LAB ACTIVITY - COMPARING CATEGORIES

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List 2–3 questions you could answer by comparing categories. :

- Which manufacturers produce vehicles with the highest and lowest average real-world CO_2 emissions?
- Which car manufacturers have the highest performance assessed by average horsepower, and possibly foot print as well.
- Do car types differ on performance assessed by acceleration.

Visualization # 1 - Average Real-World CO_2 City and Real-World CO_2 Hwy (Carbon Dioxide Emissions on City and Highway) from different Vehicle Manufacturers using Real Radial Chart

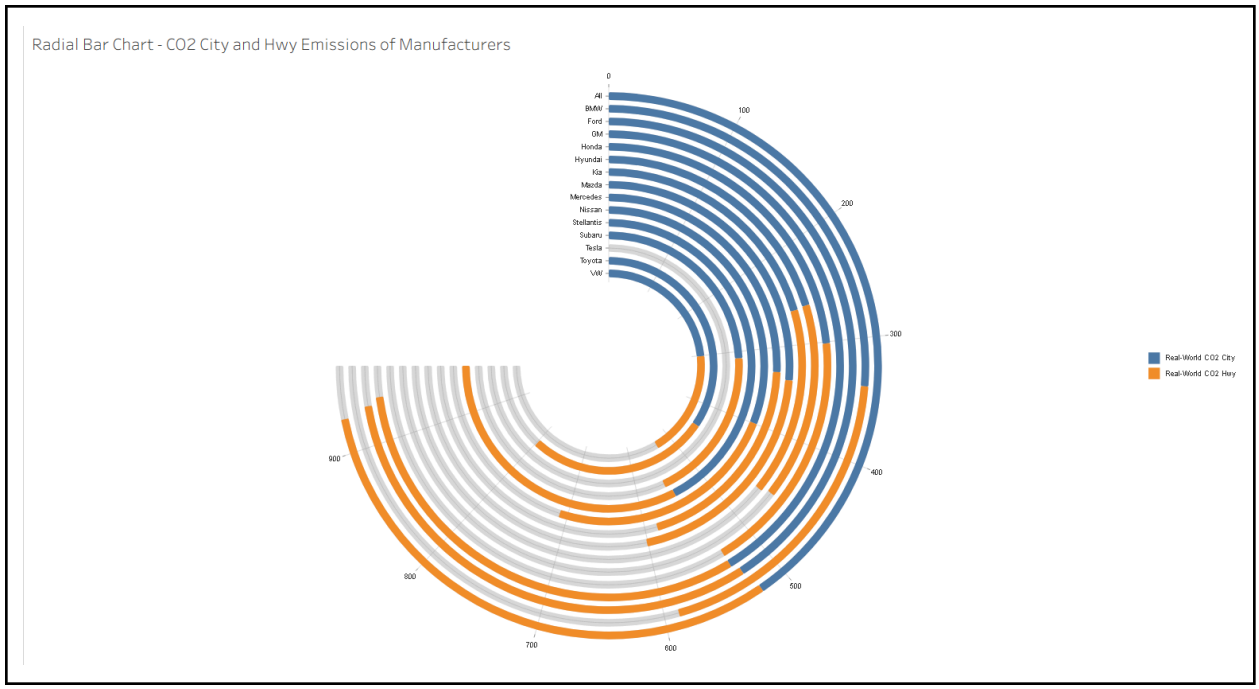

***Tableau can't import Vis Extensions, therefore we had to screenshot.**

Fig. 1 - Radial Chart

The radial bar chart, seen in Figure 1 above, compares the average 'Real-World CO_2' emissions for City driving, depicted by the blue, and Highway driving, represented by the orange ones, across different manufacturers. The chart illustrates that for every brand, vehicles significantly produce higher CO_2 emissions on city roads than on highways. It also shows a compact way of visualizing the comparison of the overall emissions performance of each manufacturer in both environments.

1.) What is the main takeaway in one sentence?

Using the Average Carbon Dioxide (CO_2) emissions of manufacturers, Stellantis still is one of the leading producers of Carbon Dioxide on City and Highways along with GM, Ford, and 'All'.

