INFO 5100 Project 2 Final Report

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Our outcome: Our team focused on data visualization of climate change based on Earth temperature data. We have created three graphs that showcase climate change from 1770 to 2013, including one geographic map, one bar chart and one line chart. We will talk about these graphs in detail below. We have gone through multiple discussions on iterations of design and coding and we are pleased to present our final visualization.

Data selection process: Our team uses a democratic way to choose the data source. Each person searched for one or two data sources of their interests online. Then we gathered all selections, and used anonymous voting to choose what we would like to focus on after reading and thinking about them. We have come up with various ideas such as air pollution and air quality in the US, minimum wage in the US, international adoption rate and climate change.

We analyzed the pros and cons of each dataset, and voted for our favorite idea — climate change. We all think it is meaningful to create a visualization on this topic since the environment issue is increasingly important in our daily life. It is educational for people to learn about changes to surface temperature over the past 240 years.

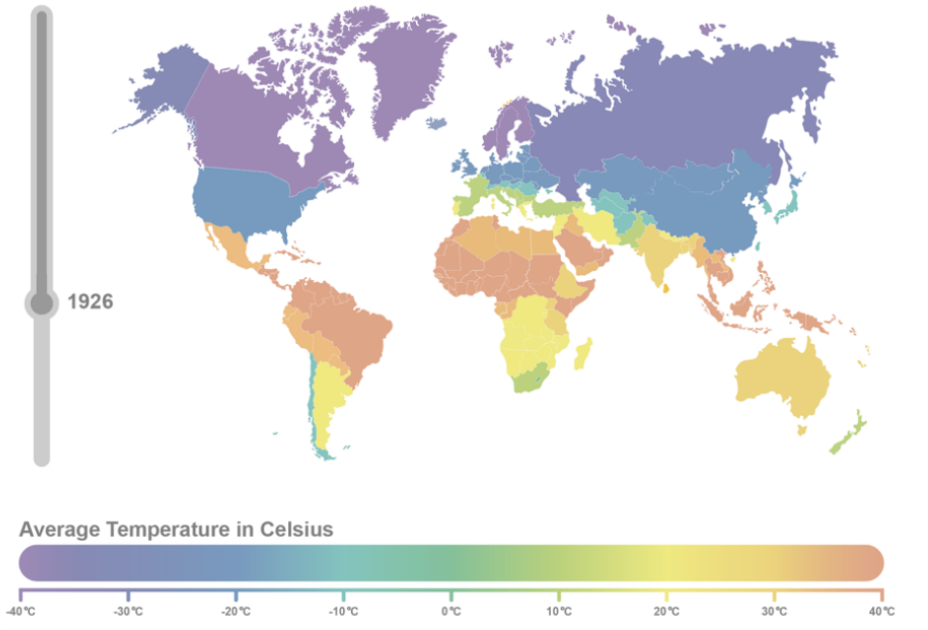
Data source:
https://www.kaggle.com/berkeleyearth/climate-change-earth-surface-temperature-data?select=GlobalLandTemperaturesByState.csv

Data Details: This data source is very complicated because it contains data from 1770 to 2013. It has five datasets and over 500,000 rows of data. It has temperatures in different categories. We decided to use three datasets of all.

