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Weather-Or-Not: A City Picker for Your Weather Needs

Weather-Or-Not is a tool intended for city-seekers to choose their next destination that overlaps the best with their weather preference!

Github public repository: https://github.com/Lucas-ZX-W/weather-or-not

This first page of the summary report covers Weather-Or-Not as a whole, for specific information and critique on the individual views of Weather-Or-Not, please refer to page 2 and 3.

Overarching Goal

Weather-Or-Not's core goal is to provide a tailored experience to the user on exploring and finding their ideal for residence, visit, etc., instead of purely presenting weather data in the most analytical way, which is the approach taken by most weather visualizations.

Instead of a complex time series visualization that shows the weather data in a very scientific manner, Weather-Or-Not simplified the visualization process by showing the user precisely what is needed to answer and address two user scenarios: 1) for the user to narrow down the initial list of cities into a couple of specific, viable options for further analysis, and 2) for the user to examine how much the week-by-week temperature of those specific cities match and differ with their preferred temperature range. With a (visually) simple selection prompt for the initial city scoping (1) and a abstracted time-series bar graph for the detailed analysis (2), Weather-Or-Not abstracts the calculations and heavy-lifting of the visualization in code to deliver to the user an intuitive interface and understanding.

Dataset Processing

Weather-Or-Not uses the weather data provided by the INFO 474 teaching staff. The only pre-processing done to the dataset is the re-ordering of the CSV rows in the order of Jan -> Dec, as the particular chronological order of the rows are minor to the overall goal of the visualization (since it does not show precisely 2014 -> 2015, but rather as a general reference).

Further Development

Several ideas for the future development of Weather-Or-Not surfaced from the development fo this prototype:

- Support for both Celsius and Fahrenheit.
- Support for zoom/change of scale (monthly, weekly, seasonal, etc.).
- Support for precise Date hanlding (leap years month with differing number of daysm etc.

Visualization #1: Initial Scoping

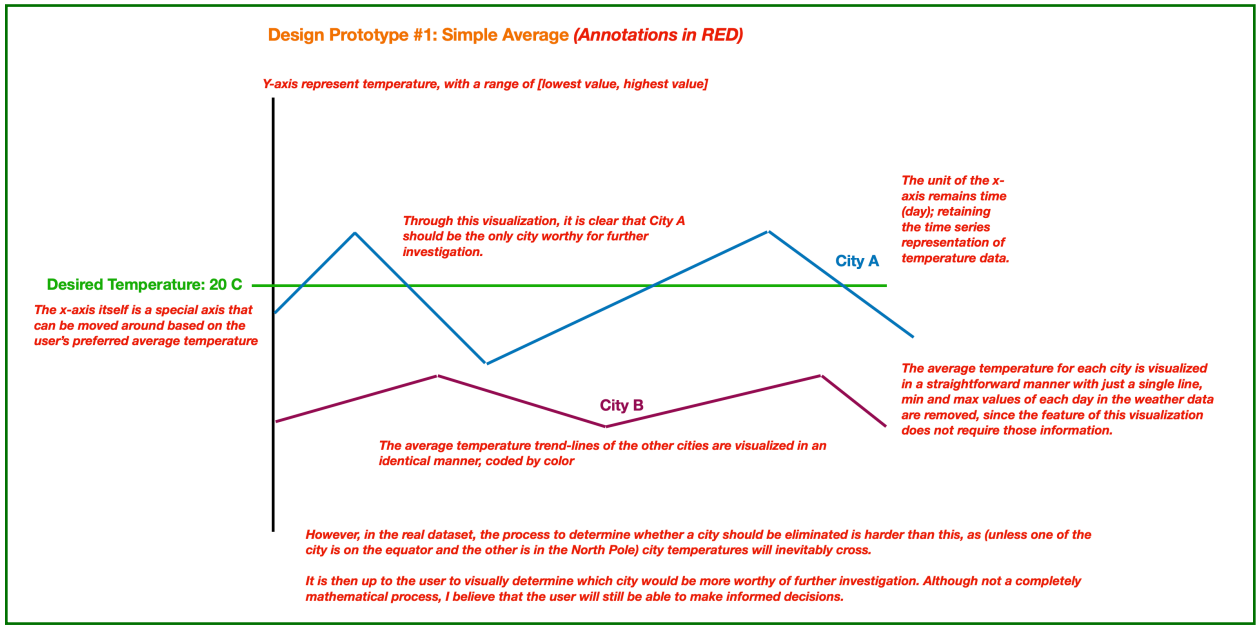
User Tasks & Features

The main goal of Visualization #1: Initial Scoping is to provide a “quick-and-easy” decision for the user to further investigate specific cities by filtering out cities that are immediately and obviously outside of the user’s preferred temperature range.

