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## Project Write-Up

### Rationale for Design Decisions

The goal of this visualization is to communicate projected temperature trends across U.S. states over time, highlighting differences between state-level data and the national average. Several design decisions were guided by the need for clarity, accessibility, and user engagement:

**Color Encoding:** We chose a sequential diverging color scale (RD, YI, BL) to encode temperature values. Cooler temperatures are shown in blue, warmer in red, which is intuitive and widely recognizable. A threshold scale was used to make differences between temperature ranges immediately apparent. Alternative options, like a continuous linear scale, were considered, but the discrete thresholds make the legend easier to interpret at a glance.

**Interactive Map:** States are displayed on a U.S. map, allowing users to quickly locate and compare regions. Hover interactions highlight the state and corresponding legend range, reinforcing the visual connection. Clicking a state isolates it and shows a detailed line chart of projected temperatures over time, providing context for long-term trends.

**Subplots:** The line chart compares state-specific trends with U.S. averages, allowing users to evaluate whether a state is warming faster or slower than the national average. We initially considered overlaying all states on one line chart but decided on interactive selection to prevent clutter and improve readability.

**Legend and Tooltips:** Legends and tooltips were added to make the data self-explanatory. Tooltips show precise temperature values, while the legend communicates the meaning of color scales and line styles.

**Year Slider:** A dynamic slider allows users to explore temperature changes over time, emphasizing trends in both spatial and temporal dimensions. We experimented with animation over time but found manual control provides users more agency to explore specific years of interest.

## **Development Process**

This project was developed collaboratively over approximately 30-35 person-hours. Work was divided among team members as follows:

**Data Processing and Analysis:** One team member attempted to clean and parse a readable csv and ensure proper numeric formatting. They also wrote the writeup and made final changes to the website and posted the website to github

**Map and Subplot Implementation:** Another member handled rendering the U.S. map, interactive coloring, tooltips, and creating the subplot for state comparisons.

**Interactions and UI:** A third member developed the selection interactions, year slider, legend hover effects, and responsive layout adjustments for different screen sizes. As well as providing super helpful feedback during the development process.

**Integration and Testing:** All members participated in debugging, ensuring the map, line chart, slider, and tooltips worked seamlessly together (This was a long process as any change completely messed with the structure and formatting). Especially at post to create a readable website

### **The most time-consuming aspects were:**

**Interactive Selection and Subplot Linking:** Ensuring that selecting a state dynamically updated both the main map and the subplot, and managing transitions for selected states, took significant iterative testing. This also was the most likely to break when changing any aspect of the plot.js.

**Color Legend Interactivity:** Implementing hover effects that link legend entries with corresponding states required careful handling of D3 selections and event listeners.

**Responsive Positioning of Selected States:** Aligning selected states for subplot focus involved calculations based on viewport dimensions, which required multiple adjustments for different screen sizes.

**CSV Mapping and Creation:** A considerable amount of time was spent trying to create a readable csv to base the visualization from. In fact most of the start of the project was spent trying to get this to work (10-15 hours).

Throughout the process, careful consideration was given to usability, performance, and clarity, balancing detailed data presentation with visual simplicity. And we are very proud of the visualization we have created.