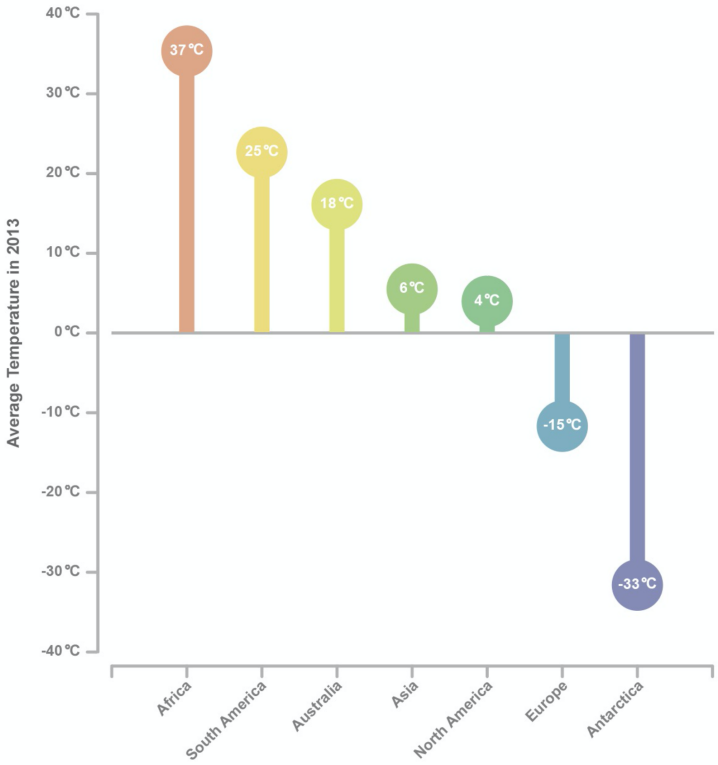
Data filtering process: Because of the large span of years and the large number of countries involved, data gaps occasionally occur. So for each data set, we filter out null values first. For the time variable, we use the same format of time value as the original data to draw the axis, so that the subsequent data processing becomes much easier. Since our vertical axis is divided into positive and negative segments, we make a simple judgment about the symbol of the data when we call it.

Design sketching process: Hang is in charge of sketching out our designs. She created the sketch beautifully using Adobe Illustrator. We talked about what we wanted to do first and she turned those ideas into sketches. The world map graph represents average temperature in Celsius in different years that viewers can slide to choose. The bar chart represents average temperature in a given year in seven continents. The line

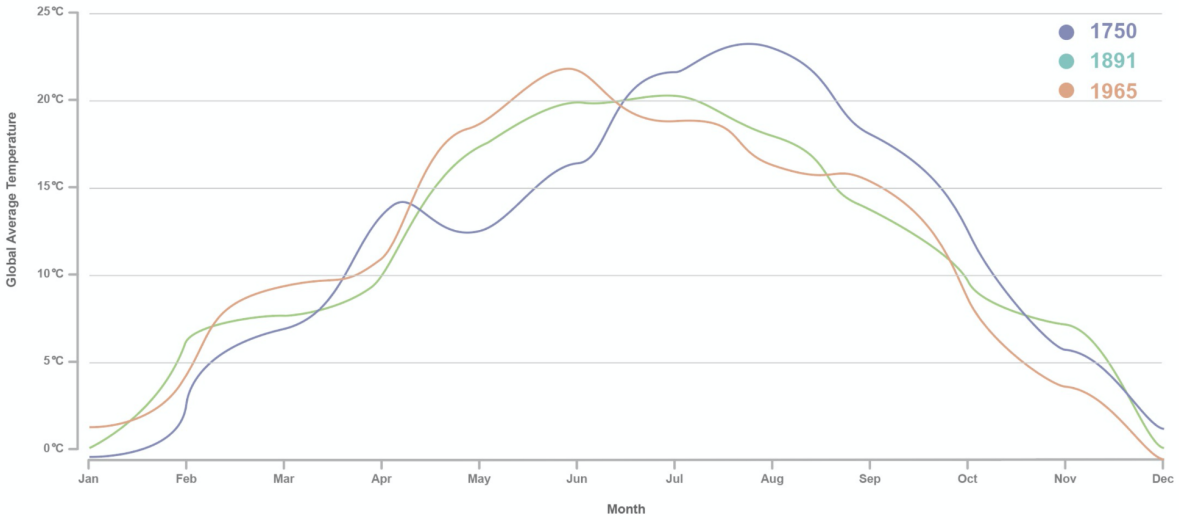
chart represents average temperature in a given region in 12 months. In a later discussion, we decided to change the bar chart to show average temperature and extreme temperature on land in a given year. The year corresponds to the slide bar. Hang considerably picked marks and channels for each graph.



