SI 649 Interactive Visualization Blog Entry

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Tableau Public Link:

[redacted]

Notes: Switch to full screen mode for better display :)

Learning Objectives

1. Summarize the general trend of country's participation in Winter Olympics over the years.
2. Remember which countries performed well in the Winter Olympics.
3. Compare countries that have unique athlete distributions.
4. Recall what the representative Winter Olympic sport is for each country.

Design Process

Idea

For the interactive version, I started with the static version and tried to focus more on presenting information related to the time dimension. Besides, I tried to make the visualization system more structured so that users can start with broad things and get more focused as they proceed to later views.

Data

My main data source is a dataset about "Olympic Results Over Time compared to Human Development Index" from Kaggle, which contains information about population, GDP per capita and also detailed information on the nationality, sports, and type of medals of each medal-winning athlete in each Winter Olympics from 1924 to 2014.

I chose to develop this interactive visualization in Tableau. No further data processing was needed after the static version. I used the dataset which connects the country-oriented information with the athlete-oriented information using country code.

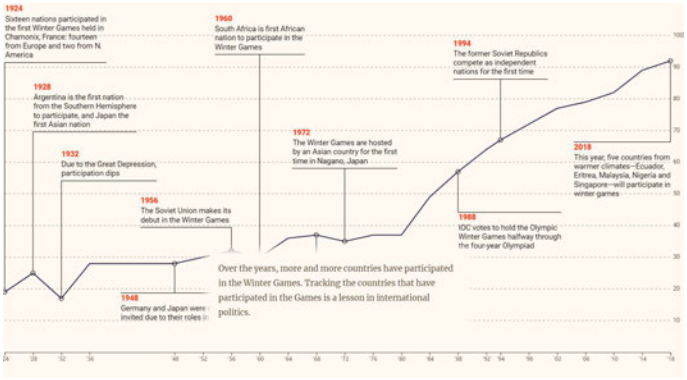
Inspiration

In terms of view design, the way I look for inspiration is to browse Tableau, Altair and D3 gallery. On the topic of the Winter Olympics, I found some blog posts and some interactive visualization works on the Internet. Among them, the visualization of the number of medals in each country in https://www.dremio.com/the-winter-olympics/ gave me a lot of inspiration.

Most of the ideas came from my static version but I've definitely made some adjustment. There were three major sources of inspiration for me:

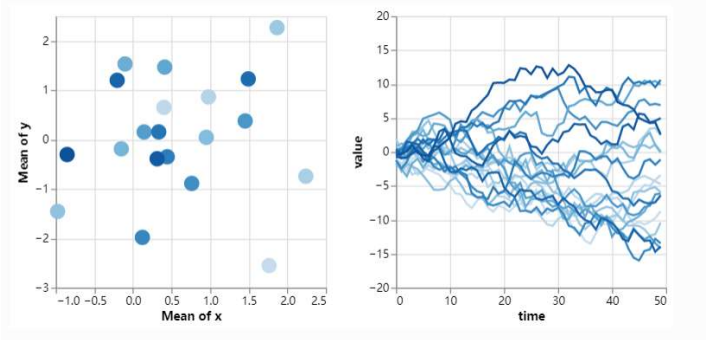
1. https://www.dremio.com/the-winter-olympics/

The thing that inspired me the most was how it started the topic. I think what I could improve in this interactive version was to have an introduction to the topic at the very beginning. I liked the idea of using a line chart to show the overall trend to open up the conversation. This is a snapshot:



2. Altair Gallery

I went through Altair Gallery and I found one of the interactive visualizations inspiring. It combines a scatterplot with multi-line chart to show detail information. I thought it could be helpful when embedding time related detail to the system.