2.) Name one design decision you made and why it improves understanding.

Aside from catching the viewer's attention since the graphics are indeed visually appealing, the method radial bar graph provides a unique approach on how the leading contributor leads and differs from the others. We notice how Hyundai, Kia, and Tesla fall behind due to the faded lines, which is a key indicator of how far and less pollution these manufacturers are behind.

3.) Identify one limitation or potential misinterpretation.

One misinterpretation can be a longer line means a much higher value of Carbon Dioxide Emissions. Creating a confusion upon making direct and precise comparisons, the analyst may get distorted on their perception these manufacturers contribute to the CO_2 emissions.

Visualization # 2 - Tree Maps showing Highest Average Carbon Dioxide emissions. (Focus on Trucks vs Car Heatmaps)

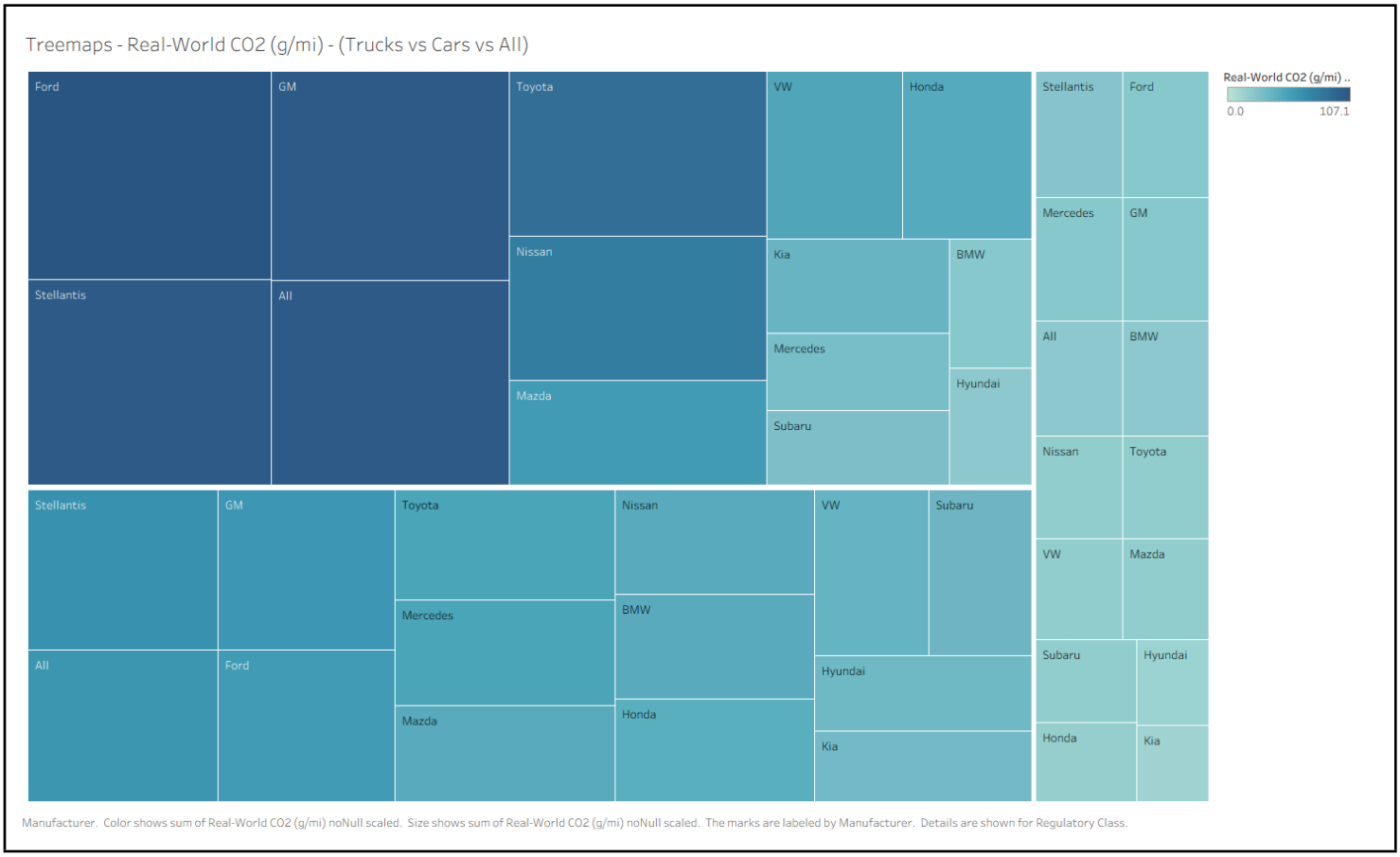

Fig. 2 - Tree Map

The tree map in the figure above shows CO_2 emissions segmented into vehicle classes like trucks and cars by manufacturer. Notice that the sizes of each rectangle vary. It is because it represents the total volume of CO_2 emissions that shows the overall carbon footprint of each brand. The color intensity indicates the average CO_2 emission rate per vehicle, highlighting the general efficiency of a manufacturer's automotive lineups. The darker shades consist of trucks, the less dark shades consist of SUVS, and the lighter shades consist of sedan categories.

1.) What is the main takeaway in one sentence?

Focusing on trucks and car types, Ford, GM, and Stellantis are the three manufacturers who produce the most average Carbon Dioxide Emissions.

2.) Name one design decision you made and why it improves understanding.

The depth of the blue color and the size of the rectangles will help us analyze ‘who makes the highest average contribution’ from the total on the certain category, on

which we clearly see at least the top 4 categories Ford, Gm, Stellantis, and “All”. These manufacturers occupied most of the space from trucks (the top left) and cars (the bottom left) compared to the other vehicle manufacturers that weren’t mentioned in the top 4.

3.) Identify one limitation or potential misinterpretation.

Difficulties on determining the actual values of the CO_2 Emissions that Car vs Trucks actually provide. Visually, there are no precise numbers mentioned, we are assuming the “how much” of the Carbon Dioxide emissions from the proportion of the rectangles space have taken up.

