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INFO 474 Interactive Information Visualizations
Design Challenge 3 – Final Deliverable

Overview of Design

For this design project, I created an interactive web-based visualization based on a variation of a lollipop chart to communicate weather trends over a year-long period for a number of US cities. In this visualization, I had a few communicative goals. First, I aimed to make the data interesting to look at. I wanted to make it clear that this chart was representing weather data; hence, I used a cloud graphic and transitions to mimic rainfall. This graphical representation of weather was also used to create intrigue, so that the viewer might be more interested in investigating the data.

Secondly, I prioritized displaying data from two different cities in order to allow the user to compare weather patterns between cities. This was a key aspect missing from the original design of this visualization, so including it here was important. The user is able to select any combination of the cities we were given to work with. While having multiple overlapping cities can run into difficulties in being able to see trends, I reduced the transparency of the encodings in order to reduce issues of occlusion. Color is also used to demonstrate the connection between data from each city through the Gestalt principle of similarity. Additionally, if they so choose, they are able to filter the data to only a singular city.

Additionally, I chose to use a lollipop chart in pursuit of a few communicative goals for the visualization. The lollipop chart allowed me to highlight the maximum and minimum temperature of each day. As the average temperature of a day may not give an accurate representation of the experienced temperature of that day, highlighting the maximum and minimum allowed me to show a range of temperatures for each day. The connecting line on a lollipop chart further allowed this range to be shown, following the Gestalt principle of connectedness. Also, the lollipop chart nicely makes each date distinctive (in that individual dates are not connected to each other), allowing the user to compare particular dates easily, another communicative goal.

Furthermore, this design also aimed to show multiple types of data within one visualization. This could allow the user to compare trends between precipitation and temperature. This is done on this visualization in that the shadow behind each end point of the lollipops encodes the total precipitation for that day.

Finally, it was important for the visualization to be able to provide details to the user on demand. This is done through the use of an interactive tooltip.

Thus, through the different visual encoding techniques and iconography included in this visualization, the visualization works to achieve the communicative goals of creating interest in the data, presenting multiple different aspects of the data, and allowing the user to interactively display the data they are most interested in.

