

CMSE 402: Data Visualization Principles and Techniques

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Spring 2025 – Dr. Devin Silvia

Pre-Class Assignment (Day 1 – January 14, 2025)

Prompt: Identify four visualizations, two that you would classify as good, and two that you would classify as bad, within your understanding of a good visualization. Explain your reasoning in as much detail as you can.

The Good, The Bad, and The Not Really A Dataset

I have listed seven visualizations in this document: two I consider “good,” two I consider “bad,” and three honorable mentions that do not visualize a proper data set or just caught my attention after I was done. I struggled with this more than I thought I would; it is indeed difficult not to find anything wrong with visualizations, but less difficult to tear down a visualization and be critical of it.

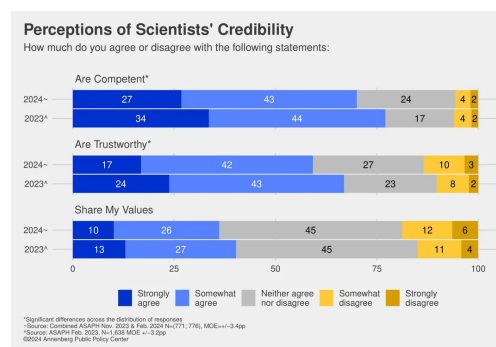
1. Visualizing the least rated episodes of popular TV shows. Verdict: Good

Owing to the large size of the image, please view it using the provided Reddit link, or the attached file, as per your comfort.

Despite the large size of this visualization which makes it slightly annoying to view in a smaller format, I believe at least each individual visualization appropriately depicts what it is supposed to, and is very informative, displaying years and years of data. However, there are certain series that are visualized with a large number of seasons, like Law and Order, that are congested on a small scale. However, if one ignores these and looks at most of the plots, including how seasons are separated by space, I believe this is a great visual.

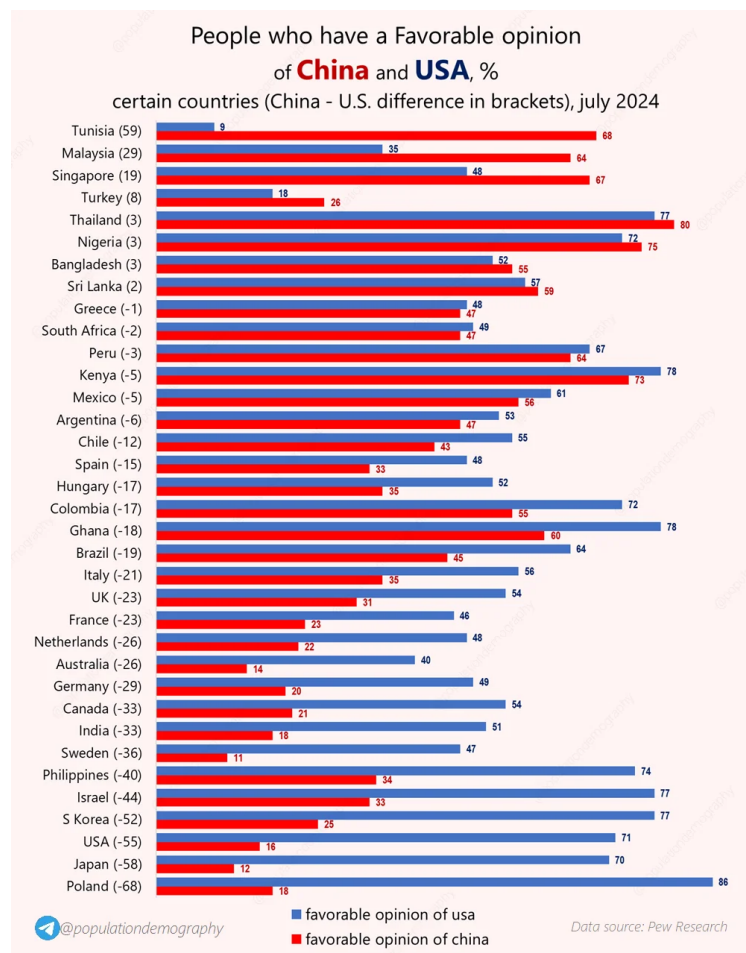
2. Perceptions of credibility of scientists in the US. Verdict: Good

While this plot may not seem that special, I like the use of appropriate colors. The colors are high-contrast, hence accessible to people who suffer from color blindness. They also look politically neutral.