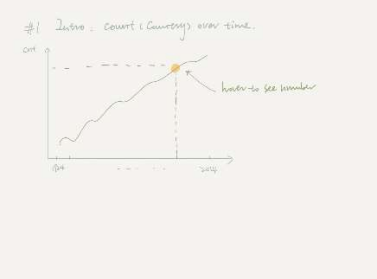
3. Random tryouts from the static version

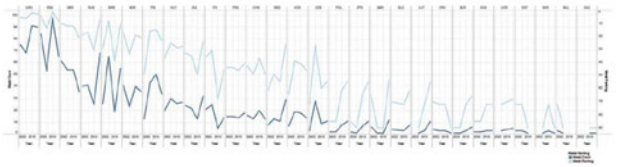
I've tried several things in the static version but didn't include them in the final design in order to avoid excessive use of space. One of those ideas was the bubble chart. I thought it was not ideal back then because of its limited ability to present high density information. But for the interactive version, I think it might be a good choice to display detail information about athletes.

Design

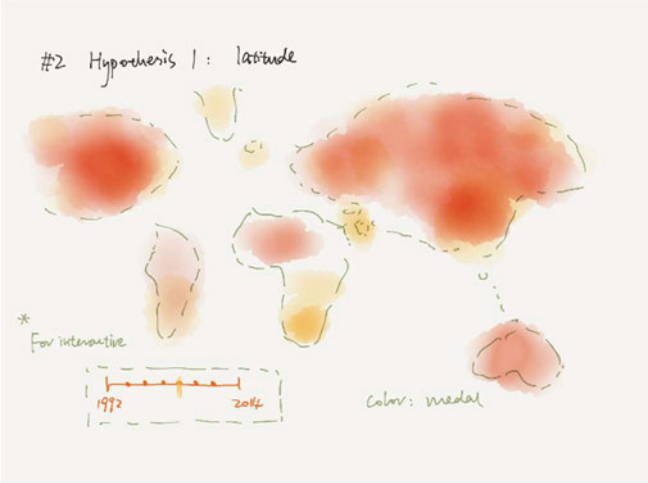
Developing on top of the static version, I did some additional sketches to brainstorming for ideas.

Firstly, I want to have a graph to illustrate the participation trend for Winter Olympics to give viewers an overview of the topic. Inspired from the blog mentioned above, I sketched a simple line chart to introduce the topic. Compared with the line chart in my static version, it contains less information but provides a rather easy starting point. As for interactions, users can hover to see detail number and click to filter the data by year and interact with other graphs.

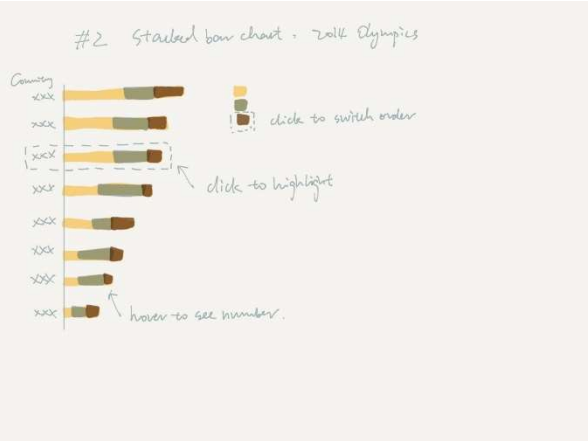




For second view, I reused my map visualization from the static version because I thought maps are the most intuitive way to show the geographic location of a country. This graphic element will also help viewers remember the location-related information.

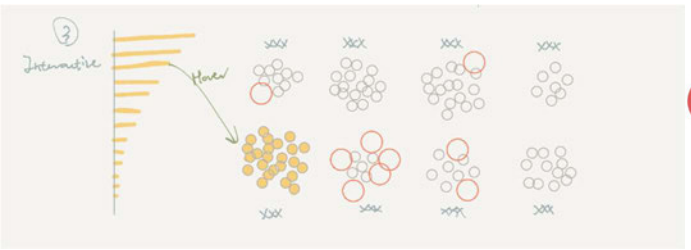


I also wanted to include a view to show medal ranking since medal count is a crucial component when evaluating a country's performance in a Winter Olympic. I chose to present this information using a stacked bar chart. I want it to used as some kind of a filter to allow users to focus on one country.