User Task/Goal	Feature to Support Goal
As the user, I would like to see the temperature-over-time relation visualized for all of the cities.	Visualize the temperature data for all cities using multiple data series in the same visualization.
As the user, I have a single temperature (on average) that I would consider to be comfortable for myself.	Defines the overarching goal of the visualization: showing the relationship between a specific value chosen by the user and its correlation with the temperature line graph: achieved through
I don’t care about the specific day-to-day minimum and maximum values just yet, just the average of each day to first make a preliminary decision.	Removes the min, max values of each day’s temperature from the visualization. We are not at a point yet where including those would bring a net beneficial effect to the comprehensibility of the visualization.
I also don’t quite care about making any specifically accurate comparisons between different cities, just to eliminate those that are obviously way out of my comfort zone so I could zero-in on the few remaining cities that are worthy of further detailed investigation.	Include no complex calculations for the comparisons of the cities’ temperature, since they are not suitable for this point in the consideration.

Design Overview: Initial Design

The initial design (Figure 1) attempts to accomplish the task of “quick elimination” by leveraging time series.

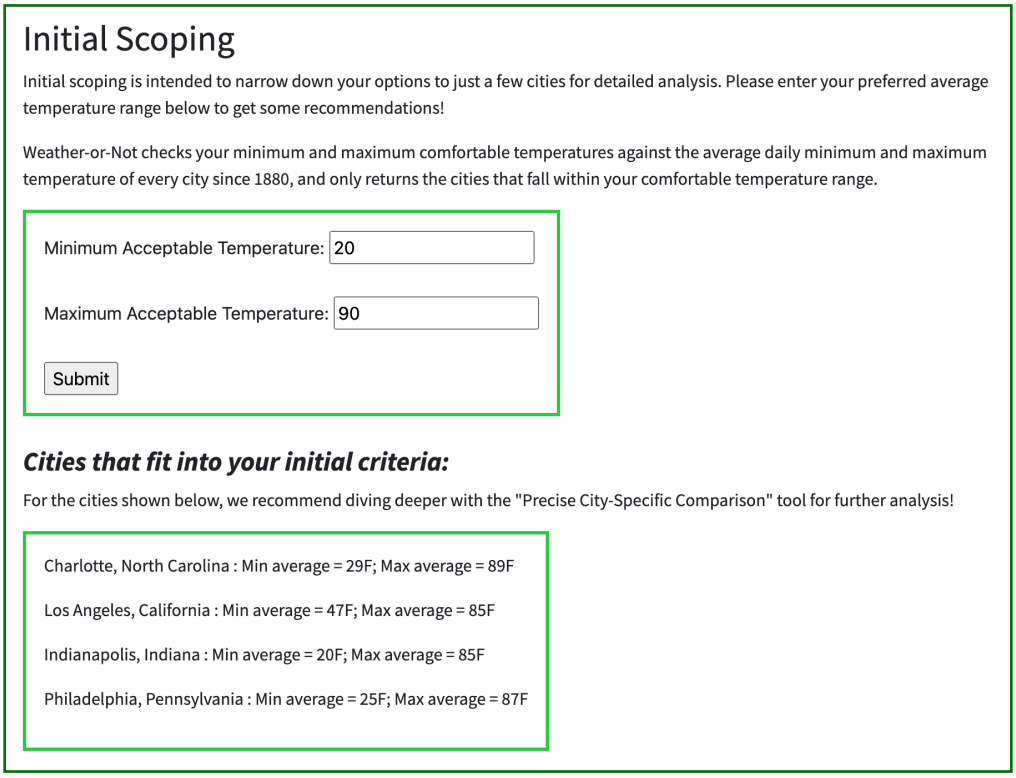


^^^ Figure 1

Although this is a technical and detailed approach, it was quickly discovered that the high complexity and density of information present would not be appropriate for the straightforward goal of the visualization. Therefore, major changes were made to arrive at the final prototype.

Design Overview: Final Prototype

After iterations and discussion, it was decided that the technicality and interactivity of multiple time series in a 2-axis graph would be over-engineering the goal of the visualization to give a quick decision. Therefore, the final prototype (Figure 2) represents a major change to the initial concept: ask the user what their minimum and maximum preferred temperature are, and give the user a list of cities that fit the range given, where they can then take to the next section for more detailed analysis.



^^^ Figure 2

Despite the simple interface of visualization #1, it is powered by a full set of D3's enter-update-exit sequence to populate and edit the eligible cities results section. This also makes the visualization modular to adapt to future modifications, since D3's sequence chain is already present and implemented.