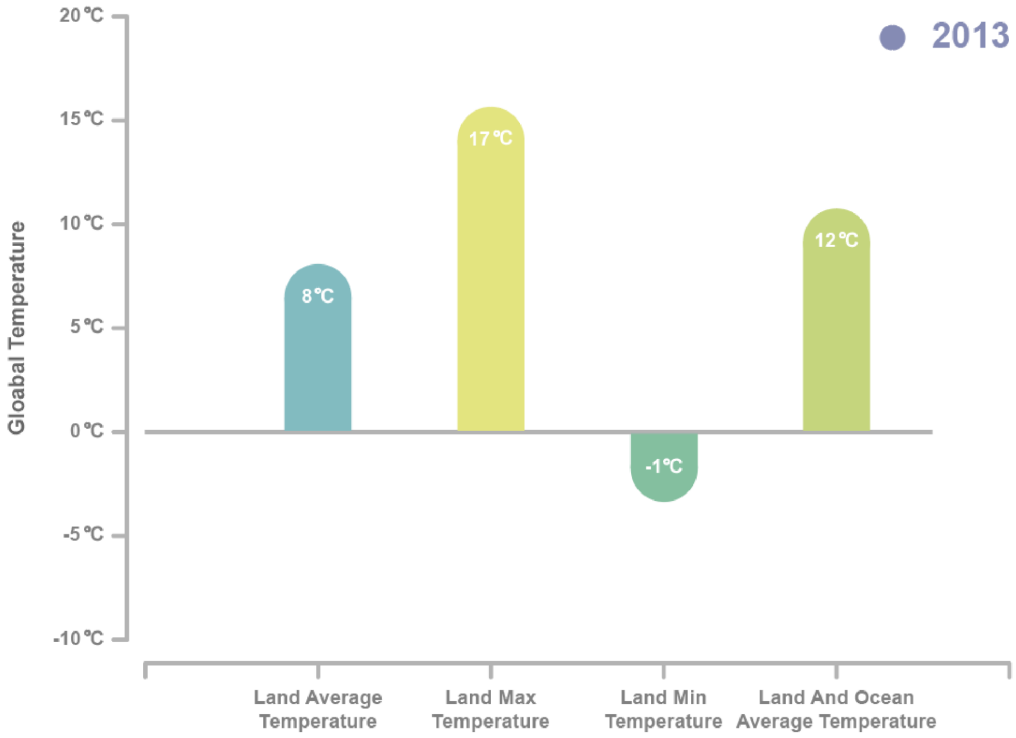
Sketch 1: average temperature in Celsius in different years



