Group 1 Information Visualization Report

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# INTRODUCTION

How do the countries that participated in the Olympic Games stand against each other concerning the medals they achieved through the years? Do countries with a greater population also get more medals? How do these standings evolve over time and how do they accumulate in a certain amount of years?

We knew there was data to answer how many medals a country scored for a certain sport in a certain year, and we did find a solution that did that, on the Internet. But we wanted to go a bit further and be able to make comparisons, not just for one sport, not just for one year at a time, and not just counting one or all kinds of medals. So we went further and now we could know, as an example, if Russia had more or less gold and silver medals than the Soviet Union.

We also thought of seeing how many medals each country “owned”. That is, for example, how many medals Germany had scored, plus medals Germans playing for other teams scored, minus the ones foreigners playing for Germany scored. Unfortunately, we couldn’t find the nationalities of a big amount of athletes, so we decided to leave this feature alone.

The first tasks we proposed to support were, then:

* Browse – display the countries with the most gold medalists in total in a given year.
* Identify – show the country with the most medalists in a sport of all time.
* Locate – show the position of a country in the overall standings.
* Explore – using the coefficient medals/population (derivative variable), display the countries with the highest coefficient.
* Compare – show the medals each country won.

Our initial thought of showing statistics for “all time” was also changed to a “span of years”, where we chose the minimum and maximum years, making our visualization more flexible.

# RELATED WORK

When we found our main dataset containing the medal standings, we had only a vague idea of what to do: display bubbles for each country over a few rows, sorted by number of medals.

Then we came across a solution somewhat similar to what we ended up with:

<http://www.nytimes.com/interactive/2008/08/04/sports/olympics/20080804_MEDALCOUNT_MAP.html?_r=0>

We liked most of what we saw, but as we said before, we wanted to go that step further.

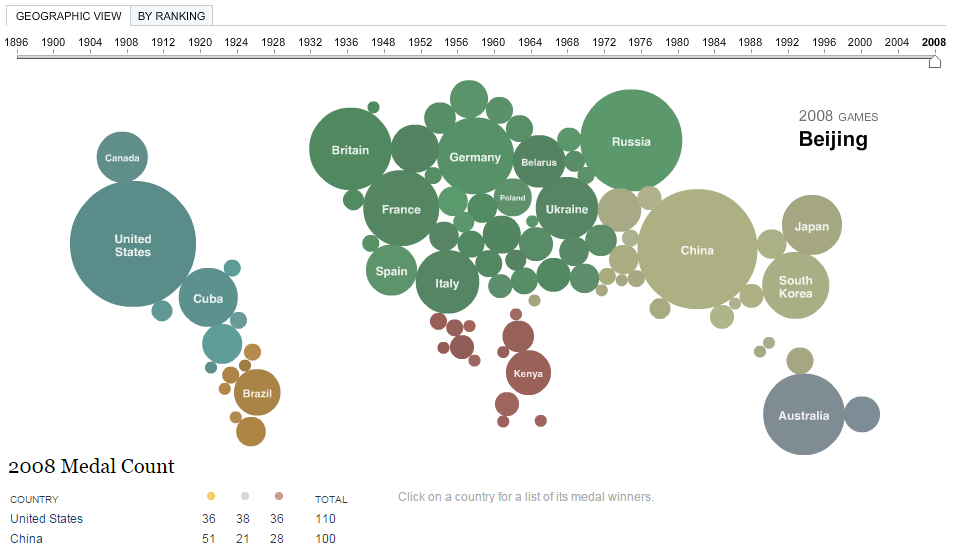


Figure - The pretty but lackluster solution we found

The main problems with this solution we found were a few and we wanted to correct most of them in our solution:

* It’s difficult to find a country, even if we know its location in the world, since the bubbles are all jumbled together and are not related to a world map.
* It settled for only the amount of medals in a year and didn’t allow for side-by-side comparisons.

We drew some inspiration from this solution’s bubbles, and the rest of our solution came from our own thoughts.

# The DATA

Over a few days of research on the Internet, we found some documents and datasets that gave us the theme for our visualization and aid its development. The main dataset we found was on a The Guardian article:

<http://www.theguardian.com/sport/datablog/2012/jun/25/olympic-medal-winner-list-data#data>

At the bottom of the article, we found the data itself:

<https://docs.google.com/spreadsheets/d/1zeeZQzFoHE2j_ZrqDkVJK9eF7OH1yvg75c8S-aBcxaU/edit>

This was the basis for most of our decisions in the project. It had more information than we needed. What we ended up using of it were the All Medalists sheet (containing information for each medal achieved), and the IOC Country Codes sheet (containing ISO codes and names for each country.

For the bubble chart we intended to draw over a world map, we needed another dataset with the coordinates for each country. For this, we opted to use this dataset provided by Google:

<https://developers.google.com/public-data/docs/canonical/countries_csv>

Since we wanted to check if a country’s population had some relation with how many medals that country scored (a tendency), we looked for a dataset with population data for countries over the years. We found a dataset with what we wanted:

<http://data.worldbank.org/indicator/SP.POP.TOTL?page=6>.