Visualization # 3 - Average Horsepower by Manufacturer

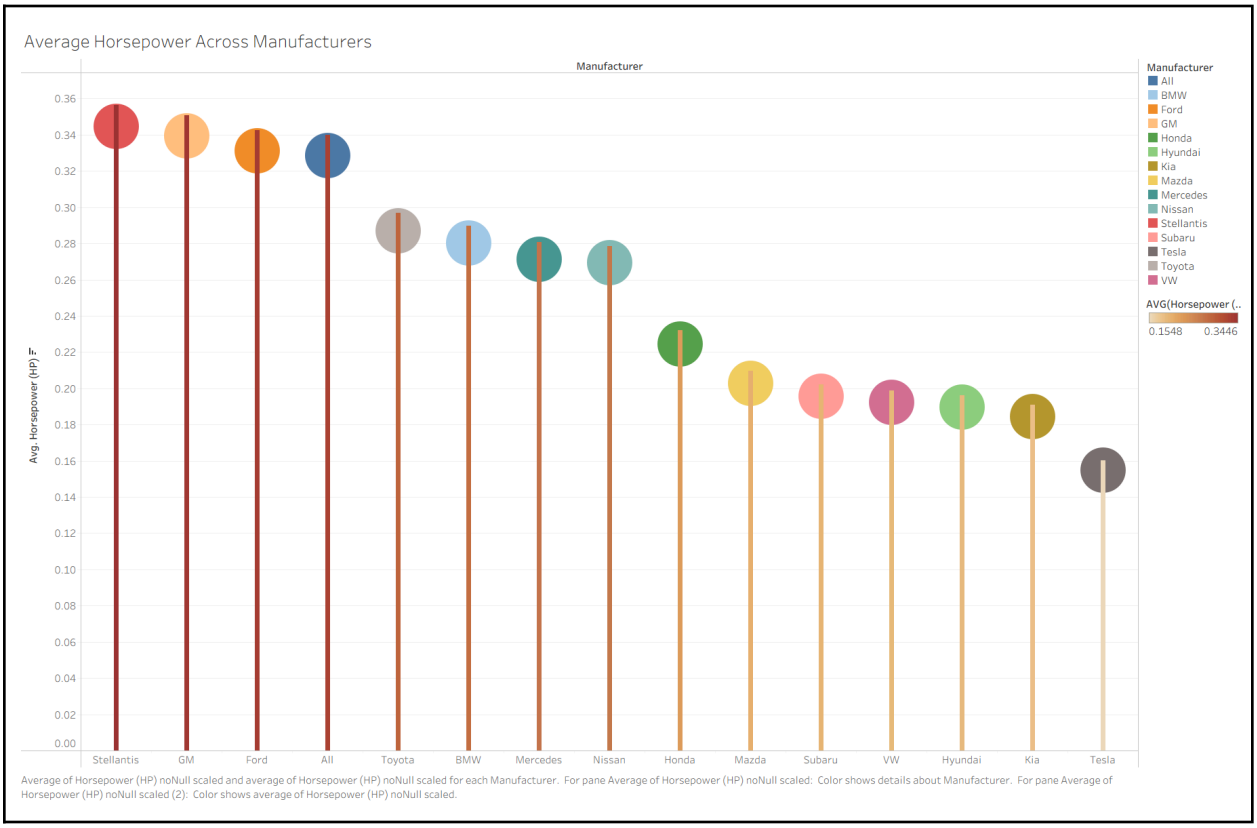

Fig. 3 - Lollipop Chart

The lollipop chart in the figure above depicts automotive manufacturers' ranking (in descending order) based on their average scaled horsepower. The chart shows that the American automotive brands like Stellantis, GM, and Ford produce the highest average horsepower. On the other hand, manufacturers focusing on making electric vehicles, such as Kia and Tesla, are positioned at the far right of the performance spectrum.

1.) What is the main takeaway in one sentence?

As you can see in the figure above, American automakers like Stellantis, GM, and Ford produce vehicles with the highest average horsepower, whereas electric vehicle-focused manufacturers such as Tesla show the lowest average horsepower in the lollipop chart presented in Figure 3.

2.) Name one design decision you made and why it improves understanding.

Given that more than a dozen manufacturers are in this dataset, we used a lollipop chart to reduce cluttering and give the chart a cleaner and more creative look. This chart elegantly draws the viewer's eye to the end of the line where the circle lies, representing each manufacturer's precise average

horsepower value, making it more organized. We also used two legends, namely the different kinds of color for each manufacturer for distinction, and a color saturation depicting the average horsepower.

3.) Identify one limitation or potential misinterpretation.

For us, the most significant potential misinterpretation stems from the Y-axis scale. Why is that, you ask? It is because the field consists of Horsepower (HP) noNull scaled, which means the values are not actual figures of horsepower. It consists of a normalized value, scaled between 0 and 1. A viewer of this lollipop chart might mistakenly think that the average horsepower (like 0.34 for Stellantis, as shown in Figure 3) is the literal depicted value, which is incorrect. Knowing the actual horsepower without a scaling method is impossible, so this lollipop chart is only valid for comparing such manufacturers relative to each other.

Visualization # 4 - Average Footprint for every Regulatory Class per Manufacturers

