

# Sakura Blooming Season

## Impact of Climate Change on Cherry Blossoms in Japan

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Computational Practices: Visualisation and Sensing

# Abstract

This abstract introduces, Sakura Blooming Season, an interactive data visualization on p5.js of the relationship between the historical cherry blossom blooming season and weather data across Japan.

The word 桜 (sakura) or 'cherry blossom' in Japanese holds profound significance in Japanese culture and society that extends beyond the aesthetic beauty. The sakura symbolizes the impermanence of life, new beginnings, and even the nation itself.

However, the announcement of cherry blossoms blooming has been increasingly earlier each year, and average temperatures are rising across the country. In 2023, cherry blossoms bloomed much earlier than normal nationwide, and in many places they were the earliest ever recorded.

In order to analyze the relationship between the accelerating bloom dates and rising average temperatures, I used the Python library "Pandas" to process historical cherry blossom bloom dates and weather data, then used p5.js to create a data visualization.

# Research on the 'Somei-yoshino'

The Somei-yoshino cherry tree is one of the most iconic cherry blossom varieties deeply ingrained in Japanese culture. The Somei-yoshino usually begin to bloom in early spring, often around late March to early April, depending on the location and climate conditions. The blooming period is relatively short, lasting about a week. With recent years, the bloom date and period have quickened potentially due to climate change.

In early 2023, the Japanese Meteorological Agency announced that the cherry blossoms have bloomed significantly earlier than the previous year. Cherry blossoms in Hokkaido, the northernmost of Japan's main islands, have bloomed a whopping 16 days earlier than 2022. Moreover, Tokyo has bloomed 10 days earlier than 2022.

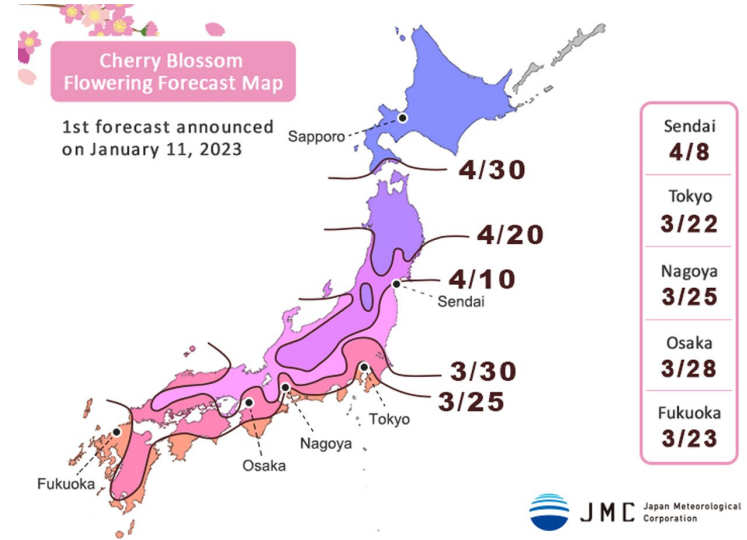
The analyzed data in this research revolves around the bloom dates of the Somei-yoshino.

# Research and Design for the Data Visualization

My project "Sakura Blooming Season" is heavily inspired by annual cherry blossom flowering forecast map, known as 桜前線 "sakura zensen" or "cherry blossom front," which are annual predictions that track the progression of cherry blossom bloom stages across different regions of Japan. These forecasts are widely followed by both locals and tourists, as they help people plan outings and events. The forecasts are typically issued by meteorological agencies and other organizations, utilizing historical data, temperature trends, and weather patterns to estimate when and where cherry blossoms will reach their peak bloom.

The forecasts are broken down regionally, indicating when cherry blossoms are expected to bloom in different parts of the country as shown on the right. Japan is a geographically diverse country with varying climates, of which 67%, two-thirds of Japan's land area is covered by forests.

Furthermore, these forecasts include a timeline of the different bloom stages, such as 開花 "kaika" (first bloom), 満開 "mankai" (full bloom), and 桜落ちる "sakura o-chiru" (blossom fall). For this project, I focused on the first bloom of the cherry blossoms across seven major cities in Japan.