Sketch 2: average temperature in a given year in seven continents

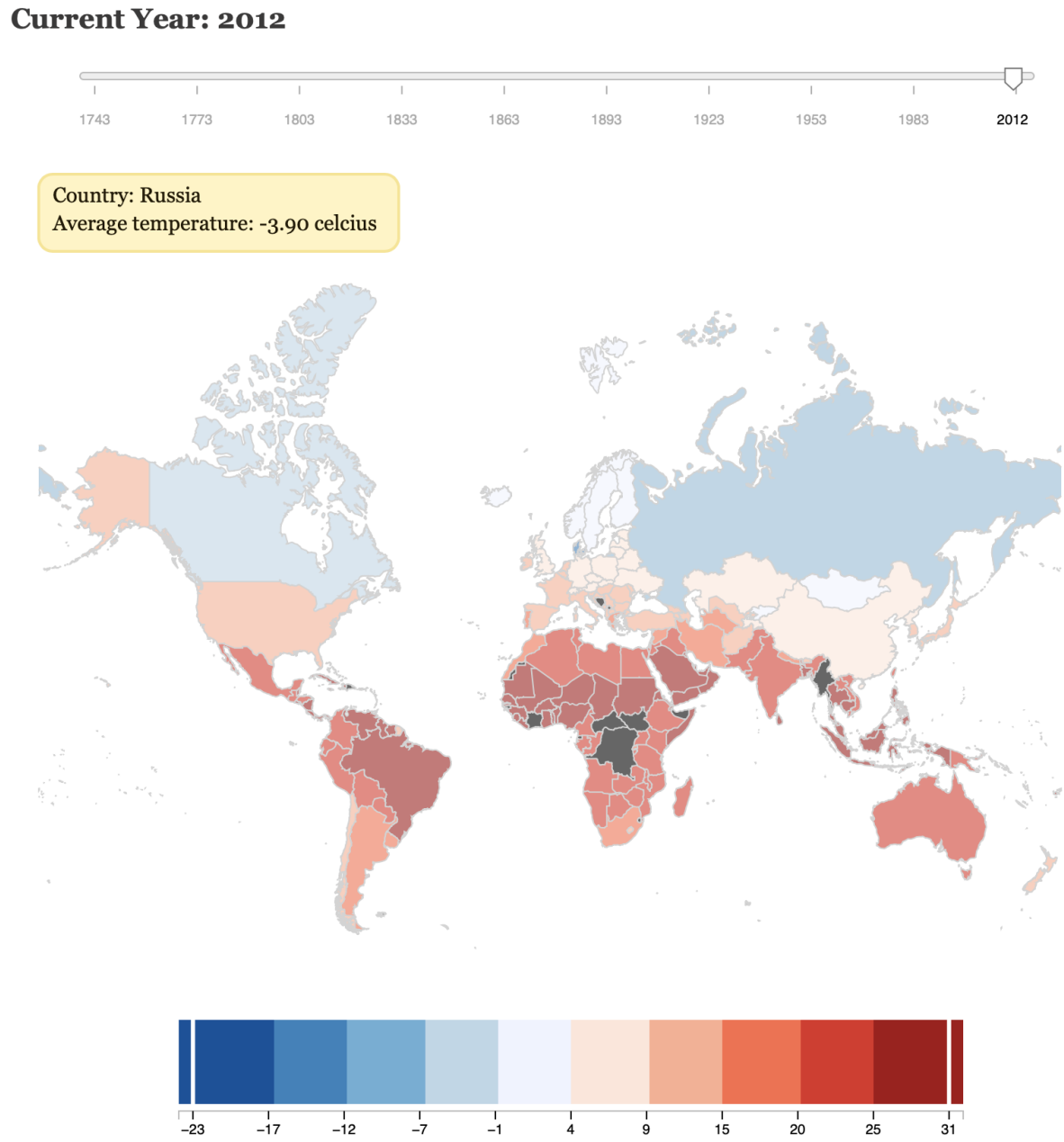


Sketch 3: average temperature in a given region in 12 months



New sketch 2: average temperature and extreme temperature on land in a given year

Final Data Visualization - Graph 1



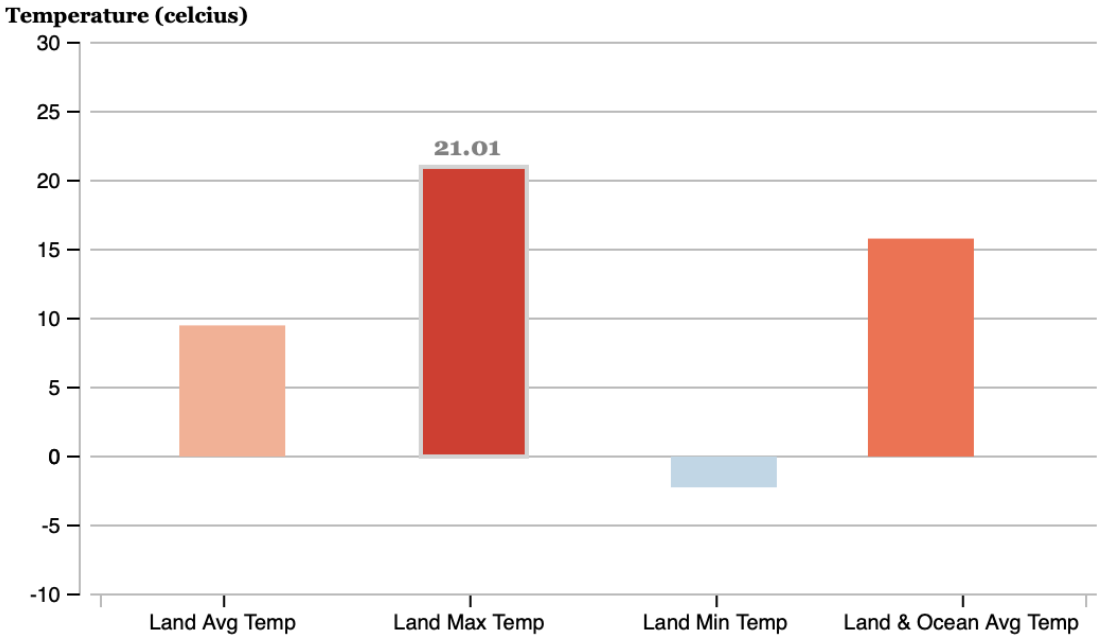
Marks: Maps has all the countries over the world
Channels: Colors corresponding to hot and cold
Colors:

- Canvas: we choose white to make the graph look clean because there will be multiple colors in this graph. White background can make the color obvious.
- Slide bar: we choose grey to make the slide bar not too outstanding to affect the whole visual experience. The year chosen will be highlighted in black.