3. Favorable opinion of US vs. China in various countries. Verdict: Bad

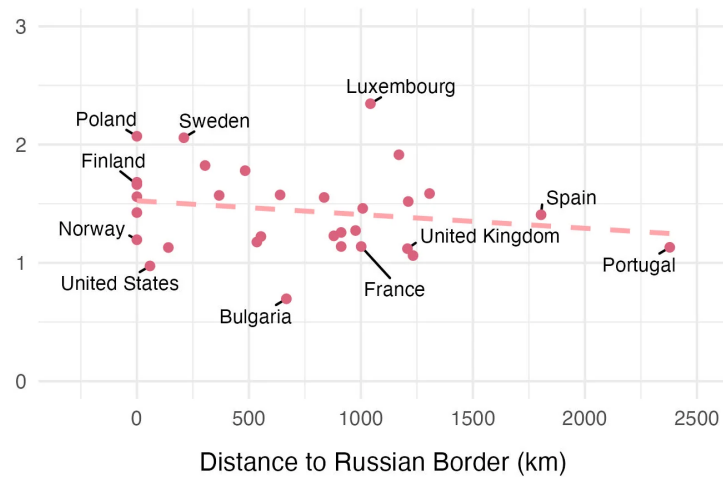
While there is nothing wrong with this visually, I believe this is inaccessible for anyone in a hurry who will confuse themselves with the overbearing color. While the colors themselves are a good choice, considering the strong association between red and China through the country's flag, and similarly the association of Western countries with blue, it would be much more useful to the average reader if there was a single bar plot, with net positive and net negative, showcasing pro-China versus pro-US, which is indicated numerically on the axis in the original plot. The bar plot can be colored or left monotone to show some neutrality, with a left-right rather than up-down approach, with no negative numbers being denoted, once again to demonstrate neutrality and defeat any accusations of provoking psychological bias.



4. Defense spending as a percentage of GDP versus proximity to the Russian border. Verdict: Bad

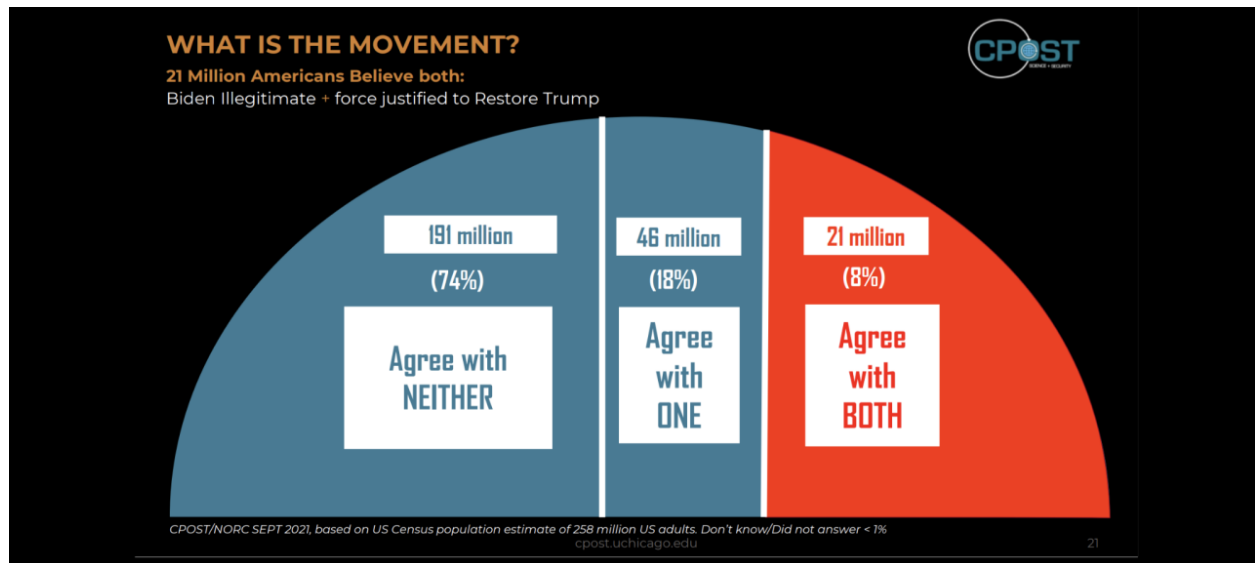
Once again, difficult to read for the average viewer. The visualizations seemed crowded. Instead, it would be easier to view relative change on differently colored line plots between the absolute 2019 and 2024 spending percentages, while also splitting the plot into a few subplots as a comparison between alliances, and regions. Also, the lines to indicated what dot is what country are misleading a disturbing the visualization. Instead, colors or symbols could have been used.