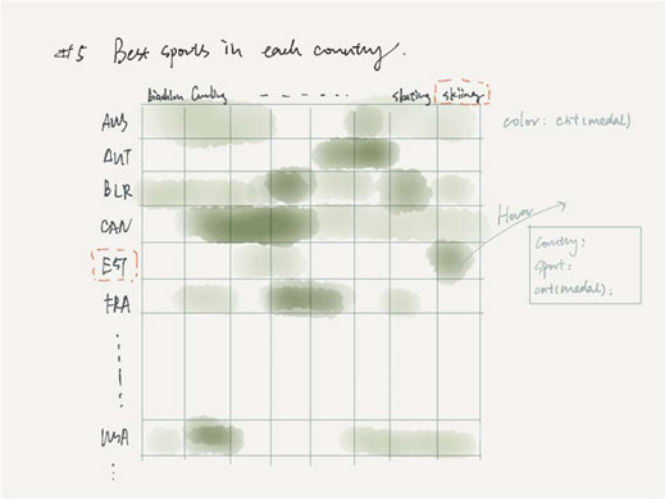


Besides providing overviews from the participation, geographic location and medal perspective, I also want this visualization system to support users' need of exploring a specific country's performance in detail. So I decided to include two perspectives: athletes and sports.

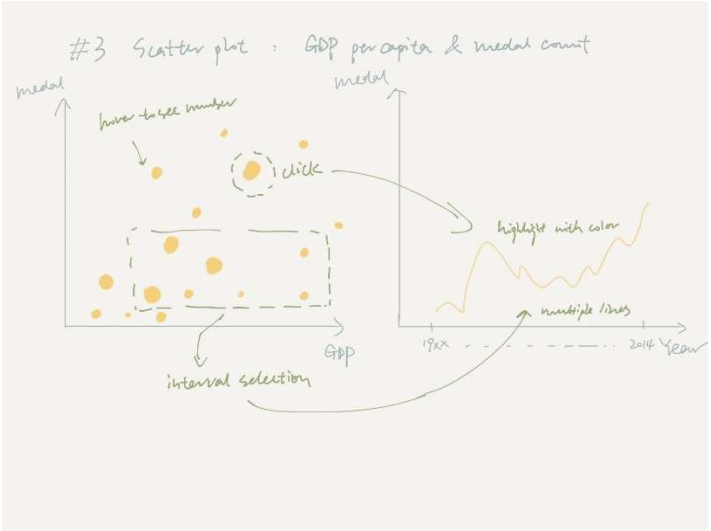
For the athlete view, I combined my attempt from the static version with bubble chart. I tried the multi-bubble chart layout first but I found out that plotting multiple bubble charts was hard in Tableau especially when the year changes, I need to decide which country to show in this layout. As a result, in order to make full use of the interactive feature, I chose to only display one bubble chart which shows the athlete distribution of the country that users selected from other graphs.



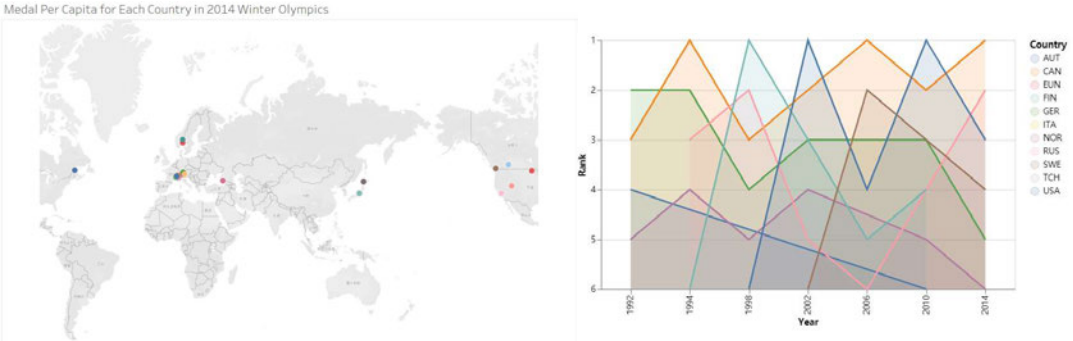
For the sports view, I reused a view from my static version and tried to use interactions to make users more concentrated when looking at it.



