

# Sketching Visualization

[CSE412: A2 Sketching Visualization](#)

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# Part 1

Sketching US Population Growth

# The Dataset

US Population Since 1840 (in thousands, rounded to the nearest thousand)			
	Boston, MA	St. Louis, MO	Seattle, WA
1840	93	17	-
1850	137	78	-
1860	178	161	0.2
1870	251	311	1
1880	363	351	4
1890	449	452	43
1900	561	575	81
1910	671	687	237
1920	748	773	315
1930	781	822	366
1940	771	816	368
1950	801	857	468
1960	697	750	557
1970	641	622	531
1980	563	453	494
1990	574	396	516
2000	590	347	564
2010	618	319	609
2020	676	302	737

Data sources: Boston ([biggestuscities.com](https://biggestuscities.com), [Census](https://www.census.gov)), Cleveland ([biggestuscities.com](https://biggestuscities.com), [Census](https://www.census.gov)), Seattle ([biggestuscities.com](https://biggestuscities.com), [Wikipedia](https://en.wikipedia.org))

# Brief Process Overview

## **How did you approach the design process?**

I would first observe the context and try to catch the point in the dataset. And then I would think about multiple representation ways to convey the important information. Finally, I would delete some sketch and try to make the original version more attractive and useful for readers.

## **What question(s) did you attempt to answer with your visualizations?**

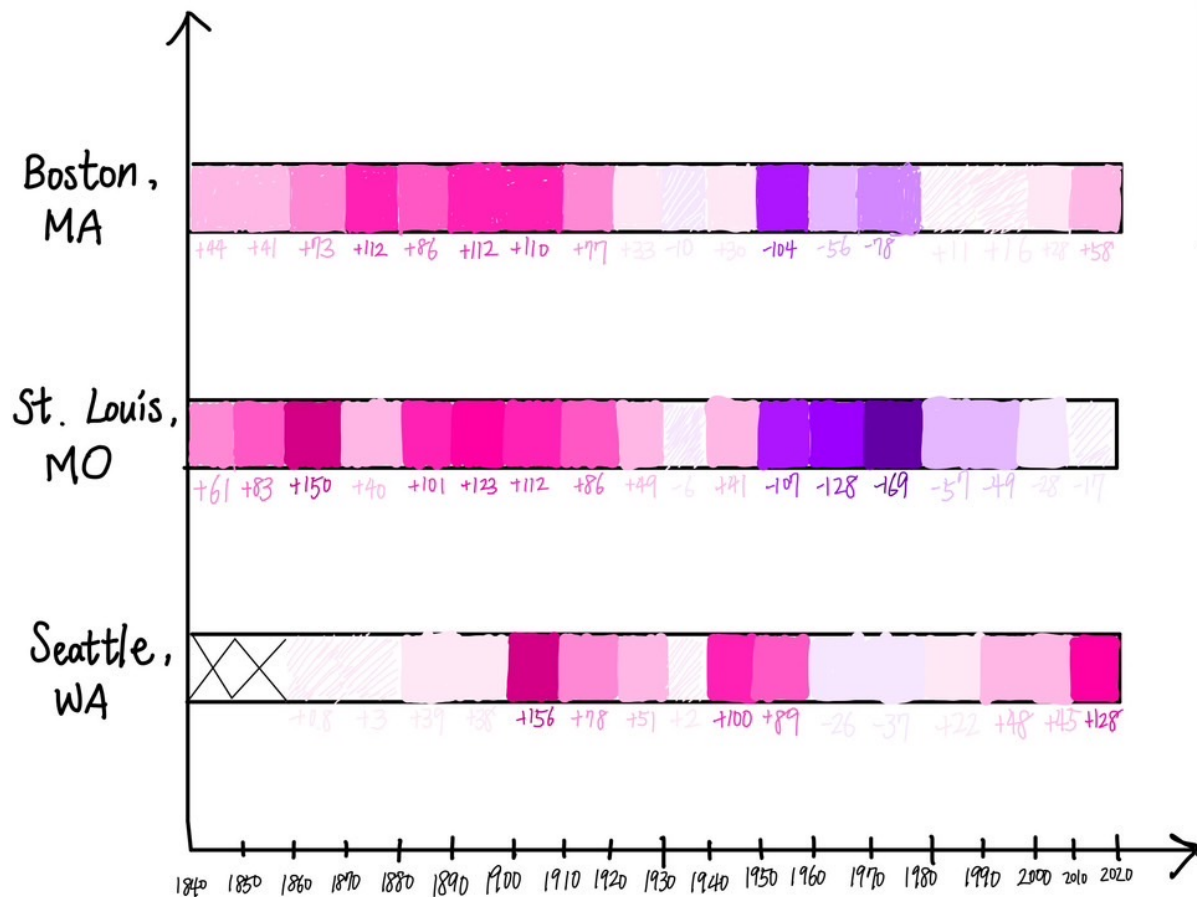
The question I attempt to answer is “What is the population trend in three US cities, and how do they compare?”. I would like to show the comparison between the cities rather than just simply display the trend by using traditional graph.

## **What did you struggle with?**

I sometimes got stuck because if I use the visualization I invent, it might be confusing or misleading to people who aren't familiar with it. So, it is important to design the visualization which is attractive but also easy to read.

## **What would you do differently next time?**

I realized that my visualizations only depict either the change in quantity or the total population. Therefore, I will attempt to incorporate both the change in quantity and the total population in the same chart to make the data more comprehensive and informative.



# Sketch 1: Design Rationale

## Brief description

This visualization uses color contrast to represent the increase or decrease number of population every ten years.

## Data representation

I calculate the change of population every ten years and use colors to represent the magnitude of the numerical changes. For each city, a bar with different color shows the trend from 1840 to 2020. There are also precise number of population change in each period under the three bars.

