

Cars Through The Years

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Abstract— This project consists of three visualizations to analyze economic and environmental statistics of cars from 1984 to 2020. This includes looking at the fuel efficiency, average consumption of oil in barrels per year, and how much a vehicle owner would save or overspend on average given the particular vehicle model. This paper will show that cars, through the years, have trended towards a greater efficiency in fuel efficiency and gas consumption. The project can be found at <https://pv00.github.io/final.html>.

Keywords—d3, cars, vehicle class, filtering, scatterplot, bar graph

I. INTRODUCTION

The goal of the project was to create visualizations that would allow viewers to notice large scale trends over time, and to be able to filter visualizations based on a specific vehicle class a user was interested in. Thus project objectives were to:

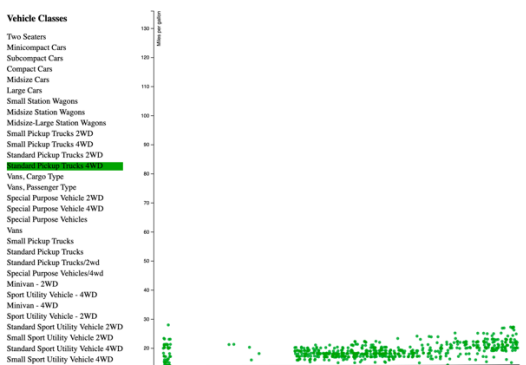
- Create a scatterplot to show the cost effectiveness of car models sorted by year.
- Create a second scatterplot to demonstrate the trend of increased fuel efficiency through the years.
- Create a bar chart that visualized the average barrels of oil a car consumed in a given year.
- Allow these graphs to be interactable and allow sorting based on vehicle class.

A. Related Works

[2] Van Dyke and [3]d3noob were instrumental in providing D3 guidance towards designing tooltips and trend lines. [1] Hula wrote an interesting paper related to this project.

II. APPROACH

The project did utilize the three visualizations outlined as project objectives, and the two scatterplots both sorted at the same requested vehicle class.



A mentionable part of trial and error was figuring out exactly how to allow the user the filter the graphs. Figure A shows

the newest attempt at user selection. I began by having the user click on a node in the graph, which would then cause only the nodes which shared that vehicle class to be visible, and also draw every other node as invisible. If the user were to want to select another type of vehicle class to compare to, they would have to mouse over an invisible node to redraw all of the previously invisible nodes as outlines. This was initially useful, though proved to add a large amount of visual noise to the visualization, potentially on accident, and made the visualization less dynamic, as it used a lot of resources to constantly draw and redraw circles that were not necessarily requested. Since there was no legend to the color scheme there was not an easy way to differentiate the vehicle classes without hovering over the nodes.

Thus, I changed my filtering request technique to be a textual list of the vehicle class, where each class could be toggled by clicking the related text, which would then draw the nodes of that class to the visualization while highlighting the text itself in that color to act as a key.

This, along with figuring out the logic and data structures to develop how the visualization should act in different cases were the main things to implement (along with figuring out how to reign in D3 at all).

A main problem that was not addressed was making the bar chart be interactive similarly to the scatterplots.

III. RESULTS

By looking at the scatterplots, a viewer would notice a general upward trend in average savings and the average MPG of vehicles as the year increased (and can also tell by the trend line). When viewing the bar chart, viewers would see a downward trend in average oil consumption per year as the graph approaches modern times. I measure my success based on that the user can notice large scale trends throughout the years and play with the data by filtering by vehicle classes.

IV. DISCUSSION

I believe the approach was a respectable way of viewing these trends, and the trend line generated in one of the scatterplots served as a moderate analysis of the dataset. As was suggested to me, I believe using a box plot chart instead of a generic bar chart would have been a better way to show trends in oil consumption per year, and I would have used a better color scheme for the vehicle classes if I had the knowledge of how to implement that.

V. FUTURE WORK

The viewer can currently look at large scale trends, but I would like to add the ability to zoom in to the scatterplots to allow for smaller trends to be observed.

ACKNOWLEDGMENT

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REFERENCES

- [1] Hula, Aaron. "Highlights of the Automotive Trends Report." *EPA*, Environmental Protection Agency, 6 Jan. 2021, www.epa.gov/automotive-trends/highlights-automotive-trends-report.
- [2] Van Dyke, Ben. *Plotting a Trendline with D3.js*, 26 Apr. 2019, bl.ocks.org/benvandyke/8459843.
- [3] noob, d3. "Simple d3.js Tooltips." *Popular Blocks*, 13 Mar. 2021, bl.ocks.org/d3noob/a22c42db65eb00d4e369.
- [4] Crabtree, George. "The Coming Electric Vehicle Transformation." *Science*, American Association for the Advancement of Science, 25 Oct. 2019, science.sciencemag.org/content/366/6464/422.
- [5] Exeter. "Electric Cars Better for Climate in 95% of the World." *ScienceDaily*, ScienceDaily, 23 Mar. 2020, www.sciencedaily.com/releases/2020/03/200323125602.htm.