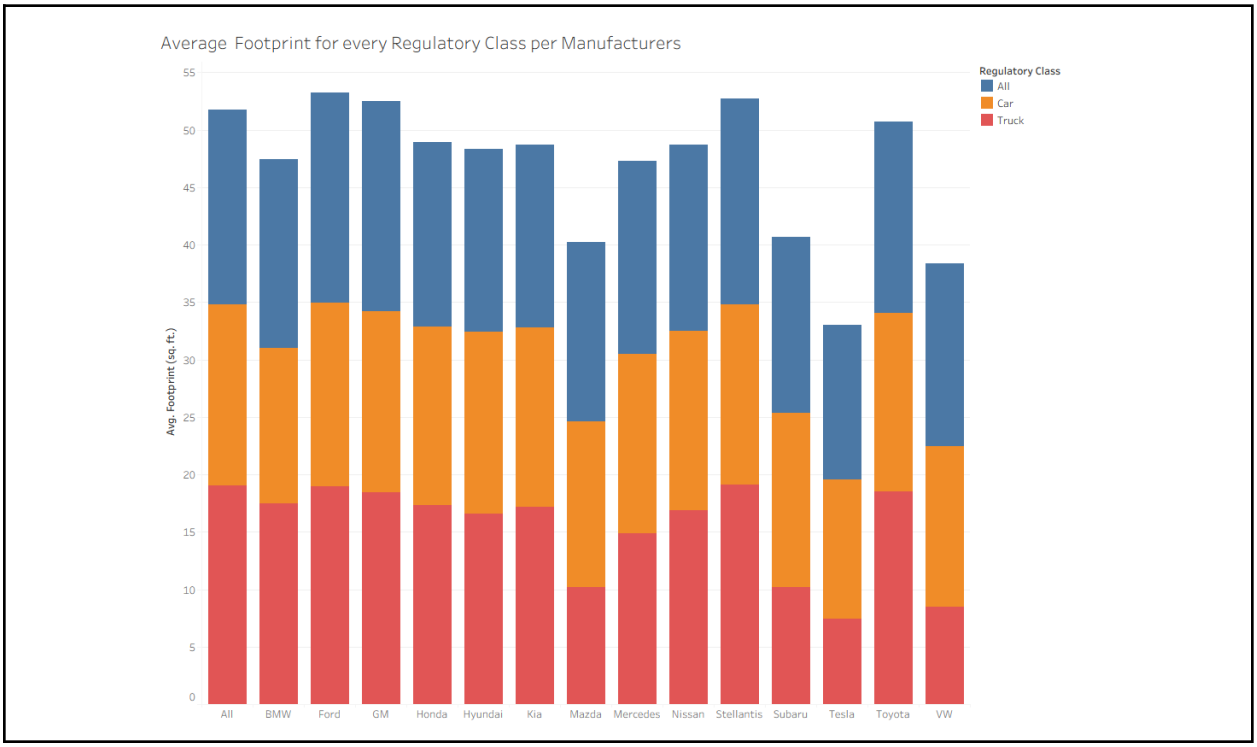

Fig. 4.1 Stacked Vertical Bar Chart

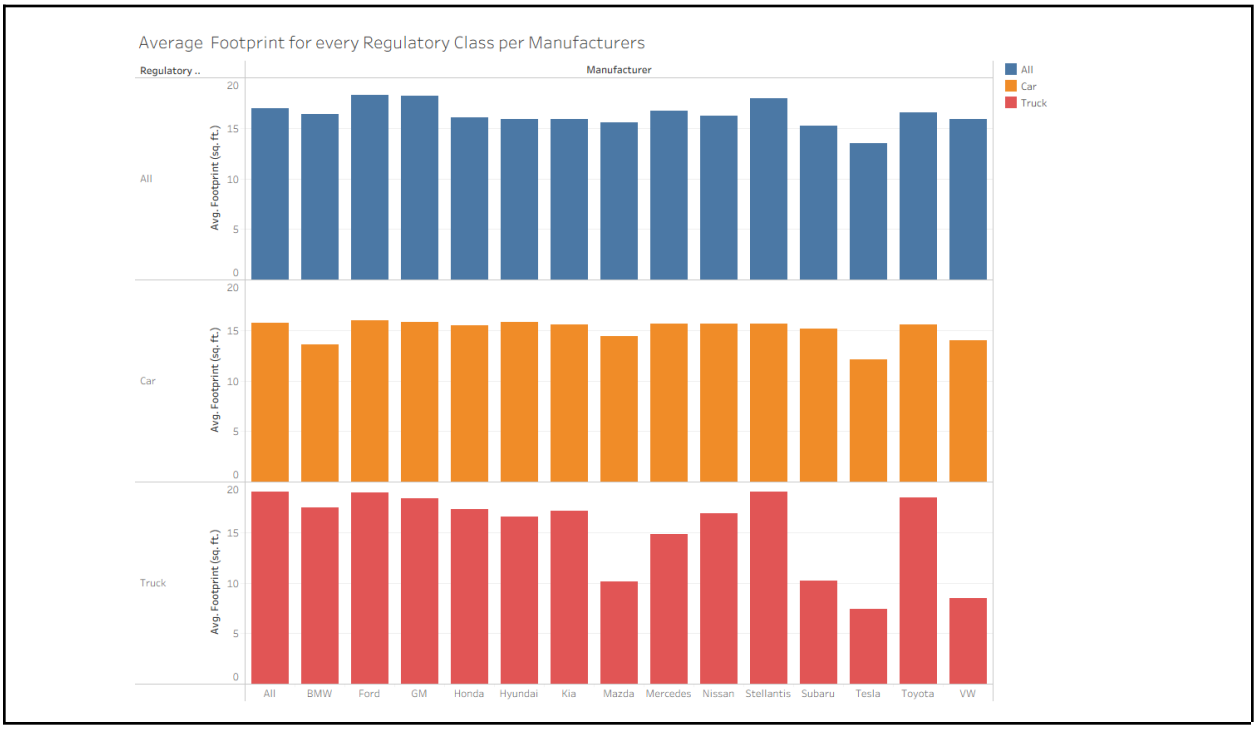

Fig. 4.2 - Separated Vertical Bar Chart

Based on the visuals of Figure 4.1, 1 horizontal axis was made to stack all the measures of every regulatory class vehicle, while in Figure 4.2, 3 separate horizontal axes were made to distinguish Regulatory Class vehicles and better distinguish the sizes of each bar for each column. The columns of Figures 4.1 & 4.2 use the categorical data of Manufacturers, which consist of 14 major ones and an all column for other manufacturers. Finally, the graph result suggested that trucks generally have a higher footprint than cars.

1.) What is the main takeaway in one sentence?

Average vehicle footprint varies by manufacturer and regulatory class, with trucks generally having a larger average footprint than cars across all manufacturers. The most obvious small takeaway is where Ford and GM have among the largest averages and Tesla among the smallest, which can be confirmed by comparing it to the underlying data.

2.) Name one design decision you made and why it improves understanding.

Instead of stacking the bars seen in Figure 4.1, I separated them by regulatory class in Figure 4.2, which makes it easier to compare average footprints within the same class across manufacturers without the visual clutter or difficulty in reading cumulative values, and the data confirms that this separation highlights actual differences between classes (Car vs. Truck).

3.) Identify one limitation or potential misinterpretation.

The Figure 4.1 and Figure 4.2 hides the distribution and sample size differences between manufacturers or classes by only showing averages. For example, a manufacturer with very few models in a class could appear unusually high or low due to outliers, which might be misinterpreted as representative of their entire lineup.

Visualization # 5 - Acceleration of Different Vehicle Manufacturers (All vs Cars vs Trucks)