- Temperature color: we choose different shades of blue and red to represent cold and hot temperature because people can usually catch this point in daily life. It is more of a habit that people can easily get.
- Information box: we choose a light yellow background because it looks neutral in this graph. It will avoid confusion between red and blue.

Interactive design elements: The viewer can use a slide bar to change the year. The color of the graph will change based on the year. The viewer can also use mouseover to check the details of the country, the name and the accurate average temperature. We decided to use a slide bar because we have so many years that people can choose. Also, sliding can show the changes quickly if they only care about how it looks over the time. We have the mouseover to keep the graph look clean, so that viewers can dig into detail if they want to do so using their mouse.

Final Data Visualization - Graph 2



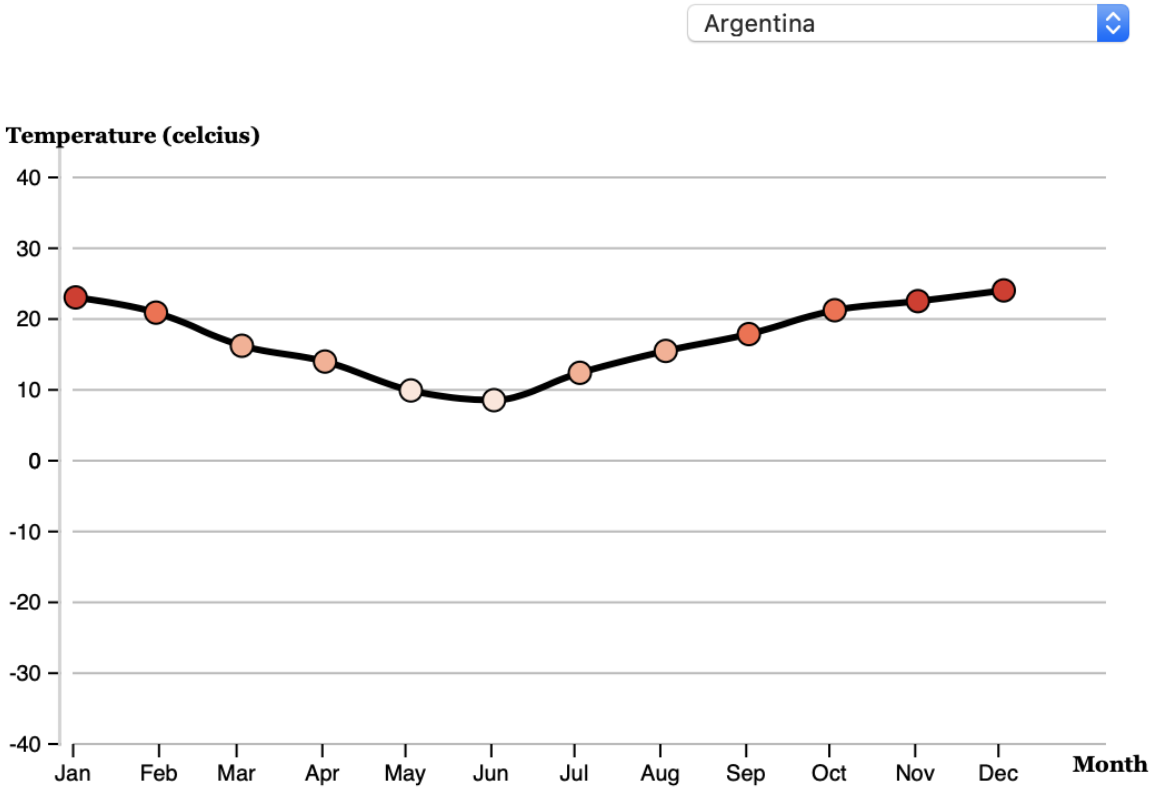
Marks: Rectangles, gridlines
Channels: Colors corresponding to hot and cold
Colors:

- Canvas: we choose the same white background to make the graph look clean and cohesive.
- Gridline: we choose grey to make the gridlines not too obvious to affect the whole visual experience.