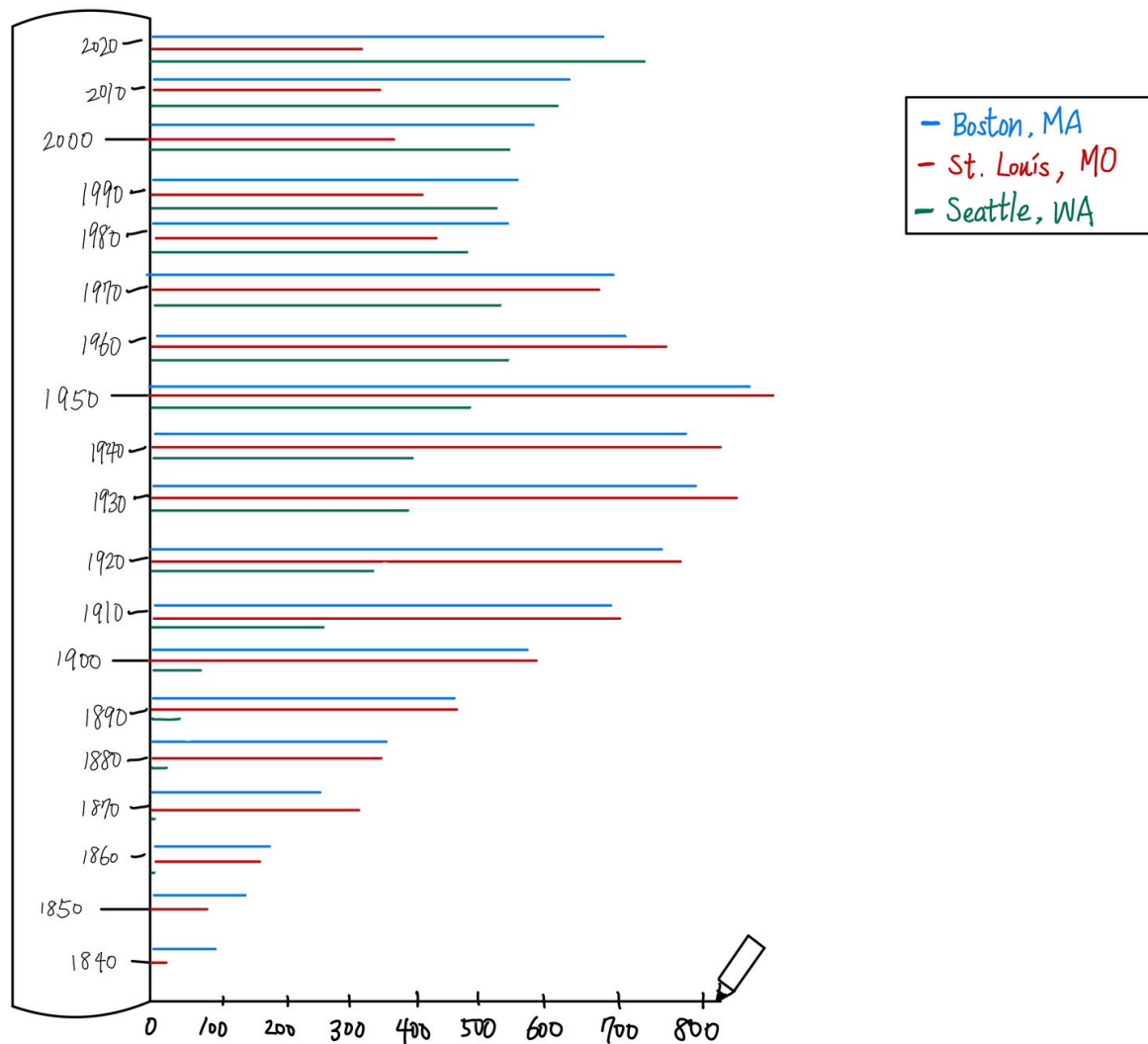
## Context of use

It can let people realize the approximate change of population without observing the complicated number by themselves.

## Key strengths/weaknesses

Strength: For those who want to focus on population changes rather than the total number, this chart effectively presents the information they are looking for. Also, the design of gradient color is also intuitive for readers.

Weakness: The color contrasts of increasing(pink) and decreasing(purple) might be too similar. Maybe choosing two colors with bigger contrast will be better for readers.



# Sketch 2: Design Rationale

## **Brief description**

This visualization is inspired by the shape of a ruler, with each unit on the ruler representing one year. For each year, I use three colored lines to display the populations of three cities.

## **Data representation**

X-axis is the population number, and Y-axis is the year. Blue, red, and green color represents different cities, and the length of the lines shows the population of the city.

## **Context of use**

From this visualization, we can observe the trend of each city. What's more, it gives us a easier way to compare them.

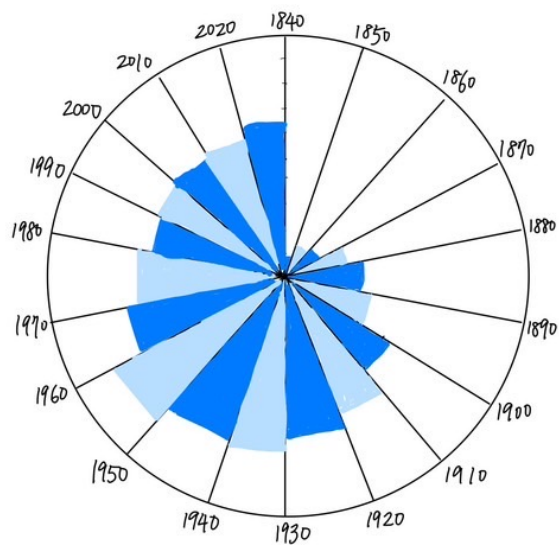
## **Key strengths/weaknesses**

Strength: We can directly compare the population difference in a period of ten years.

