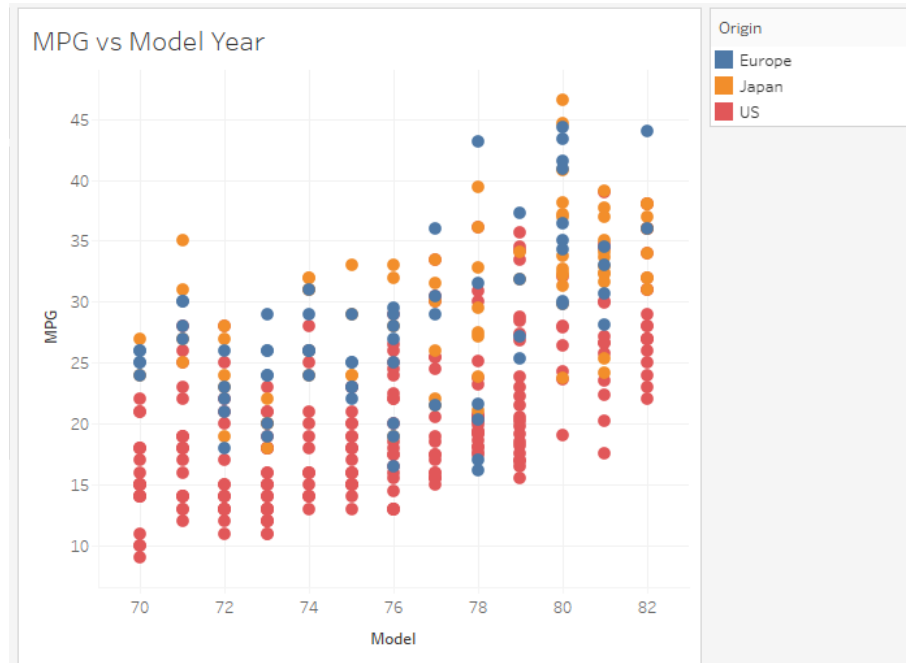
For my next visual, I studied the relationship between weight and MPG. I created a scatter plot which plotted all the datapoints, and then separated them by region to see if there was a relation to the previous graph. There were also a few point with 0 MPG, which I filtered out. As one can see, generally, there is a negative relationship between weight and MPG. This means the more a car weighs, the less MPG it has. This makes sense logically as well since the more something weighs, the more energy it would take to move it. Separating it by regions, it is noticeable that most of the heavier cars belong to the US and most of the lighter cars belong to Japan. This is one validation that explains why Japan has the best MPG, their cars are lighter compared to other regions. Some further questions can be asked analyzing what this visual shows. For example, since the US has heavier cars does that mean they have slower cars? As well as the inverse, does Japan having better mpg and lighter cars mean they have the fastest cars? If not, what are other factors that partake in deciding a cars speed.

What is the relationship between acceleration and weight?



This dataset did not provide a speed characteristic, but I thought it would be interesting to see the relationship between the acceleration and weight. Theoretically, one would think that the heavier cars would have lower acceleration. We see this relationship confirmed with the datapoints from Japan and the US. Interestingly enough, the European cars do not show this relationship. There is a slightly positive to no correlation at all. This was pretty shocking and raises a few questions. What is the cause of this non-correlation? Can these methods be implemented into other regions and achieve the same results?

Has MPG improved with newer models?



Finally, going back to the topic of MPG, I analyzed if there was an improvement of MPG with newer models. I separated the points by region to also observe if there were improvements regionally. The visual shows that there is, in fact, improvements of MPG the newer the model. Looking at the datapoints, it even visually confirms our original graph by having the data points of the US towards the bottom and Japan towards the top, albeit with a few outliers. The model year 80 provided interesting results as most of the European cars had higher MPG that year compared to Japan. Looking at just the model year 80, what characteristics led to a higher MPG for European cars? From 78 to 82, 7 of the 9 highest MPGs came from Europe. If we gathered more data from earlier years (83 and forward), will there be a switch with Europe taking the top spot in having higher MPG? How would this change affect the other relationships/characteristics? It is generally accepted in the car community that Japan has some of the most reliable and quality cars. After some analysis, these claims can be backed as Japan showed favorable results in the characteristics analyzed.