- Temperature color: we choose different shades of blue and red to represent cold and hot temperature because people can usually catch this point in daily life. It is more of a habit that people can easily get.
- Mouseover effect: the exact temperature will be shown in dark grey because it matches the gridlines well and not a significant information

Interactive design elements: The bars in this graph will change when the year changes in the previous step. The viewer can use mouseover to check the accurate temperature because if we keep all the temperatures there, the graph will look messy when the graph is changing quickly. The trend is easier to notice through the length of bars instead of the numbers on it when the slide bar moves fast.

Final Data Visualization - Graph 3



Marks: Circles, line, gridlines
Channels: Colors corresponding to hot and cold
Colors:

- Canvas: we choose the same white background to make the graph look clean and cohesive.

- Gridline: we choose grey to make the gridlines not too obvious to affect the whole visual experience.
- Temperature color: we choose different shades of blue and red to represent cold and hot temperature because people can usually catch this point in daily life. It is more of a habit that people can easily get.
- The line: we choose black to make the line obvious enough to see
- The circle stroke: we choose black as well to make the circle easy to locate its location

Interactive design elements: The viewer can use the dropdown menu to select the country that they want to see the average temperature in a given year. The graph will change based on the slide bar in previous steps. We decided to use a dropdown menu because it is easy for viewers to choose the countries we have. It is simple to use and read.

Labels: The label at the bottom of the graph applies to all three graphs in our visualization. The higher the temperature is , the redder the color is. Vice versa, the lower the temperature is, the bluer the color is. One label that can apply to all graphs minimizes the possibility of confusion on colors. The color is easy for viewers to understand and see.

The Story: Our main gain is that the viewer can tell the temperature change over the past 243 years from this data visualization. They can have senses of these changes either globally or regionally. The viewer can use the slide bar at the top of the map to choose the year they want to know about the average temperature. As the viewer is sliding, the map and the other two graphs will change based on the year. The viewer can see the animation while sliding the bar for all three graphs. On the left, the viewer can see different countries in different colors. According to the color, the viewer can tell the temperature in that country or region. The viewer can also use the mouth to place it in a country so that a box will show up and tell the accurate average temperature and country name. One the top right, the viewer can see four bars telling the average, the max and the min temperature on land and the land and ocean average temperature. On the bottom right, the viewer can choose the country they like to see the average temperature in the year they chose on the slide bar. As a result, no matter in which graph, as the year goes more toward the twenty-first century, the average temperature is increasing in a very obvious way. Also, no matter in what country, the conclusion also applies. Global warming is real.

Team distribution:
Each team member picked the area that they are most interested in and good at. We are happy with the work distribution among four of us and worked happily together.

Haixin Tang - Project manager, report writer
Hang Jiang - Illustrator, presenter
Jiaqian Yu - Programmer
Peiyu Xu - Programmer

Date	Task	Team Member
10/22	1st Group Meeting ● Tasks assigned and group channel created	Peiyu Xu, Hang Jiang, Jiaqian Yu, Haixin Tang
10/28	Brainstorming: ● Group members bring ideas together to select at least one ● Decide which to implement later	Peiyu Xu, Hang Jiang, Jiaqian Yu, Haixin Tang
10/29	Refine Milestone 1 Document & Submit	Haixin Tang
10/29	2nd Group Meeting ● Discuss about design and choices	Peiyu Xu, Hang Jiang, Jiaqian Yu, Haixin Tang
10/30-10/31	Design Sketching	Hang Jiang
11/1	3rd Group Meeting ● Discuss about sketches and modifications ● Acquire feedback from Milestone 1	Peiyu Xu, Hang Jiang, Jiaqian Yu, Haixin Tang
11/2	Data Processing and Early Stage Coding	Peiyu Xu, Jiaqian Yu
11/5	Refine Milestone 2 Document & Submit	Haixin Tang
11/6-11/14	Ongoing Coding	Peiyu Xu, Jiaqian Yu
11/15	4th Group Meeting ● Check in with coding progress ● Start to work on final report	Peiyu Xu, Hang Jiang, Jiaqian Yu, Haixin Tang

11/15-11/16	Finalize Coding	Jiaqian Yu, Peiyu Xu
11/19/2021	Final Report Submission	Haixin Tang, Hang Jiang
11/19/2021	In Class Presentation	Hang, Peiyu, Jiaqian, Haixin