Defence Spending as % of GDP
Relative Change 2019-2024



Honorable Mentions

1. Opinion poll on the legitimacy of the Biden presidency and the justification of using force to restore Trump. Verdict: Bad



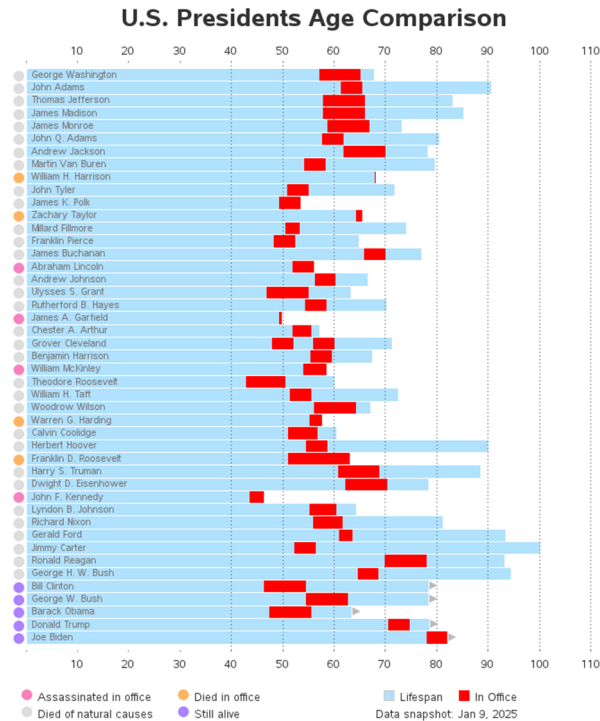
This visualization is visually misleading and may distort the information it is trying to depict. While 74% agree with neither statement, the chunk associated with this occupies less than half the space. The people who agree with both statements or one statement, despite being the minority, occupy more than half the space. Also, which statement do the people who agree with just one statement agree with?

In terms of optics, if I were to make a pie chart of the data from this visualization (I feel a simple bar chart would be much better to communicate the message from the data), I would use radial slices.

It also looks like they extrapolated survey data from the sample to the entire voting population of the United States. This disregards the basic rules of survey research, survey/sample statistics, voter turnout, and apolitical people. Simply multiplying percentages with the total population will not cut it.

Finally, I would include the non-responding population in the pie chart, or not talk about them at all.

2. Timelines of each US President. Verdict: Good



This visualization very effectively displays the lifespans of US presidents to date. Most visualizations like this are time-series-esque with all presidents being put on a timeline since the birth of George Washington. I feel this simplifies it, using age instead of year of birth. One way I would further simplify this is starting off the timeline of age from 35, instead of 0, since you need to be 35 to be a president, so it is not intuitive to visualize ages before 35 if the main focus is the age-wise lifespan of each president, as it is in this visualization.

3. Periodic Table of Investment Returns by Asset Class Verdict: Bad

This visualization, unfortunately, is an eyesore and is hard to read. I would back this up with mathematical data and use a line plot to show the most popular asset classes and visualize the booms and the busts.

Note: last column shows annualized avg. return from 1985 to 2024

Ranking of Investment Returns by Asset Class | 2010 to 2024

Annualized real total return % (i.e., adjusted for inflation and the re-investment of dividends)