Originally, I wanted to include a view about GDP and medal count. Inspired by the "Selection Detail Example" from Altair Gallery, I wanted to be a combination of scatterplot and multi-line chart. However, I realized that since I want to include data for all time, it's unreasonable to relate other year's medal count with GDP data from 2014. So finally, instead of combining the scatterplot with line chart, I chose to combine the sports view with the line chart and eliminate GDP information in this interactive version.

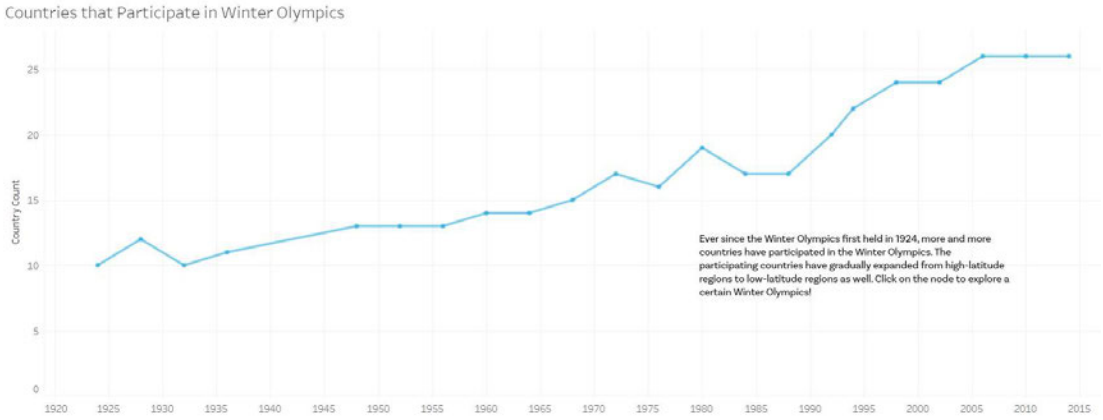


I also tried some alternative sketches around cities that hold Winter Olympics and ranking information:



Design Rationale

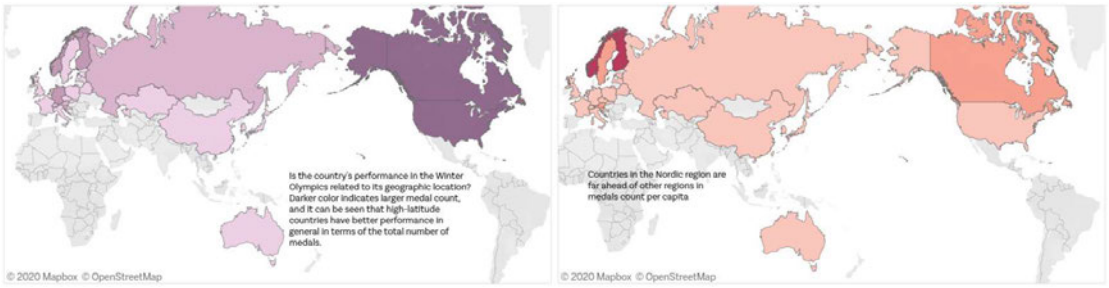
#1 Number of countries participated in Winter Olympics over time



This is a simple line chart that shows the participation trend of Winter Olympics since 1924. The pattern of the trend is easy to understand, which makes it a perfect fit for an introduction piece to get viewers to be more familiar with the topic. I highlighted the nodes using dots to make them more obvious considering that Winter Olympics were not always held at a 4-year interval.

As for interactions, users can hover to see detail number of participants of that specific year. In addition, by clicking on a node, it will serve as a filter for other views and users can narrow down to a specific year and start further exploration.