Visualization #2: Precise City-Specific Comparison

User Tasks & Features

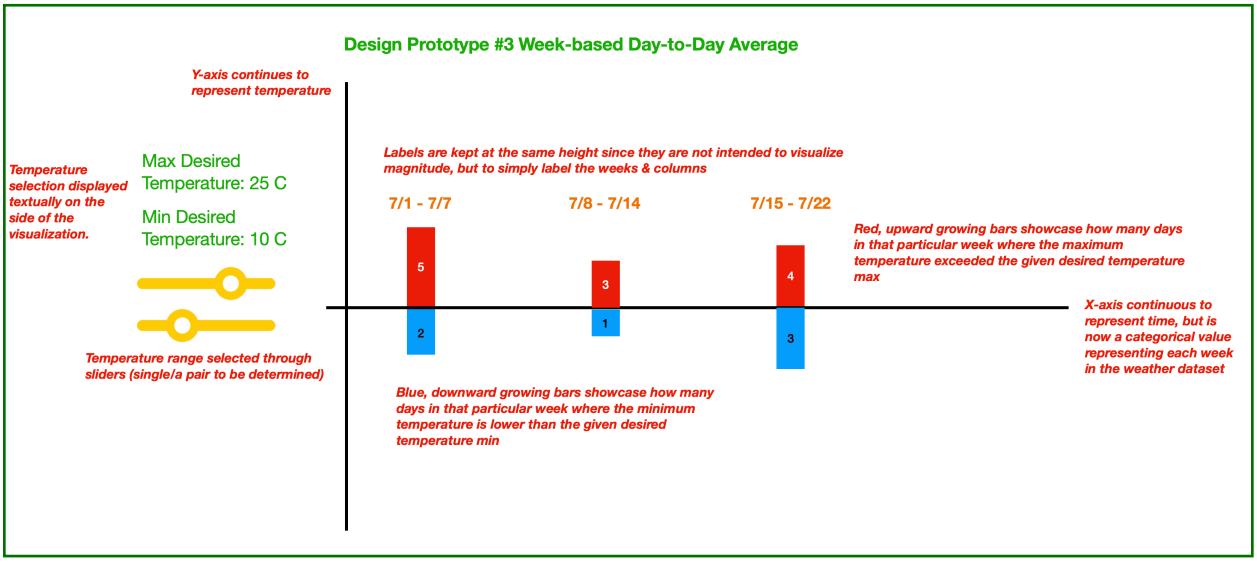
The main goal of Visualization #2: Precise City-Specific Comparison is to provide a detailed time series analysis for the user, so they can make informed decisions on what to do and prepare for specific times of the year with precision.

However, as stated in the overall goals, the visualization needs to be less of a technical "over-eningeering" than the standard formats of time series. Hence, time series was abstracted into categories instead, and temperature was abstracted into the number of days within each 10-day period where the temperature exceeds or dips below the desired range for a more intuitive, targeted explanation, abstracting data processing in code.

User Task/Goal	Feature to Support Goal
As a user, I would like to select one particular city.	City dataset selection achieved through the use of a drop-down selector, where only the data for the selected city would be visualized.
I would like to input my range of desired temperature.	Range entry selection is achieved through sliders.
I would like to visualize on a week-by-week basis to find out how I should plan my weeks to account for the discrepancy.	Then, the visualization shows the week-by-week discrepancies by: Dividing the x-axis's visualization of time via categories as weeks. Each week would be visualized with a pair of bars: One extending upward to represent the number of days in that given week where the maximum temperature exceeded the desired maximum temperature, magnitude labeled. One extending downward to represent the number of days in that given week where the minimum temperature was lower than the desired maximum temperature, magnitude labeled.

Design Overview: Initial Design + Final Prototype

Unlike visualization #1, the initial design of visualization #2 remained relative static throughout the interaction and implementation process. All input and interaction elements remained constant (slider for range input, double-ended bar charts for visualizing number of days, etc. Through this simple design, the visualization is able to present its information well to the user (Figure 3).



^^^ Figure 3

The final prototype (Figure 4) is almost an exact implementation of the initial design. Although more simplified data-wise, a noticeable amount of data processing was required in code (post CSV import) to generate the summary data needed for the visualization. I am pleasantly surprised that JS was even able to execute quick enough for a on-the-fly auto-re-render of the visualization. While it is certainly possible to avoid this computational overhead by pro-processing the CSV beforehand, post-process allows modularity, and can accept any arbitrary city data in the same format, making Weather-Or-Not more scalable.

^^^ Figure 4