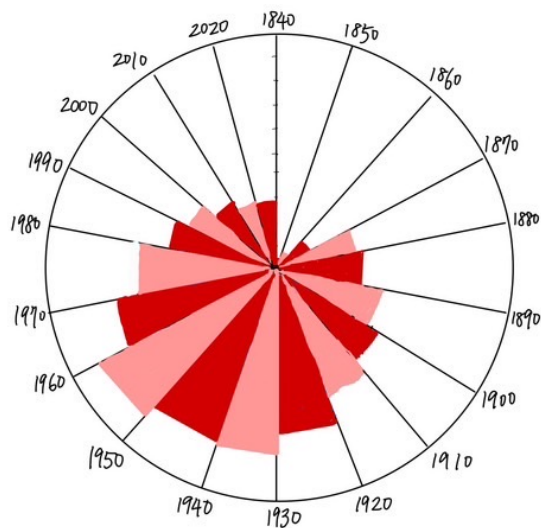
Weakness: The arrangement of putting the three countries together may make it more difficult to understand the individual population trends of each country.



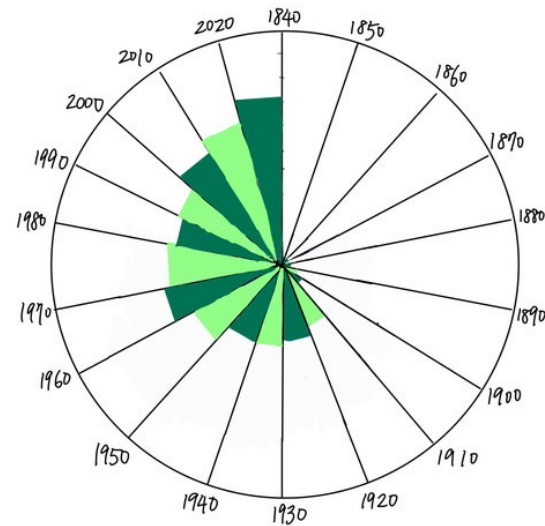
Boston, MA



St. Louis, MO



Seattle, WA



# Sketch 3: Design Rationale

## Brief description

Three transformed format of pie charts shows the population change of three cities.

## Data representation

The size of the triangle inside the pie chart represents the total number of population in every ten years. I utilize colors with interweaving light and dark to show better visibility.

## Context of use

The clock-like representation will make it clearer to shows the trend of the population in each city.

## Key strengths/weaknesses

Strength: The visualization presents the population trends of each city separately, which allows readers to grasp the information at a glance. For example, we can easily observe that Seattle is a city with the latest development because the upper-right portion is blank.

Weakness: It is hard to compare the population change in different cities. Also, due to the circular arrangement, the year 1840 is positioned next to 2020, which may cause confusion.

# Reflection

## **Compare your designs. What are their relative strengths and weaknesses?**

In my opinion, three visualizations have their own strengths. For instance, the first one focus on the change of population , the second one can let us compare the value between three cities, and the last one shows the trend in each city well. They all make use of color contrast to represent the data. However, their weakness are similar, as readers cannot determine the exact total population; they can only roughly understand the changing trends through the charts. Moreover, it is challenging to correlate the data with the years which is divided into very small intervals.

## **What was your favorite design and why?**

My favorite design is the third one because it transform pie chart into more interesting representation. Although this visualization is unconventional for us, its interpretation is intuitive, requiring no explanatory text.

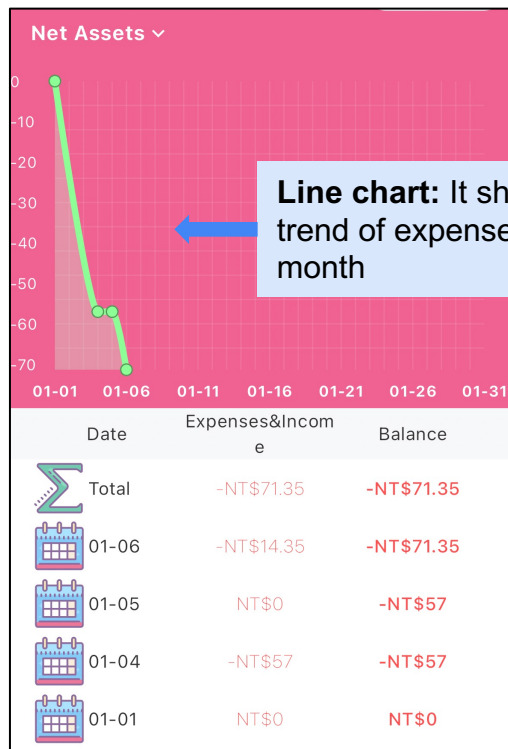
## **What did you learn from this part of the assignment?**

From the assignment, I learn that visualization is such a profound field. It's crucial to strike a balance between visual appeal and ensuring readers can easily grasp the information. I've acquired various skills and techniques to effectively incorporate all key points we aim to convey into visualizations.

# Part 2

Sketching Selected A1 Visualizations

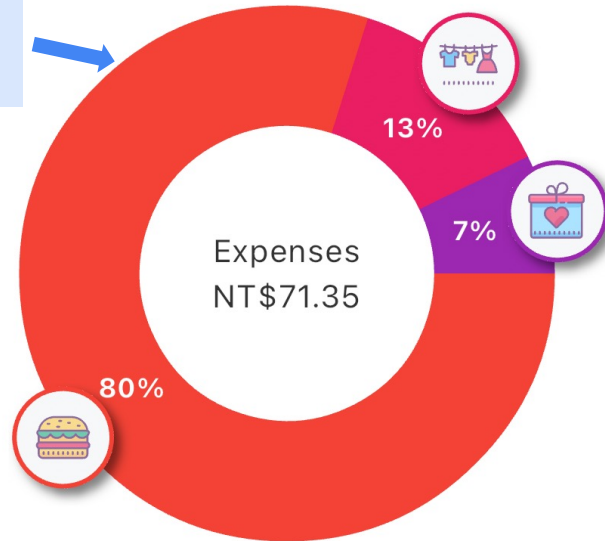
# Visualization 1 Annotated



**Expense list:** expenses every day and the total value

## By Category ▾

**Pie chart:** It shows the percentage of expenses from different categories



Diet

80%

NT\$57



Dress

13%

NT\$9.22



Gift

7%

NT\$5.13

**Detailed list**

# Visualization 1 Critique

## What is the goal of this visualization?

The goal of these visualizations are to help people record daily expense with a more explicit chart. It can help people see the trend of spending money and realize which category they spend the most.