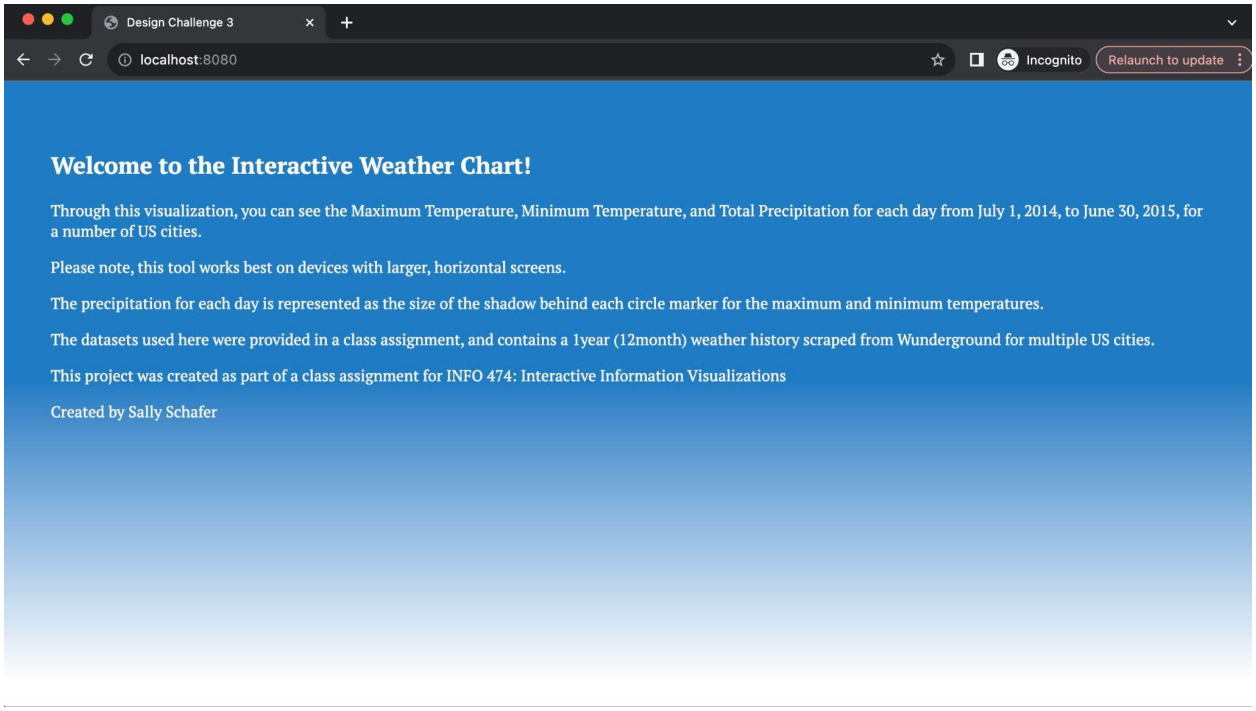
User Tasks

This visualization supports a number of different user tasks. These include:

- Comparing Temperature Trends between cities
    - A user who is interested in multiple cities (for example, someone who is moving or has family in another city) may be interested in comparing the temperature between two different cities. This design allows the user to compare two different cities' daily maximum and minimum temperatures over the course of a year. While the data presented is from past years, understanding what the weather has been like in a previous year could allow the user to understand the difference between temperatures in different areas.
- Comparing Temperature Trends Over the Course of a Year
    - A user may want to understand temperature trends over the course of a year in order to plan different activities. By displaying a past year's worth of data, this visualization allows the user to understand maximum and minimum daily temperature trends over the course of a year.
- Understanding Precipitation Trends
    - A user may want to understand when precipitation most commonly occurs in a given city. By including an encoding for precipitation, the user is able to see when large precipitation events occurred in a previous year, and could plan other events accordingly. (For example, a user may want to know when a particularly rainy time of year is for a particular city in order to plant a crop that requires large amounts of rainfall when it is first planted. Contrastingly, a user may want to know when a particularly dry time of year is for a particular city in order to paint their house).
    - A user may also want to compare the amount of precipitation different cities experience, such as someone who would like to move to a place with more or less precipitation. This visualization, by scaling the precipitation encoding on the same scale between cities, clearly allows the user to compare relative amounts of precipitation between cities.
- Accessing details about particular dates
    - A user may want to know what the maximum or minimum temperature or the total amount of rainfall was for a particular date. For example, they may want to investigate a particular date they remember, or they may be intrigued by a particularly hot/cold/heavy precipitation day. The tooltip allows the user to hover over particular dates and learn more about the data for that particular date.