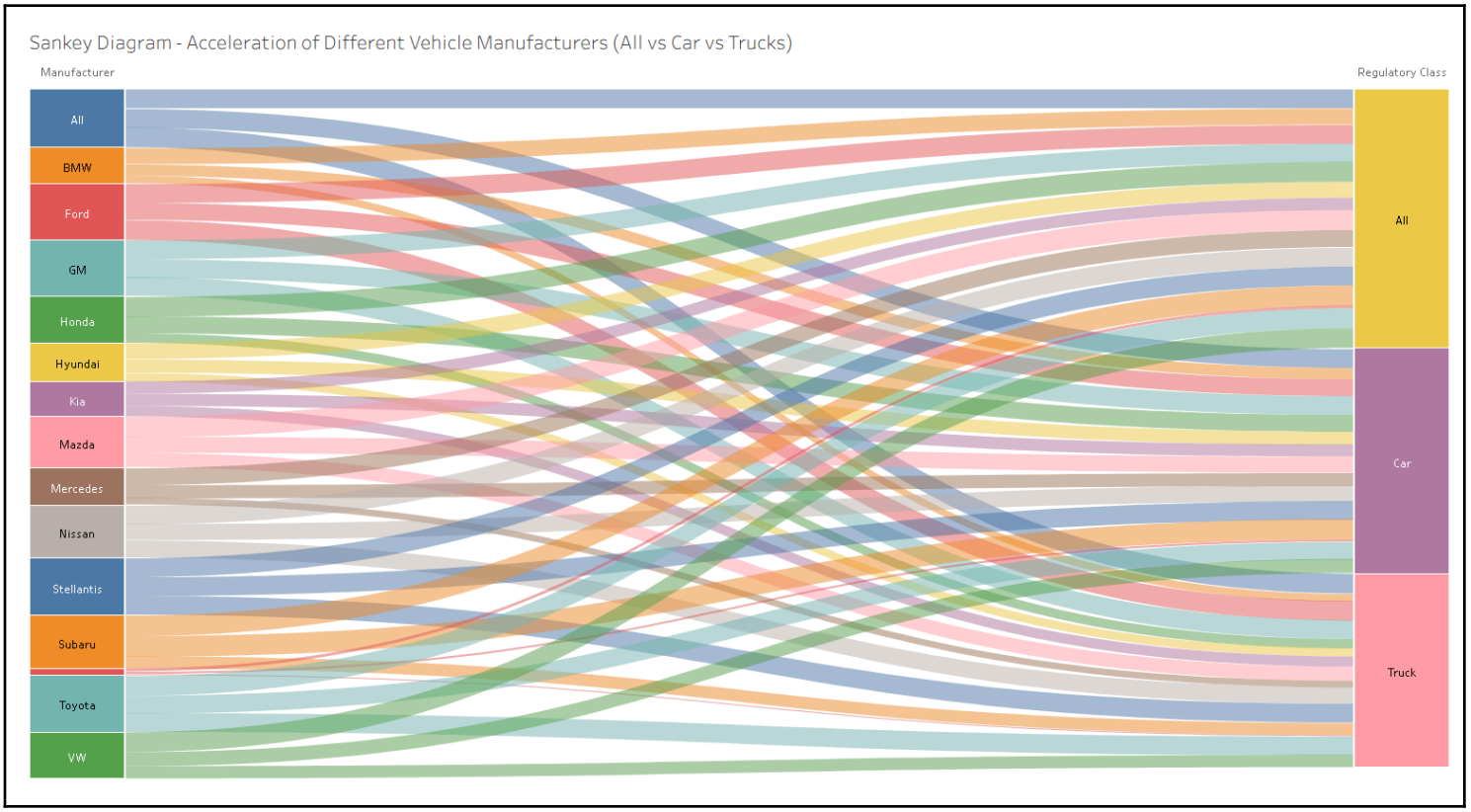

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Fig. 5 - Sankey Chart

From figure 5 is the Sankey chart, from the left part are the nodes showing the manufacturers who produce vehicles, linking to each are the average acceleration of the different vehicle type records (all, car, and truck) that can be found in these manufacturers. Observing the patterns of thickness of the lines from the truck and car, the ones connected through the car are thicker than those going to the trucks. Furthermore, acceleration performance amongst cars is usually better than the trucks but not at all manufacturers have the similar pattern.

1.) What is the main takeaway in one sentence?

Average Acceleration on cars seems to be faster compared to trucks on manufacturers of BMW, Honda, Hyundai, Kia, Mazda, Mercedes, Subaru, and VW meanwhile the opposite occurred from Ford, Honda, Nissan, Stellantis, and Toyota.

2.) Name one design decision you made and why it improves understanding.

Since we are comparing for the distribution of Car vs Trucks Average Acceleration Values, we find out by observing the thickness of the lines from the selected car manufacturer can easily distinguish visually on which type of vehicle does have a better acceleration performance (0 to 60) in seconds.

3.) Identify one limitation or potential misinterpretation.

Highly cluttered, visually distracting there are too many lines present on the details, thus showing as one complete picture, the meaning would be difficult to make sense especially for the people who don’t have expertise or exposure to these kinds of graphs. Observing the connection between the manufacturers and to which vehicle type is a time consuming and tiresome job for the analyst.