## How is the data represented—its visual encoding, graphical marks, color, etc.?

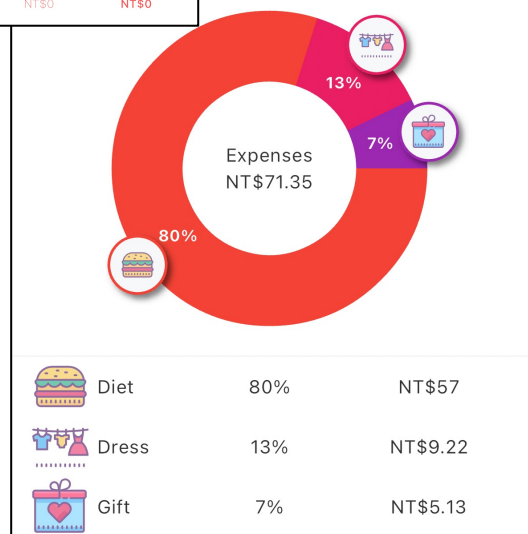
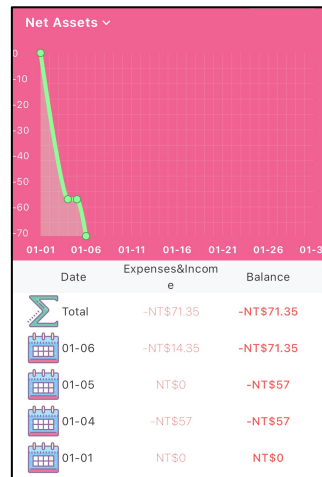
It shows data in two format: pie chart and line chart. It not only display the percentage on the pie chart but also use small schema to represent different categories. As for the line chart, it use green line to indicate the change of expense.

## What are some key strengths of this visualization and why?

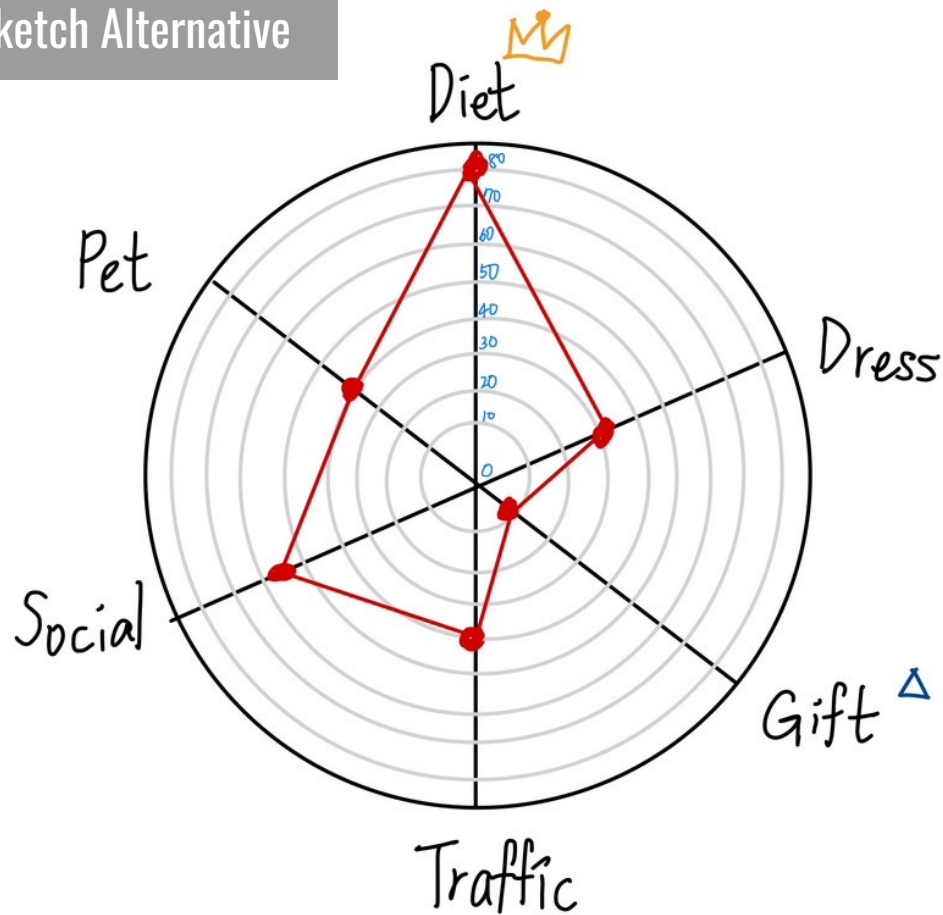
- The color of two figures are both bright and have contrast against background.
- Small schema strengthen the characteristic of this APP, making it cuter and more attractive.

## What are some key weaknesses of this visualization and why?

- The line chart shows the trend of this month only, but I think it will be more effective to show recent 30 days rather than start with the first day of the month.
- Users can only record the expense with categories. If the expense records are based on shop names rather than categories, the pie chart would become very chaotic.



## Visualization 1 Sketch Alternative



👑 : Highest  $\Rightarrow$  Diet

△ : Lowest  $\Rightarrow$  Gift

# Sketch 1: Design Rationale

## Brief description

This is a radar chart, which represents the expense of different categories. Legend shows the highest and lowest cost within a month.

## Data representation

The data of each category is represented as a red point in the radar chart. All the red points are connected to show the difference of them more clearly. In addition, the crown represents the category with the highest expense, while the triangle represents the category with the lowest expense.

## Context of use

By using the radar chart to record the expense within a month, we can conveniently compare data from different categories, making it easier to see the obvious contrast.