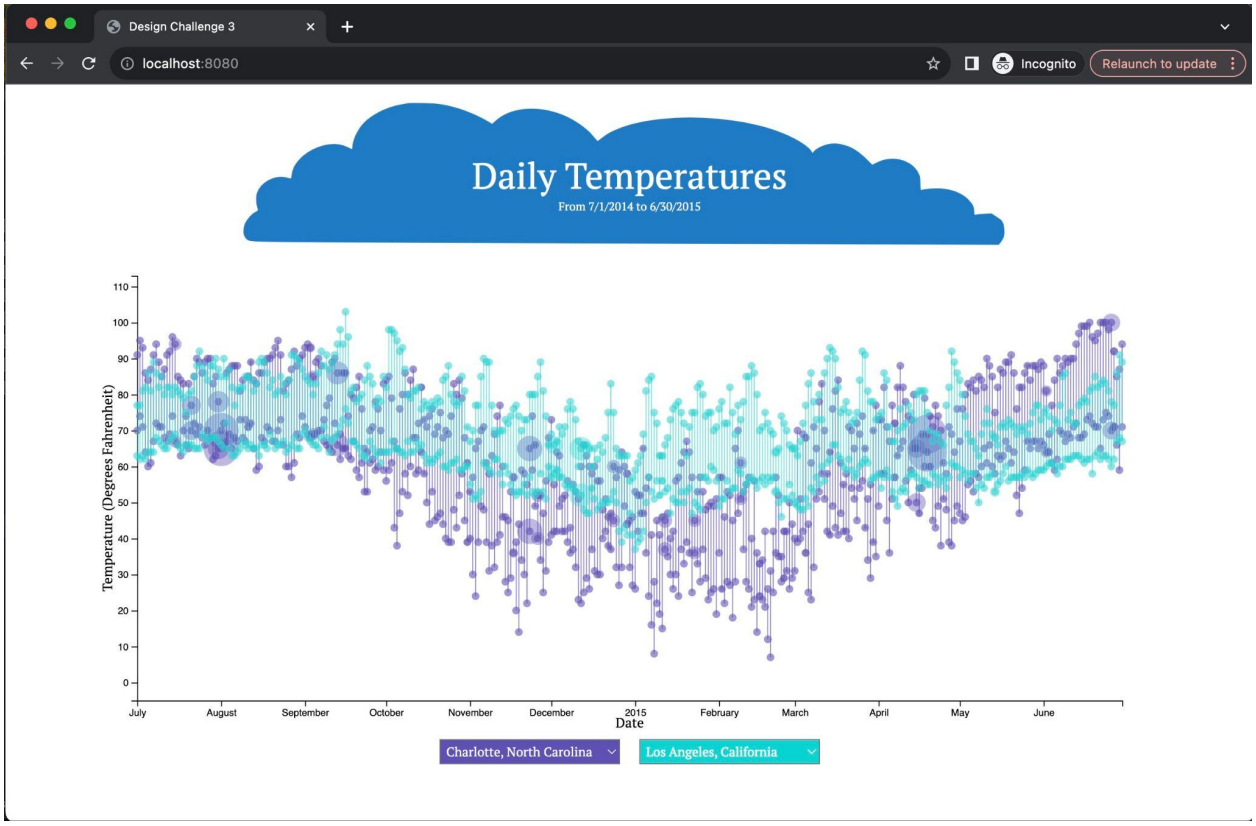
Walk Through of Interface

Top of Page



This is the first section of the website that appears when loading the visualization. This part of the visualization describes how the visualization works and what it displays, as well as where the data comes from. This transparency and context is an important part of good visualization design that we have discussed during this course.