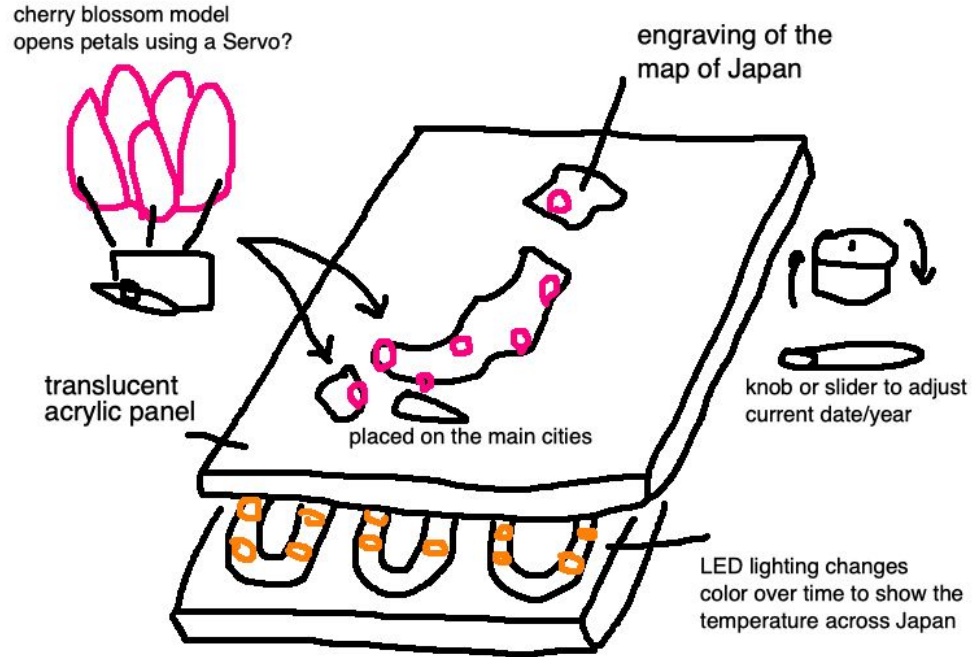
# Brainstorming and Initial Designs

During the brainstorming process, I initially wanted to create a physical data visualization using Arduinos, where the user can click on buttons and see the cherry blossoms 'bloom' with motors.

As shown in the sketch, the physical data visualization uses a translucent acrylic panel with an engraving of the map of Japan that glows using the LED strips underneath. The LED lighting color represents the average temperature of the area, similar to the forecast I was inspired by.

The flowers are made using small 'petals' made with 3D printed materials or acrylic panels that open and close using the slider. The Arduino connected to this will change the colors of the LED lighting or open/close the cherry blossoms.

I decided to scrap this idea because there is not much significance in creating a physical data visualization compared to a digital visualization, there are limitations on how I can present the data, and the project is quite ambitious of an idea.