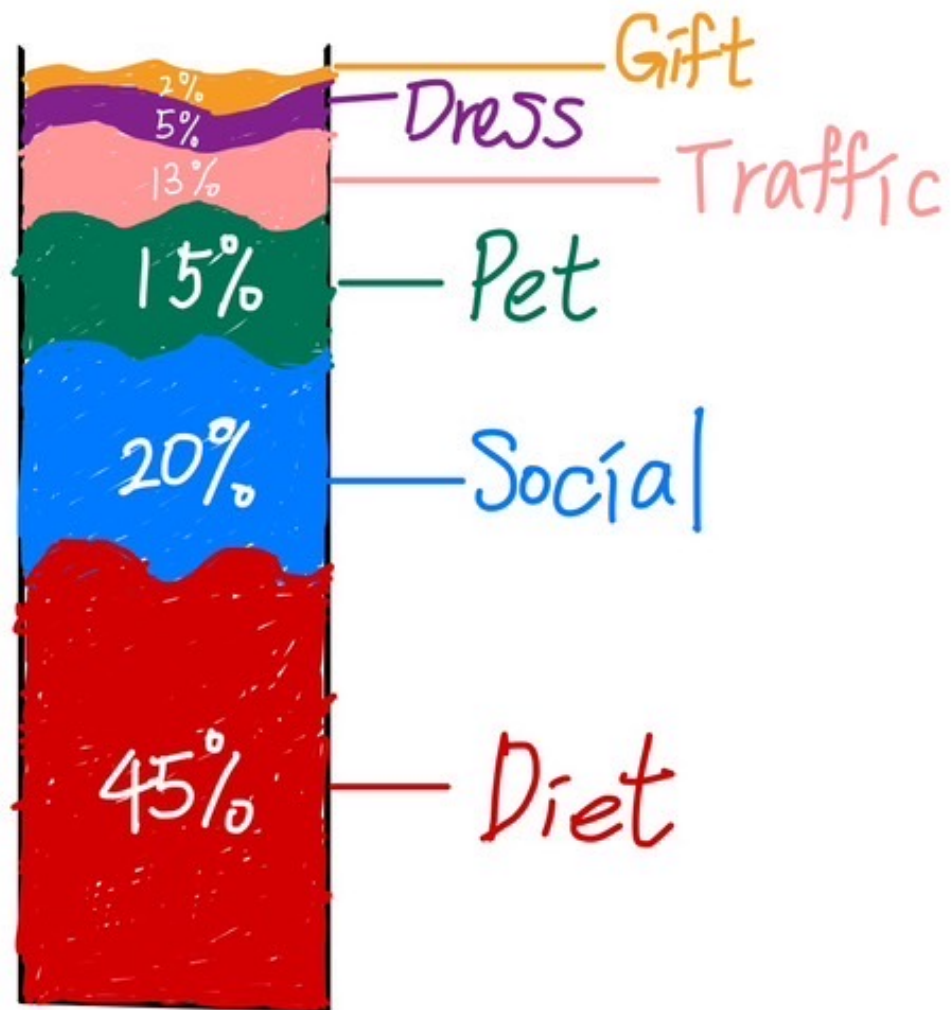
## Key strengths/weaknesses

Strength: Compared to original visualization, radar chart is more understandable to me because it can display the highest and lowest expense by seeing the trend of the red line. That is, we can observe the contrast between different categories in a intuitive way.

Weakness: With radar chart, we cannot understand the detailed expense by percentage. And the representation way of showing detailed value is really inconspicuous, too.



## Visualization 1 Sketch Alternative



# Sketch 2: Design Rationale

## Brief description

This is a creative visualization featuring a cup filled with various colored drinks, each representing distinct categories.

## Data representation

The cup displays one hundred percentages, and the different colors represent different categories of expenses. Additionally, precise percentages for each category are indicated in white text within the cup, offering detailed insights. As for the order of categories, I place the category with the highest proportion at the bottom, and stack them upward in descending order, from largest to smallest.

## Context of use

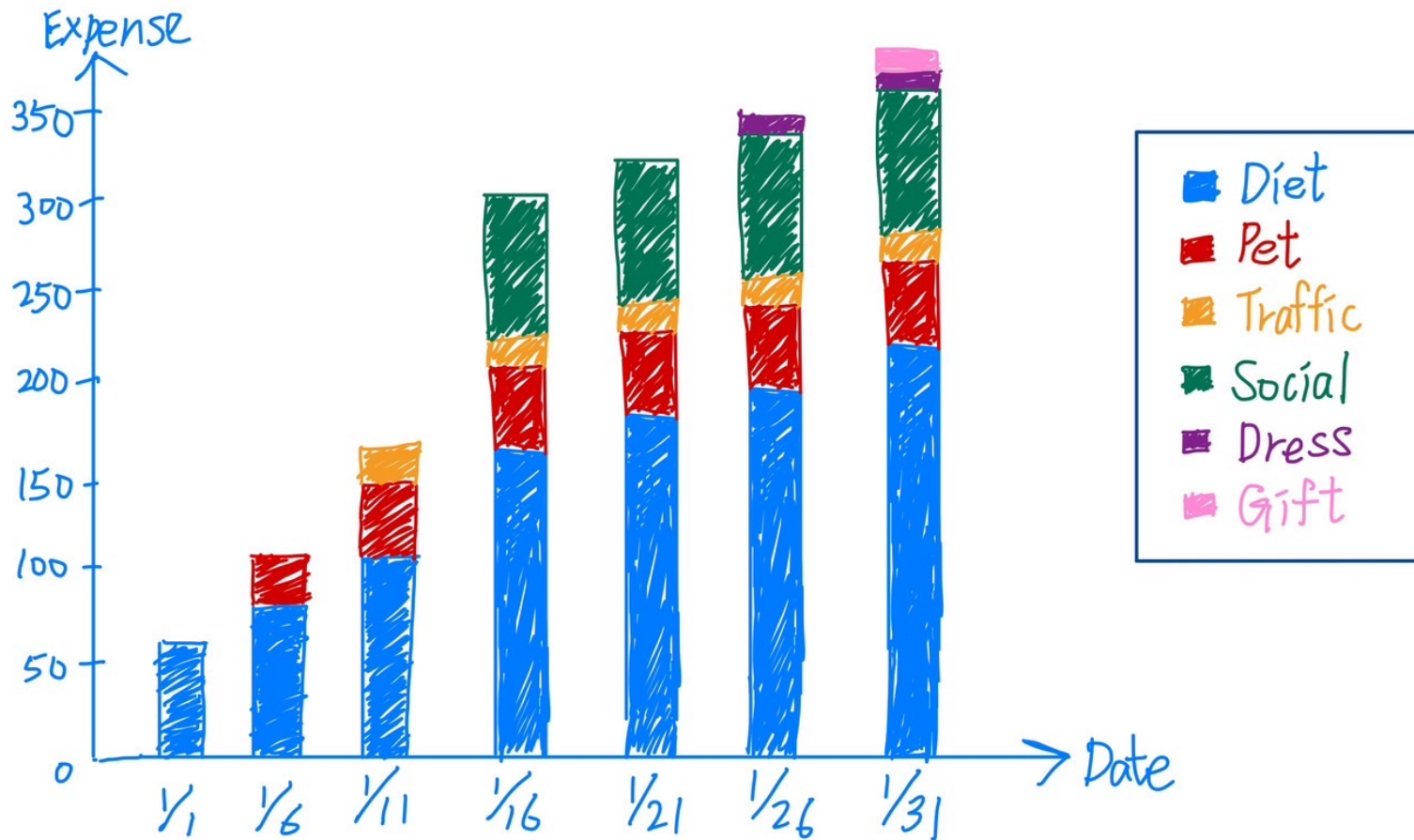
This visualization can let us observe all the categories and their proportion with order in a single graph, rather than comparing different expenses by ourselves in other graph such as bar chart. By seeing this visualization, we can quickly interpret the data with a more convenient way.