Created by:
The Measure of a Plan

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Average (CAGR, all years)
Best asset class	REIT 26.6%	Cdn Bonds 7.2%	Emerging Mkt Stocks 16.8%	US Small Cap Stocks 35.8%	REIT 29.3%	Cdn Bonds 1.9%	Cdn Stocks 19.3%	Emerging Mkt Stocks 28.7%	Int'l Bonds 1%	US Large Cap Stocks 28.5%	Gold 23.3%	REIT 31.2%	Cash (TBill) -5.2%	US Large Cap Stocks 22.1%	Gold 23.3%	US Large Cap Stocks 8.6%
	Gold 26.1%	Gold 5.5%	Int'l Dev Stocks 16.5%	US Large Cap Stocks 30.4%	US Large Cap Stocks 12.8%	REIT 1.7%	US Small Cap Stocks 15.9%	Int'l Dev Stocks 23.8%	Cash (TBill) -0.1%	REIT 26.1%	US Small Cap Stocks 17.5%	US Large Cap Stocks 20.2%	Gold -7.2%	US Small Cap Stocks 15.6%	US Large Cap Stocks 21.5%	US Small Cap Stocks 7.6%
	US Small Cap Stocks 26%	REIT 5.5%	US Small Cap Stocks 16.2%	Int'l Dev Stocks 11.7%	Cdn Stocks 9%	US Large Cap Stocks 0.6%	US Large Cap Stocks 9.7%	US Large Cap Stocks 19.3%	Cdn Bonds -0.6%	US Small Cap Stocks 24.5%	US Large Cap Stocks 16.7%	Cdn Stocks 17.5%	Cdn Stocks -11.4%	Int'l Dev Stocks 13.8%	Cdn Stocks 18.9%	Emerging Mkt Stocks 7.3%
	Emerging Mkt Stocks 17.2%	All US Bonds 4.6%	REIT 15.7%	Cdn Stocks 11.7%	Int'l Bonds 8%	Int'l Bonds 0.3%	Emerging Mkt Stocks 9.6%	US Small Cap Stocks 13.8%	All US Bonds -1.9%	Cdn Stocks 20.3%	Emerging Mkt Stocks 13.6%	US Small Cap Stocks 10%	HYield US Bonds -15%	REIT 9.4%	US Small Cap Stocks 9.8%	REIT 6.6%
	Cdn Stocks 14.8%	HYield US Bonds 4.2%	US Large Cap Stocks 14%	HYield US Bonds 3.1%	Cdn Bonds 7.2%	All US Bonds -0.3%	HYield US Bonds 9%	Gold 9.3%	Gold -3.2%	Int'l Dev Stocks 19.3%	Int'l Dev Stocks 8.7%	Int'l Dev Stocks 4.1%	Cdn Bonds -16.9%	Gold 9.1%	Emerging Mkt Stocks 8.2%	Cdn Stocks 6.3%
	US Large Cap Stocks 13.4%	Int'l Bonds 0.8%	HYield US Bonds 12.5%	REIT 0.9%	US Small Cap Stocks 6.7%	Cash (TBill) -0.7%	Gold 6.6%	Cdn Stocks 7.1%	HYield US Bonds -4.7%	Emerging Mkt Stocks 17.6%	Cdn Bonds 7.5%	HYield US Bonds -3%	Int'l Bonds -18.7%	HYield US Bonds 8.1%	HYield US Bonds 3.4%	Int'l Dev Stocks 5.2%
	HYield US Bonds 10.9%	US Large Cap Stocks -0.8%	Gold 6.5%	Int'l Bonds -0.4%	All US Bonds 5.1%	Int'l Dev Stocks -0.9%	REIT 6.3%	HYield US Bonds 4.9%	US Large Cap Stocks -6.2%	Gold 15.9%	Cdn Stocks 6.2%	Emerging Mkt Stocks -5.8%	All US Bonds -19%	Cdn Stocks 8.1%	Cash (TBill) 2.3%	HYield US Bonds 4.4%
	Int'l Dev Stocks 6.8%	Cash (TBill) -2.9%	Cdn Stocks 6.4%	Cash (TBill) -1.5%	HYield US Bonds 3.9%	HYield US Bonds -2%	Int'l Bonds 2.5%	REIT 2.8%	REIT -7.7%	HYield US Bonds 13.3%	All US Bonds 6.1%	Cash (TBill) -6.5%	Int'l Dev Stocks -20.9%	Int'l Bonds 5.2%	Cdn Bonds 2.2%	Cdn Bonds 4.3%
	All US Bonds 5%	US Small Cap Stocks -5.5%	Int'l Bonds 4.5%	Cdn Bonds -2.4%	Emerging Mkt Stocks -0.1%	US Small Cap Stocks -4.3%	All US Bonds 0.5%	All US Bonds 1.4%	Cdn Stocks -10.7%	All US Bonds 6.3%	HYield US Bonds 3.9%	Cdn Bonds -7.3%	US Small Cap Stocks -23.1%	Emerging Mkt Stocks 5.2%	Int'l Bonds 0.8%	All US Bonds 2.8%
	Cdn Bonds 4.2%	Cdn Stocks -10.7%	Cdn Bonds 2.8%	All US Bonds -3.6%	Cash (TBill) -0.7%	Cdn Stocks -9.7%	Int'l Dev Stocks 0.4%	Cdn Bonds 0.6%	US Small Cap Stocks -11%	Int'l Bonds 5.5%	Int'l Bonds 3.1%	All US Bonds -8.3%	Emerging Mkt Stocks -23.2%	Cdn Bonds 2.9%	REIT 0.7%	Int'l Bonds 2.6%
	Int'l Bonds 1.7%	Int'l Dev Stocks -15%	All US Bonds 2.4%	Emerging Mkt Stocks -6.4%	Gold -1.2%	Gold -12.3%	Cdn Bonds 0.2%	Int'l Bonds 0.3%	Int'l Dev Stocks -16.1%	Cdn Bonds 4.6%	Cash (TBill) -0.9%	Int'l Bonds -9.2%	US Large Cap Stocks -23.6%	All US Bonds 2.3%	Int'l Dev Stocks 0.1%	Gold 2.3%
Worst asset class	Cash (TBill) -1.5%	Emerging Mkt Stocks -21%	Cash (TBill) -1.7%	Gold -29%	Int'l Dev Stocks -6.4%	Emerging Mkt Stocks -16%	Cash (TBill) -1.8%	Cash (TBill) -1.3%	Emerging Mkt Stocks -16.2%	Cash (TBill) -0.1%	REIT -6%	Gold -10.3%	REIT -31.1%	Cash (TBill) 1.6%	All US Bonds -1.6%	Cash (TBill) 0.4%