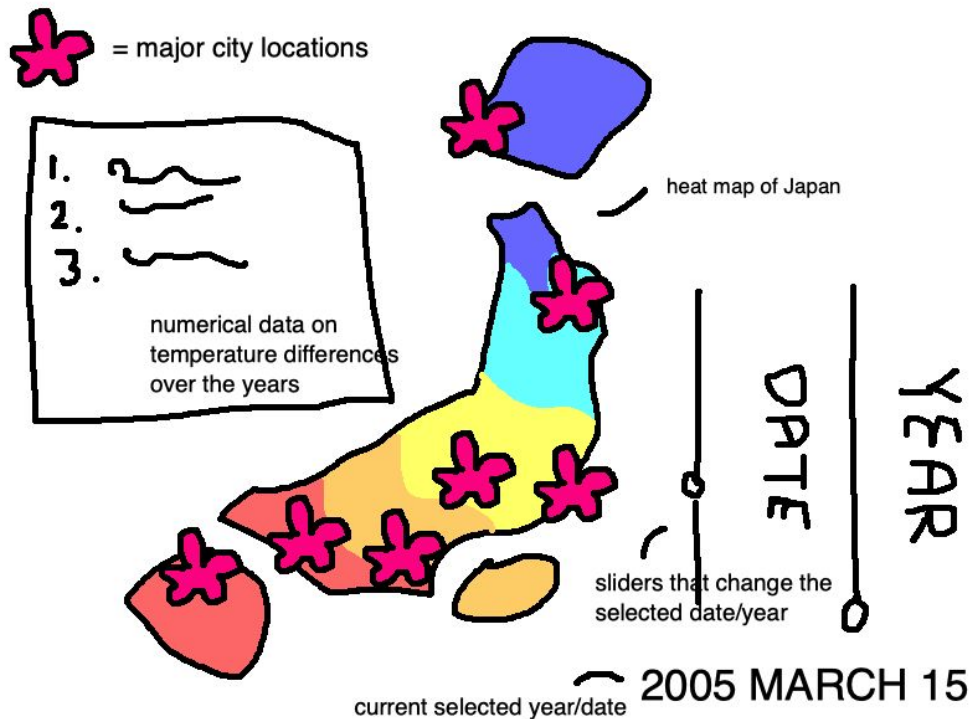
# Design

The design of the digital version of the data visualization is inspired by the cherry blossom flowering forecast as mentioned before.

The visualization features the map of Japan with a heat map of the average temperature of each region, with blooming date data of the seven major cities: Sapporo, Sendai, Tokyo, Nagoya, Osaka, Hiroshima, and Fukuoka.

The two sliders on the right can be adjusted by the user and see the difference in temperature and blooming dates of each region over time. With live adjustable data, the difference in the average temperature between the selected year and the previous year can be compared to show any positive or negative changes.

The flowers will appear/hide depending on the bloom date of the region at the time, and the current selected time. Theoretically, the flowers will begin to bloom from the bottom and become earlier each year.

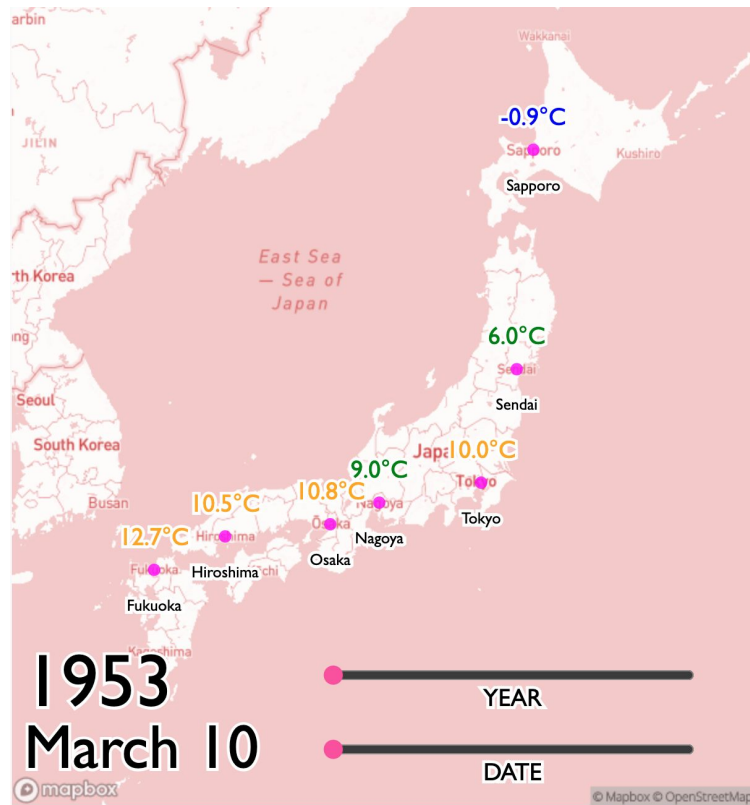


# Design Process

The image on the right is the mid-stage of the data visualization process. When accessing the image of the map from Mapbox using its API, I set a custom color of a light shade of pink to match the aesthetic of the theme. I had to try several different shades to make sure that the map is visible and the text above is legible.