## Key strengths/weaknesses

Strength: The visualization is not traditional, but it still very easy to understand. The categories is ordered by the value of percentage, which enable readers to instantly see the relative expenses values of all categories at a glance.

Weakness: For people who need more detailed analysis or want to track the trends over time, this easy visualization cannot satisfy their need. It can only provide a quick way to observe the data distribution.

## Visualization 1 Sketch Alternative



# Sketch 3: Design Rationale

## Brief description

This visualization is a cumulative bar chart, showing the overall expense since the first day to the recorded date. Different color means different categories.

## Data representation

Data is represented as a transformed format of bar chart. The x-axis represents dates, grouped in units of five days, while the y-axis represents expenses. And in each day shown, we can see how much we have spent since the first day of the months, and we can also observe the proportion of different categories by seeing different color. Legend shows all the colors and the categories they correspond to.

## Context of use

It can let people understand the relationship between date and expenses. For example, by observing the figure, we can identify a category with a substantial increase in a specific week, while some categories just increase steadily.

## Key strengths/weaknesses

Strength: Compared to the two visualizations I drew, this figure add the factor of date. It is more useful because we can realize the trend of expense from each category.

Weakness: Although it provides more information in a graph, it doesn't provide a clear conclusion or key message for us. The percentage of each category aren't shown on the visualization, making it hard to analyze the data more deeply.

## Visualization 2 Annotated

Maximum visitors

Real-time number of visitors

即時人流

	現在人數	容留
游泳池	80	200
健身房	23	60

運動場地



羽球 撞球 桌球

場館資訊

- 場館網頁公告
- 收費方式及使用規範
- 每日開館時間 06:00 - 22:00
- (02)2820-2880

**Type of Sports:**  
We can see available type of sport field in a sport center

**Open hours and phone number:**  
necessary information

Price

5F羽球場 01  
北投 \$ 300

7 8 9 10 11 12 13  
14 15 16 17 18 19 20  
21 22 23 24 25 26 27  
28 29  
4 5

**Available reservation time:**  
We can reserve for the field in the following week

2024-01-19

06:00 - 07:00  
07:00 - 08:00  
08:00 - 09:00  
12:00 - 13:00  
15:00 - 16:00

已選擇 1 個時段  
\$ 300

下一步

**Time slot:** After choosing a day, it shows remaining time slot for reservation

# Visualization 2 Critique

## What is the goal of this visualization?

This visualization is intended to provide a way of reservation for people who want to book a sport field. By using this integrated APP, they can search for available field and time slot more easily.

## How is the data represented—its visual encoding, graphical marks, color, etc.?

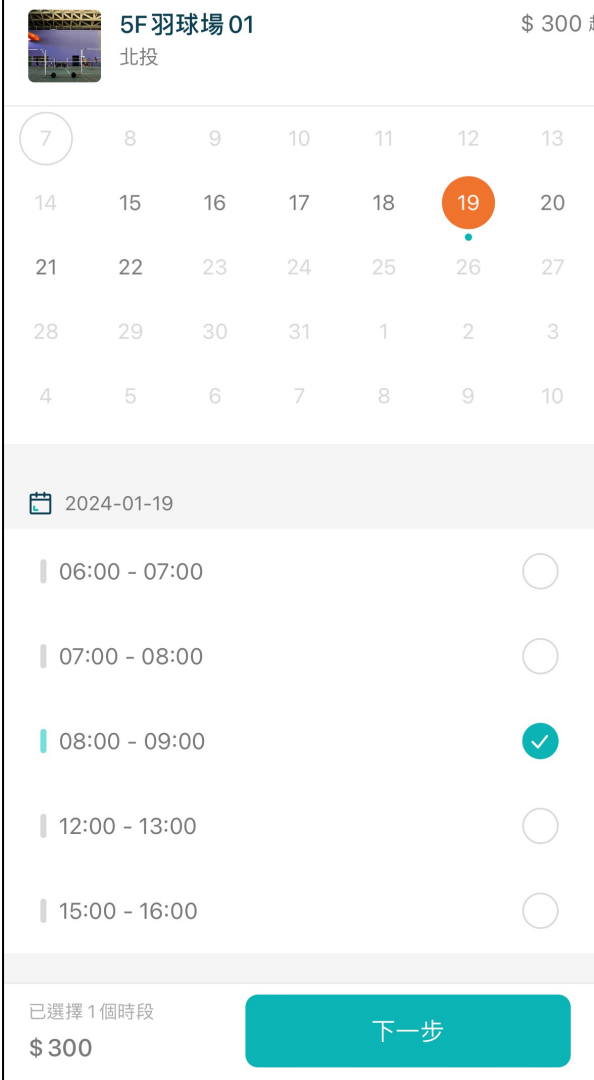
It shows data in a calendar form. Dates with black color mean they are available now, while dates with gray color mean they cannot be booked. The time slot below are all selectable, when selecting, it will shows a green checkmark and its price below.

