United States Climate Trends Mapped Throughout Time

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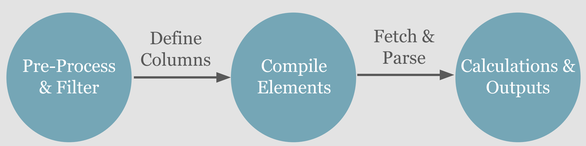
Introduction

- In recent years, we have faced unprecedented concerns regarding climate change
- Climate change can be recognized and understood through changing and extreme weather patterns
- Visualizations convey information in a fast and easy-to-understand manner
- Interactive visuals allow the user to control what they are seeing, enabling them to discern the data at their own speed
- As such, visualizations for climate data are an accessible way to enhance climate education

Methodology

Data: National Oceanic and Atmospheric Administration: National Centers for Environmental Information



Components:
- map
- scale
- scrollbar
- tabs

Front End:
- React JavaScript
- D3.js

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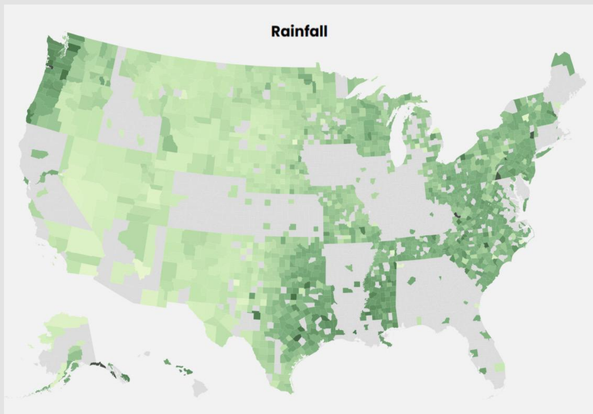
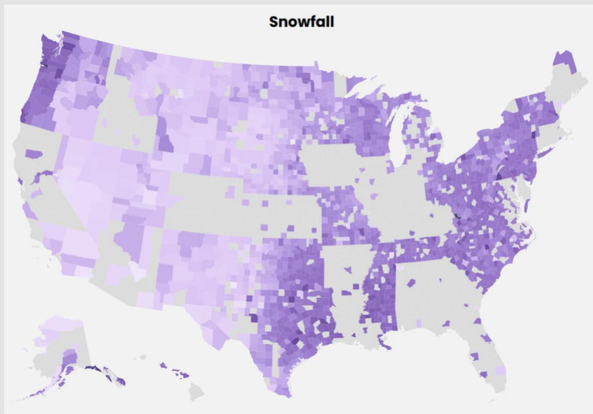
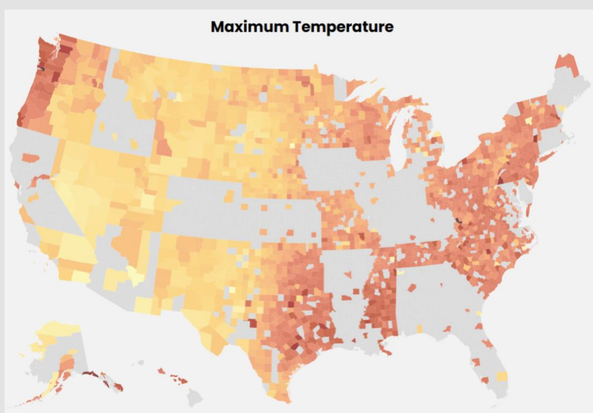
Map pseudocode:
 1. Extract country and state information
 2. Find corresponding data using
    countyID
 3. Extract average region value for
    given year
 4. Set region color based on value
    corresponding with scale
```

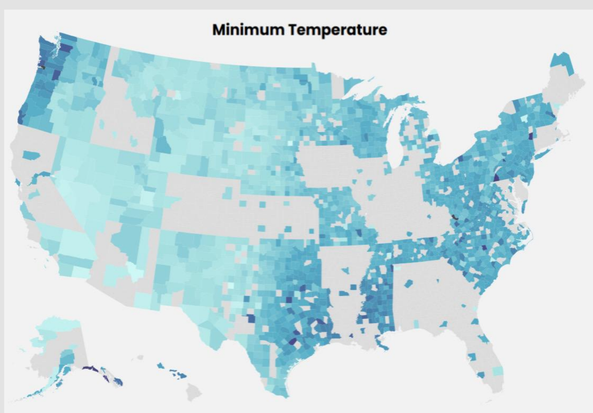
Results

Pictured below are example graphs for each climate pattern included in our project, including the daily average over a year for rainfall, snowfall, maximum temperature, and minimum temperature. The map data spans from 1940 to 2022, and is traversed yearly. Each tab is linked to one map, and the year displayed can be controlled with the scroll bar below the map, with button options to either speed up or slow down the automated scroll or go one year at a time. Each map has a corresponding key depicting the numeric values represented by the different shades of color.









Note: the pictured values are all the rainfall data from 1940.

Check it out yourself at:
go/climatetrends/

or using our QR code!

Future Work

- Find sources for missing data and fix outliers
- Program click and zoom for specific counties or states to see more information
- Slide map comparison between first and last years
- Analyze trends on a monthly basis
- Incorporate more climate patterns

References

Cho, R. (2023). Climate Education in the U.S.: Where It Stands, and Why It Matters. State of the Planet | Columbia Climate School. https://news.climate.columbia.edu/2023/02/09/climate-education-in-the-u-s-where-it-stands-and-why-it-matters/

Lang, C. (2014). Do weather fluctuations cause people to seek information about climate change?. Climatic change, 125(3-4), 291-303. https://link.springer.com/article/10.1007/s10584- 014-1180-6

NCEI.Monitoring.Info@noaa.gov. (2023, January). Annual 2022 global climate report. Annual 2022 Global Climate Report | National Centers for Environmental Information (NCEI). https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202213

Newell, R., Dale, A., & Winters, C. (2016). A picture is worth a thousand data points: Exploring visualizations as tools for connecting the public to climate change research. Cogent Social Sciences, 2(1), DOI: 10.1080/23311886.2016.1201885, https://www.tandfonline.com/doi/full/10.1080/23311886.2016.1201885)

Nocke, T., Sterzel, T., Böttinger, M., & Wrobel, M. (2008). Visualization of Climate and Climate Change Data: An Overview. in Ehlers et al. (Eds.) Digital Earth Summit on Geoinformatics 2008: Tools for Global Change Research (ISDE'08), Wichmann, Heidelberg, 226-232. https://www.researchgate.net/publication/ 241401725_Visualization_of_Climate_and_Climate_Change_Data_An_Overview

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