The sliders were placed horizontally instead of vertically, unlike the original design from the previous slide. I felt a slight discomfort trying to move the sliders up and down, and it did not visually make sense as most people would visualize time to proceed horizontally.

The location of Osaka and Nagoya are very close to each other, which made it difficult to place the location name and temperature on the same line. To make sure that the values and text do not overlap, the temperature has been placed above the point, and the location name below the point. The cherry blossom may slightly overlap with each other when appeared, however, it does not affect the visibility of the text.

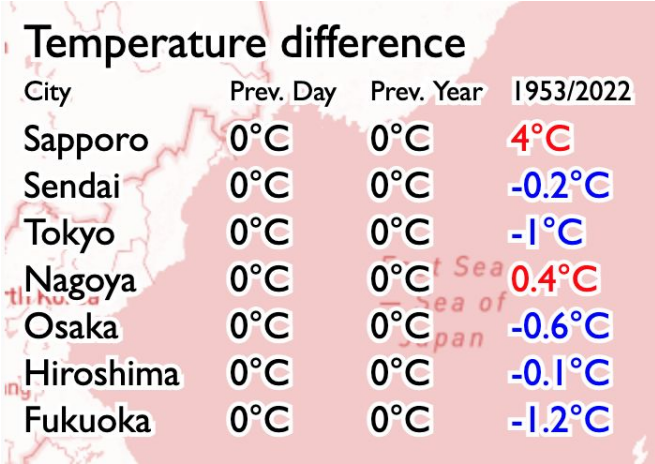


# Design Process

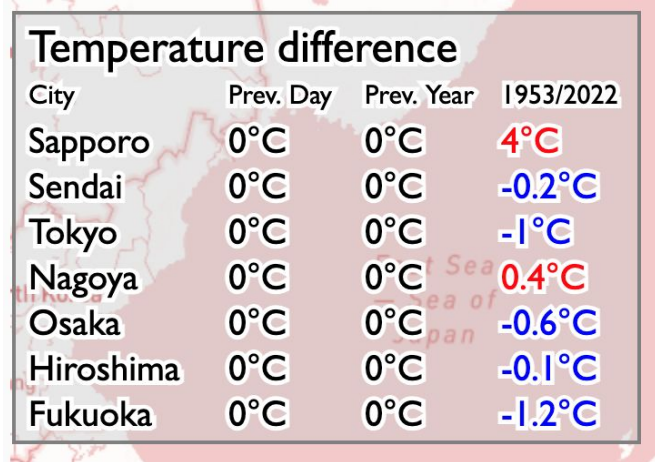
I decided to include data on the difference between the temperature of the selected day and previous day, the selected year and previous year, and the difference between the day of 1953 and 2022.

When the user selects Mar. 10th, there is no data before the date to compare the temperatures, so the value will be set to 0. Similarly, if the year is set to 1953, there is no data for the year before and will also be set to 0. If the difference between the two values are positive, the text will be highlighted red, whereas a negative value will be highlighted blue.

I later included a rectangle behind the text for clarity of the text. Looking back at this design, I can potentially add a plus symbol before the temperature to symbolize a positive change between the two dates, similar to a negative difference.



| City      | Prev. Day | Prev. Year | 1953/2022 |
|-----------|-----------|------------|-----------|
| Sapporo   | 0°C       | 0°C        | 4°C       |
| Sendai    | 0°C       | 0°C        | -0.2°C    |
| Tokyo     | 0°C       | 0°C        | -1°C      |
| Nagoya    | 0°C       | 0°C        | 0.4°C     |
| Osaka     | 0°C       | 0°C        | -0.6°C    |
| Hiroshima | 0°C       | 0°C        | -0.1°C    |
| Fukuoka   | 0°C       | 0°C        | -1.2°C    |