## What are some key strengths of this visualization and why?

- Its format of calendar can let people schedule their time more efficiently.
- The date, time slot, and price are both shown in the same page. It is very readable.

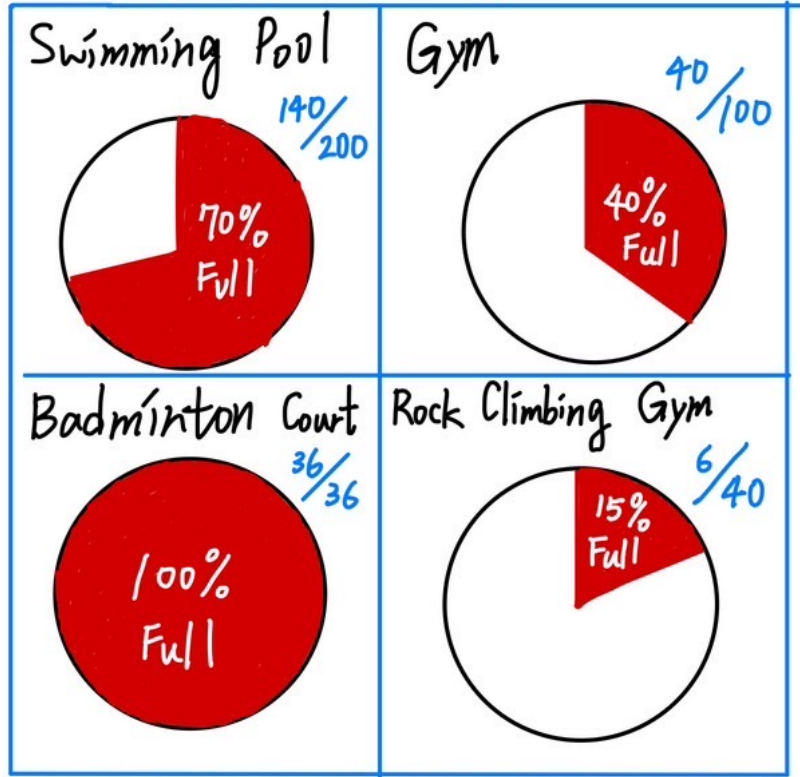
## What are some key weaknesses of this visualization and why?

- The time with black sometimes shows no time slot below. If there is no field left in a day, marking it with gray color will be better.
- We need to click every day to check the suitable time slot. It will be better to create a function to filter the specific time slot in the whole week.



## Visualization 2 Sketch Alternative

### Real-time Crowd Flow



# Sketch 2: Design Rationale

## Brief description

The visualizations are four pie charts, which shows the real-time crowd flow of every field in the sport center.

## Data representation

The real-time number of people is transformed as the format of pie chart, and the red color indicates the percentage of people currently using the venue compared to its maximum capacity. The fraction beside each pie chart shows the precise information, with the numerator indicating the real-time number of visitors and the denominator representing the maximum capacity.

## Context of use

This visualization can help people understand the capacity of every sport field and their crowd flow.

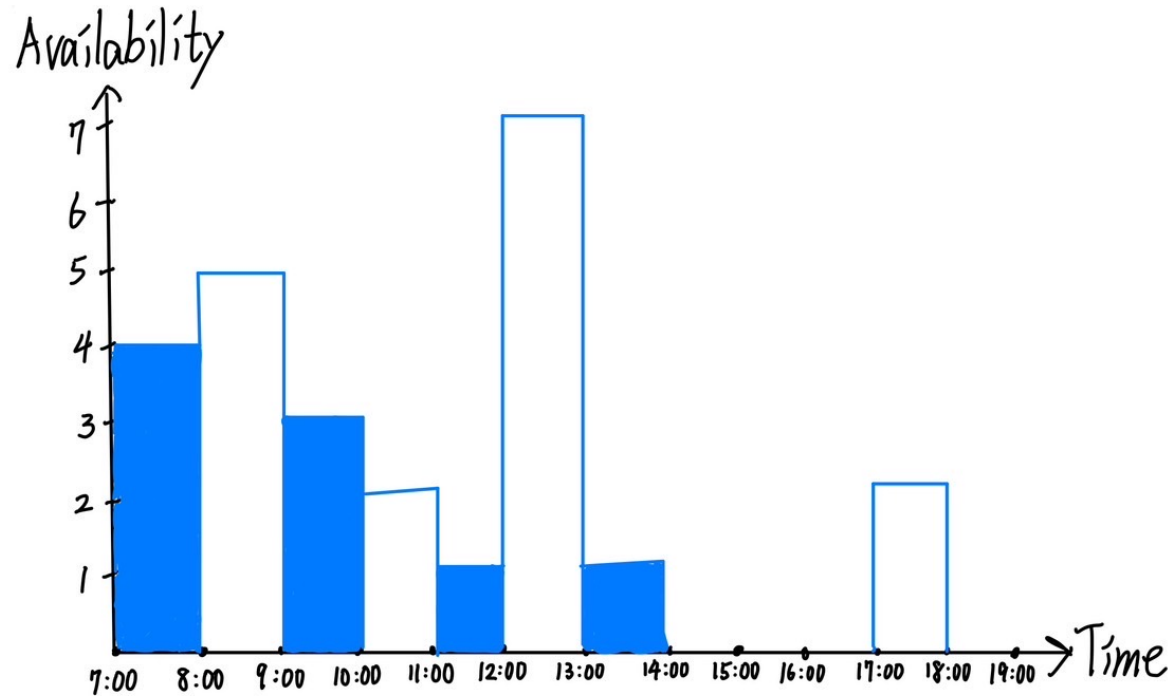
## Key strengths/weaknesses

**Strength:** It shows the number of visitor with percentage, which can enhance the readability. Sometimes we don't need to know the precise number of people. Instead, the pie chart can help people know if the field is crowded or not currently.