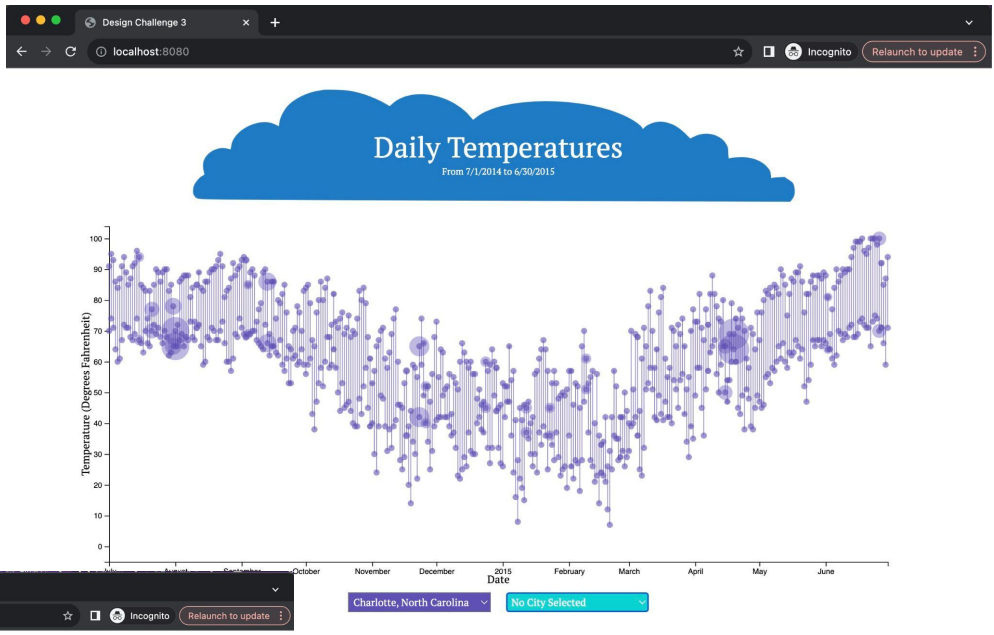
Visualization Section

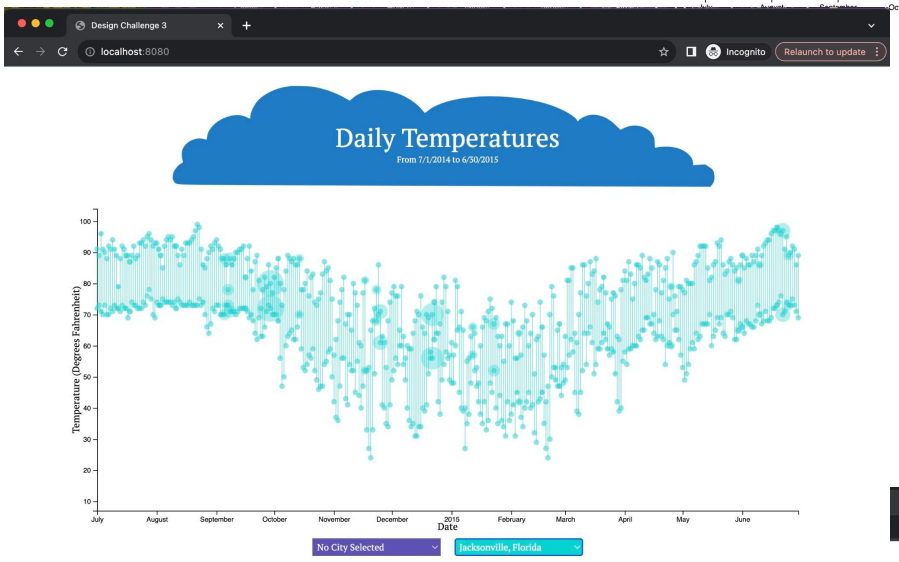


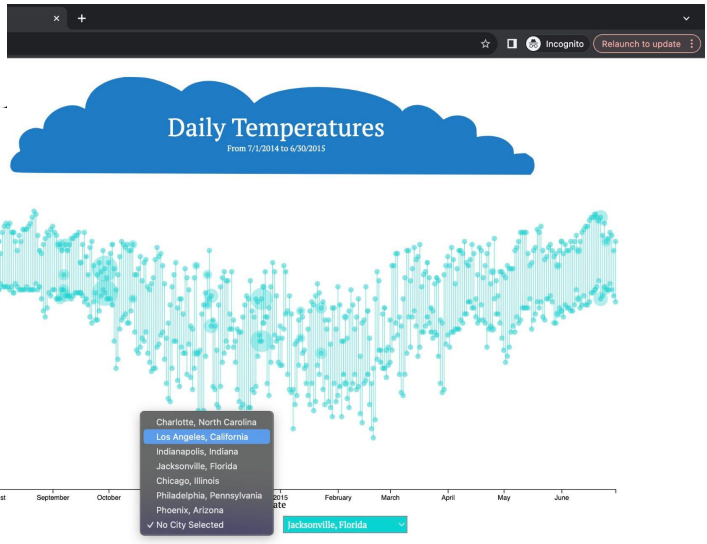
The next section of the webpage is the interactive visualization itself. After an animation runs when this section of the visualization is scrolled to, this is the starting visualization that shows. This visualization utilizes a dual sided lollipop chart, where the end points of each line represents the maximum and minimum temperatures of each day. The shadow behind the lollipop end points represent the total precipitation for that day; the relative area of each circle is determined by the precipitation for that day.