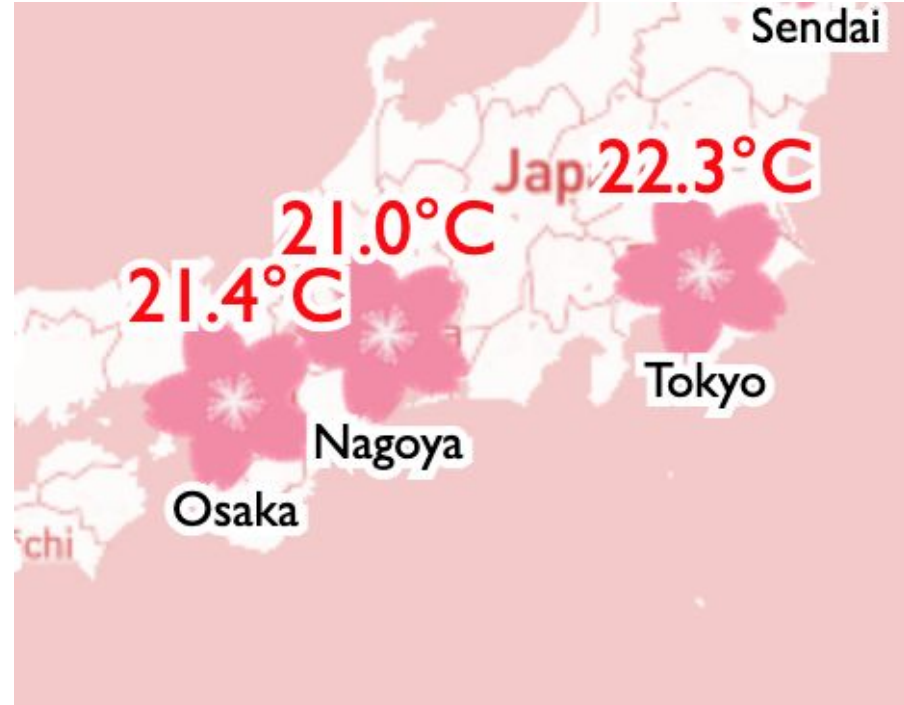
| City      | Prev. Day | Prev. Year | 1953/2022 |
|-----------|-----------|------------|-----------|
| Sapporo   | 0°C       | 0°C        | 4°C       |
| Sendai    | 0°C       | 0°C        | -0.2°C    |
| Tokyo     | 0°C       | 0°C        | -1°C      |
| Nagoya    | 0°C       | 0°C        | 0.4°C     |
| Osaka     | 0°C       | 0°C        | -0.6°C    |
| Hiroshima | 0°C       | 0°C        | -0.1°C    |
| Fukuoka   | 0°C       | 0°C        | -1.2°C    |



# Design Process

When adding the cherry blossom images on top of the locations, it was difficult to see any change as the background color is very similar. For future changes, I will try to select a different color for the background instead of choosing pink. However, to tackle this issue, I decided to have the cherry blossoms rotate back and forth to show some movement or changes in the map. Originally these flowers will show or hide and stay static, which makes it difficult to notice when the user is changing the values of the date rapidly.

Instead of having the images show or hide, I originally wanted them to slowly appear or disappear using alpha values.



# What went well, future improvements, conclusion

I believe that the data visualization was able to show and highlight the difference in data over the years, whilst maintaining its aesthetic and theme of the cherry blossom flowering forecast. While I was not able to include a heatmap on top of the map of Japan, the statistics on the side clearly shows the positive or negative changes in temperature over the years; however, it may not be as impactful as I hoped it to be.

For future improvements, I want to think about how I should present the data on the difference in temperature over the years in a more visually impactful manner. I can add a line graph to show the rapidly changing temperature over the years instead of having to constantly compare the temperature with its previous year. I also want to think about what other ways I can present this data in a different fashion.

## Works Cited

- “Cherry Blossom Forecast 2023: Japan’s “Sakura” Season Open to International Tourists Again.” *Nippon.com*, Nippon Communications Foundation, 16 Jan. 2023, [www.nippon.com/en/japan-data/h01564/](http://www.nippon.com/en/japan-data/h01564/).
- “Release of 2023 Cherry Blossom Forecast (10th Forecast) | Japan Meteorological Corporation.” 日本気象株式会社, Japan Meteorological Corporation, 20 Apr. 2023, [n-kishou.com/corp/news-contents/sakura/?lang=en](http://n-kishou.com/corp/news-contents/sakura/?lang=en).