**Weakness:** For people who don't frequently use this website, this presentation format may be unfamiliar and potentially confusing. Some people may not understand the meaning of red and white color in the pie chart at a glance.



## Visualization 2 Sketch Alternative



# Sketch 2: Design Rationale

## Brief description

This visualization illustrates the availability of courts during each time slot throughout the day. By viewing this, users can quickly identify which time slots are still open.

## Data representation

Data is represented as a format of histogram because it is more suitable for continuous data. The x-axis represents Time, while the y-axis represents Available number of court. I use blue and white colors to create a contrast between different time slots, enhancing clarity compared to using the same color.

## Context of use

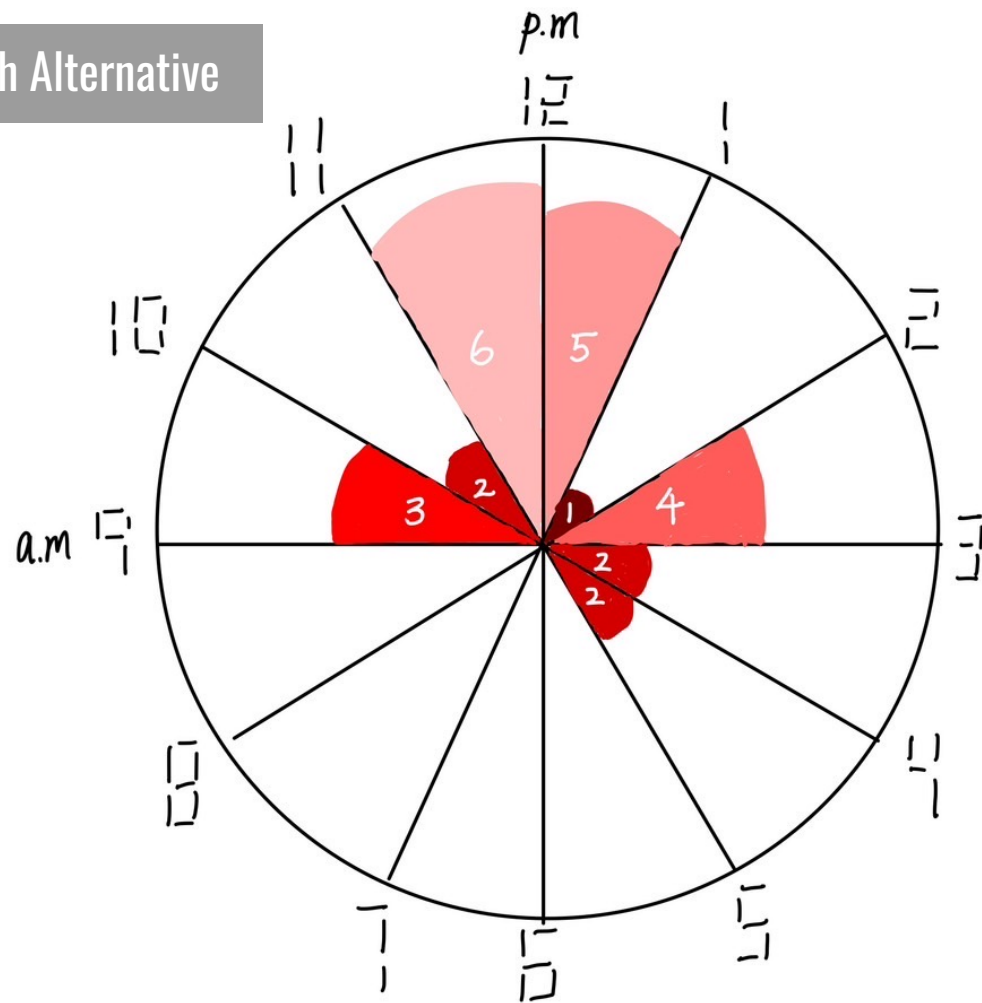
It visualize the list of available time slot for users. It can also help people know the most and least popular time of the court.

## Key strengths/weaknesses

Strength: For the original APP, after we click on a specific day, the available time slot will be shown as a list. But we don't know how many court is left. By using this visualization, it is more useful for people who need to reserve for more than a single court.

Weakness: The use of white and blue colors is intended to provide a clear contrast between different time slots. However, this color scheme might lead to confusion for users who are not familiar with it. Also, it could be challenging to accurately interpret the numbers for data that are far from the y-axis.

## Visualization 2 Sketch Alternative



# Sketch 3: Design Rationale

## Brief description

This visualization is inspired by the concept of a clock. By coloring different time slot, it represents the available court during each time.

## Data representation

The available court during each time is represented as a circular sector in this clock. Darker-colored sectors represent fewer remaining courts available for that time slot, while lighter-colored sectors indicate a greater number of available courts. Also, the number on the sector means the accurate number of availability.

## Context of use

The visualization of clock is the most intuitive way to represent time because people with different age can understand it easily.

## Key strengths/weaknesses

Strength: By observing the clock-like representation, people can gain a more direct understanding of the remaining available reservation times. Additionally, the color contrast is also helpful for users to obtain the information.

Weakness: The representation of a.m. and p.m of the time may lead to confusion. This visualization may not be suitable for sport centers which opens more than 12 hours a day.