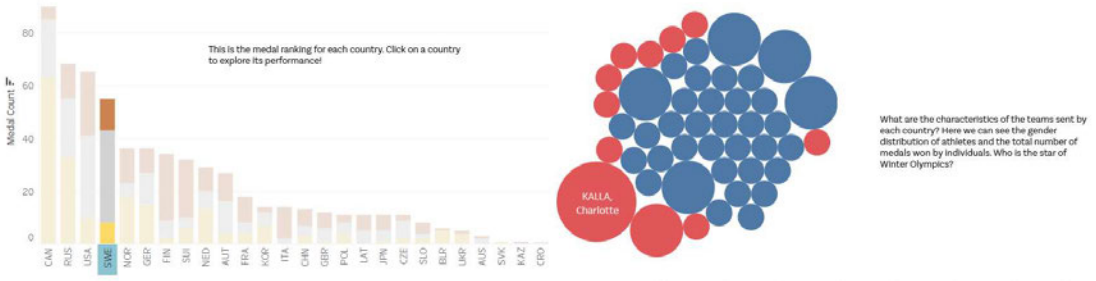
#2 The relationship between country's medal count and latitude in Winter Olympics



The figure on the left shows the relationship between the total number of medals and latitude. Using hue to encode the total number of medals allows readers to clearly feel the level of differences among countries. The darker colors in high latitudes are also easy to capture by readers. In the figure on the right, I chose to use color to encode the medal count per capita. Readers can easily find that the influence of latitude in the picture above has disappeared, and several countries in the Nordic region have extraordinary performance.

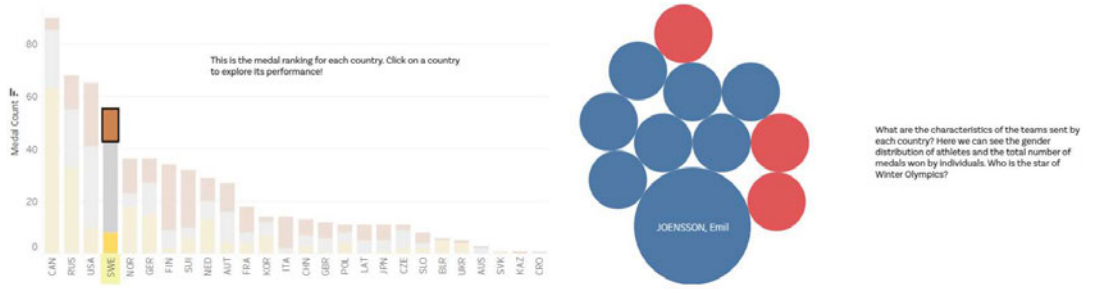
For interactions, the data will be affected by the viewer's year selection at View #1. So viewers can compare the difference in medal distribution between each Winter Olympics by clicking on different year in View #1. Secondly, by clicking on a specific country, the corresponding place will be highlighted in both maps and it also serves as a filter for graphs down below. Users can narrow down to a specific country and start further exploration.