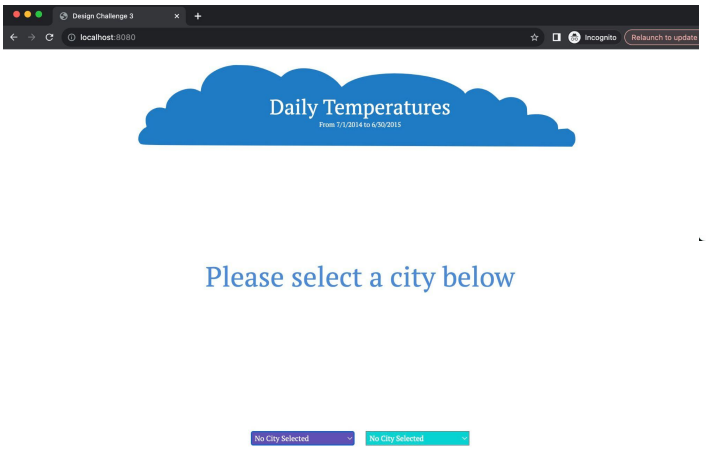
Selecting Different Cities

The four screenshots on this page demonstrate how which city that is displayed can be altered in a drop down menu. Additionally, the user can choose to show only one city if they prefer, and this can be in either the first city or the second city's color. If the user does not select any data to be displayed, they are asked to select a city.

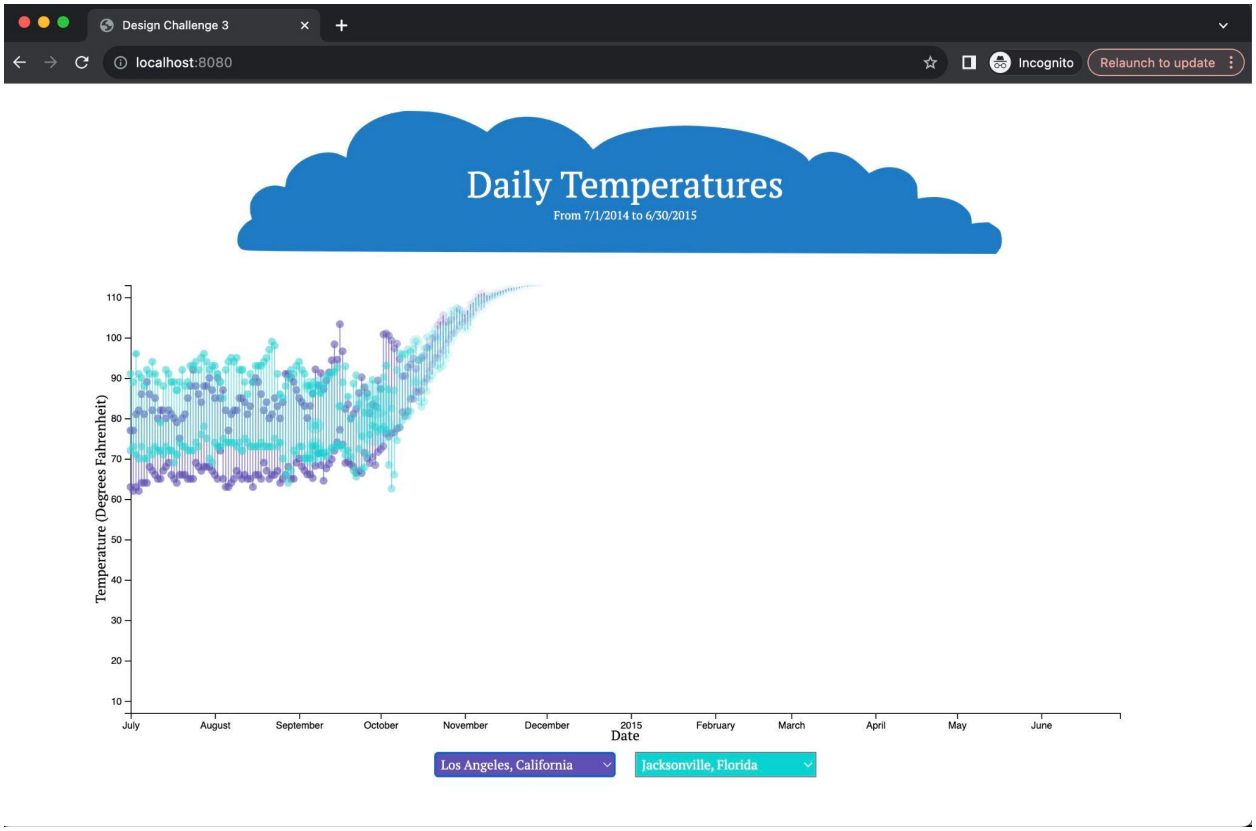






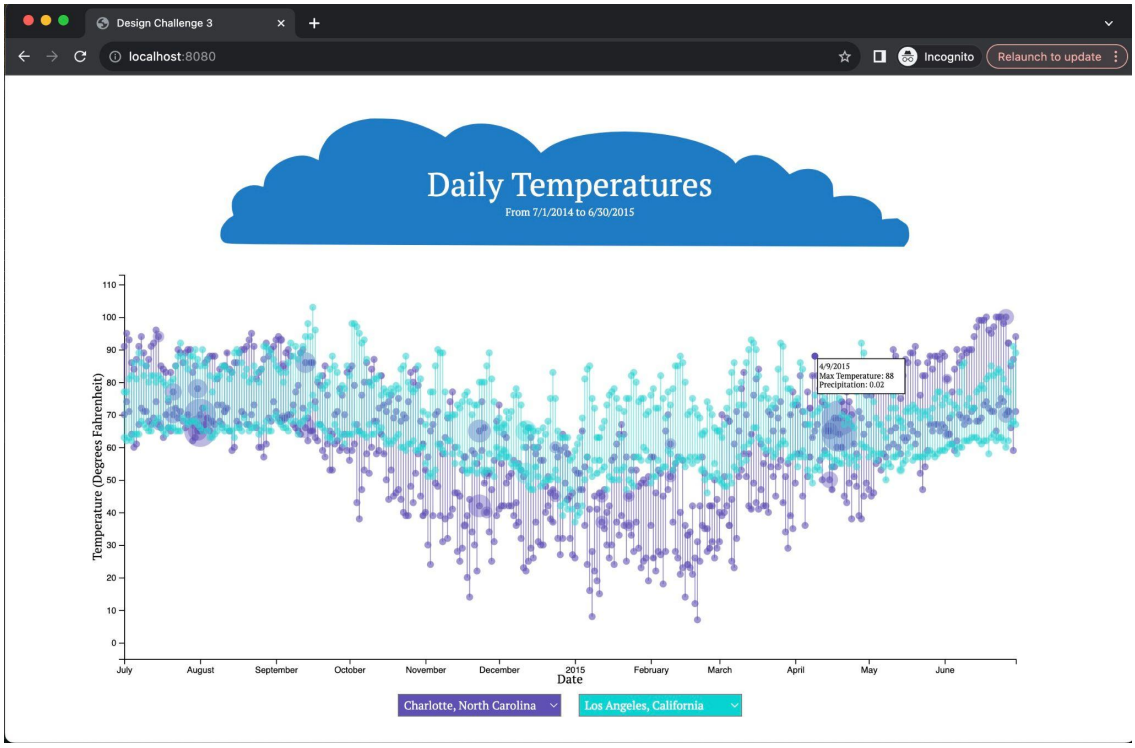


Animation/Transition



This screenshot is mid-transition / animation. Every time the visualization loads, the data “rains” in from the cloud. This mimics precipitation, which is part of the data represented. Additionally, because the data loads in progressively, it further gives the impression of time (the earliest data falls into place first).

Tooltip / Hovering



When data points are hovered over, a “tooltip” appears, which gives information about the data point, including the max/min temperature (depending on which point is hovered on), the date, and the amount of precipitation for that day. This allows for details about the data to be presented on demand.

Process

For this project, I used d3. I also referenced a few different sources in order to complete parts of the coding for this process. A few key articles and sources that I referenced are listed here:

- For Lollipop chart
  - https://d3-graph-gallery.com/graph/lollipop_cleveland.html
  - https://d3-graph-gallery.com/graph/lollipop_basic.html
- For transitions
  - https://observablehq.com/@d3/transition-end
  - https://www.d3indepth.com/transitions/
- For scrolling event
  - https://www.javascripttutorial.net/javascript-dom/javascript-scroll-events/
- For tooltip and mouse-over events
  - https://medium.com/@kj_schmidt/show-data-on-mouse-over-with-d3-js-3bf598ff8fc2
- Website used to convert png cloud drawing I made to svg
  - https://svgtrace.com/png-to-svg