#3 Country's medal count ranking in Winter Olympics + Athlete distribution

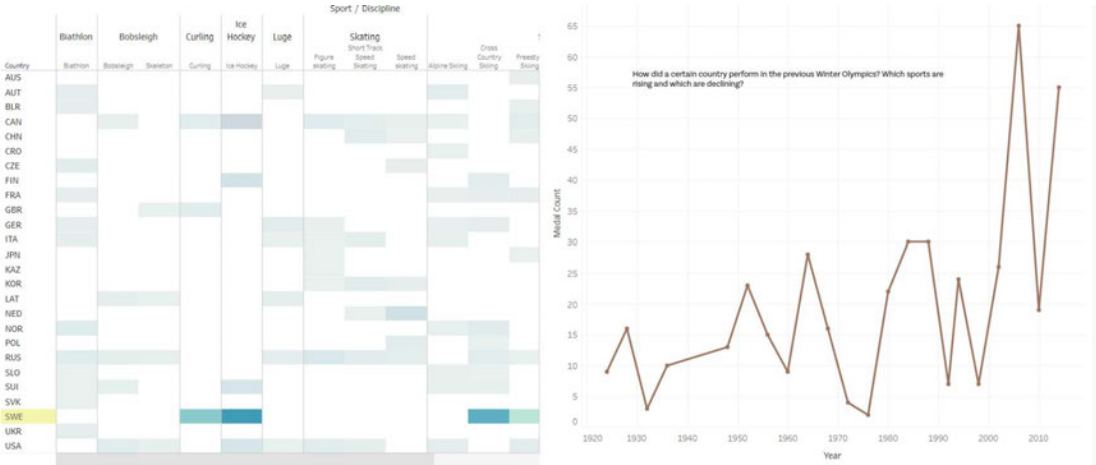


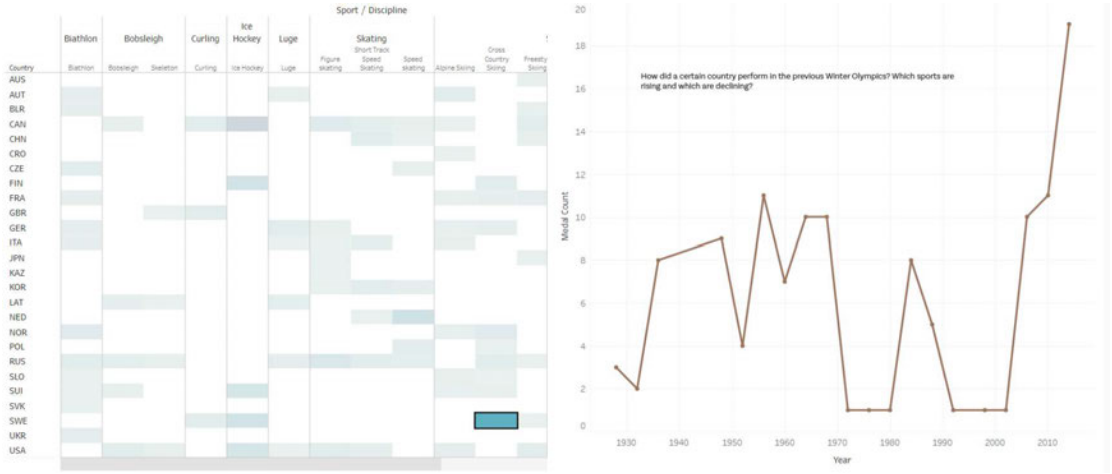
This is a combination of a stacked bar chart on medal and a chart that focus more on athletes. In the stacked bar chart, I used color to encode gold, silver and bronze medal which is in line with viewer's perception. For the bubble chart, each circle represents a single athlete and size is used to encode medal count won by that individual. I encoded the size using quadratic so that multi-medal winners can be highlighted since that's the part I want the viewer to put more focus on. I also use blue and red to encode gender, which provides an additional dimension in athlete distribution.

For interactions, users can highlight a country by clicking the country name in the stacked bar chart. Accordingly, the bubble chart will display athletes of that country who attended that Winter Olympics. In addition, clicking on a specific segment on the bar chart will also filter the bubble chart. By switching between multiple countries, users can easily compare the athlete distribution pattern of each country observing the bubble chart. It is also in line with the learning objective 3.



#4 Country's performance on each sport in Winter Olympics + Country's performance trend





This picture shows the sports that each country is better at. Due to the large amount of information, using box as a mark is a way to maximize data ink. This is also for the convenience of users corresponding to the horizontal and vertical coordinates for retrieval.

The line chart provides a time series in terms of country. It clearly shows the trend of a country's performance so that viewers will form a general impression on the country's ability from this chart. Furthermore, if viewers are interested in a specific sport, the trend of that sport for that country will be generated when clicking on the box on the left side view. The sport performance trend is helpful to capture not only a "signature sport" of the country, but also sports that are rising or declining.

Evaluation Methods

According to my learning objectives, I first need to validate whether the viewers can achieve those objectives once they finish viewing the visualizations. One way to do that is to ask domain related questions after the testing. For instance:

1. Use one word to describe the participation trend of the Winter Olympics.
2. Name three countries that are good at Winter Olympics.
3. (Show 2 images) Describe the difference between these two countries' athlete.
4. What sports does Norway excel at?

Another potential threat is ineffective encoding idiom. Besides justifying the design choices beforehand, it's also necessary to do usability tests on users to find out whether the encoding is the most effective. Before that, a metric to measure effectiveness is needed. In this case, it can be time spent on finding out a country's dominant sports, etc.