It only provided data from 1960 until 2014, but we found those 13 editions in between to still give us a good idea of the tendency we wished to verify.

During the early development of the project we made several changes to the data we had and needed. Since we got our final dataset ready rather early, we could focus on the development of the visualization during the rest of our time.

## Setting up and cleaning our data

From the All Medalists sheet, we managed to extract several pieces of data, grouped by arrangements of year, kind of medal, sport and country, using Pentaho. Some of those pieces of data (that we showed in the 2nd Checkpoint) were created as an experiment but never used because the arrangement and grouping of the attributes didn’t suit our needs. We realized this only after the 2nd Checkpoint, which fortunately wasn’t too late. Also shown in that Checkpoint were the only two pieces of data we used from then, which had the amount of each medal, in each sport that each country had in each year, and summed by country and year. Other attributes such as the gender of the medalist were filtered out for being irrelevant.

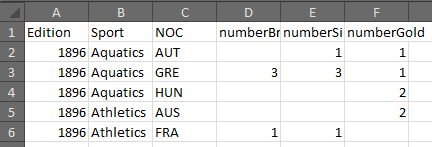


Figure - Our main dataset in its early stages

Something else we had to do was tidy up the Country Codes table. Some of the country codes didn’t match perfectly with the coordinates and population data sets’ entries. We checked which codes were missing on those tables using Pentaho and we made matches.

We also faced another problem which was having countries that no longer existed having no coordinates assigned. We added extra entries on the Country Codes and Coordinates tables, so older countries could be displayed on the map, next to their more recent counterparts. An example of this is Russia, which has five bubbles over it on the bubble map: modern Russia, the Soviet Union, the Russian Empire and two agglomerate teams.



Figure - All the teams related to Russia

Then, through some data joins and confusing normalizations and denormalizations made on Pentaho, we ended up with two almost final datasets. One containing the Olympic medals counts by country, year, sport, joined with the coordinates of that country. The second containing the population number and the total amount of medals by country and year.

Finally, we did simple mathematical operations on those datasets using Excel to obtain additional medal counts on one table and the coefficient on the other table.

This concludes all the work we had to do to have our final datasets.

As we will mention in the fifth section of this report, we ended up not having to worry about scalability issues, even if our datasets were really big, because runtime processing of the data was done much faster than we ever imagined.

# Implementation details

The implementation of the most complicated aspects of the visualization weren’t in fact ridiculously difficult.

The first challenge was choosing the scales for the widths of the bars, radii of the bubbles and coordinates of the lines. We had to choose values that would display the number of medals and coefficient clearly but without great disparity between smaller and larger values. After that, we had to choose the best tick values for the line graph’s Y axis.

The second challenge was being able to sum the medals of all sports for a country in a certain year, and also adding all the medals of the same sport over the years. For both we had to use a few iterative cycles nested by one another and sum all the medals.

The third challenge was making the connection between idioms. The HTML and SVG elements we used had some attributes (their “id” containing the country code) that made matching bubbles and bars easy. The hard part was coding the logic to highlight the marks for a chosen country and stop highlighting the previously chosen country’s marks. For that we had to save the name of the previous country.

The fourth challenge was implementing the range sliders for the timeline and the animation that progresses through the years. For the range timeline, we used a J-Query solution we found online and modified for our fitting. Then we had to figure out a cycle that would increase the years and update the visualization and the sliders.

The fifth challenge was making the tooltips over the bubbles and bars. We initially used a graphical element that would pop up over a mark after one second, but then opted for a simple solution we found online that popped up immediately after hovering over the mark.

The sixth challenge was making the drawing of the map more efficient. Initially we had it being drawn every time we changed the bubbles, which was the most straining thing in our visualization. We had to find a way around D3’s logic to allow a one-time drawing of the map bug free.

What did not end up being a challenge was optimization. We expected the sum of medals over the years and sports to be a very slow process. We’d have to do it every time we selected a range of years or to show stats for all sports. But that sum process was in fact rather quick under any circumstances, and did not spoil the experience. Thus, no optimization was needed on that.

In the end, most of the problems we had arose from not knowing the JavaScript language’s quirks well enough, initially. We made all the idioms ourselves without ever using D3’s examples page.

# conclusion & future work

Having finished our visualization with all that we had planned, and even during the development, we learned a few things, some related to the data we displayed, some unrelated to that, as well as. Some extra features beyond the tasks we first committed to answer to were also added to enrich our visualization, and those taught us a few more things.

## Things we learned

We didn’t know there hadn’t been any games during the World Wars. We had to display an image instead of data, when we found out there were no bubbles or bars during those years.

We learned that computers are really fast. We had a few thousands of entries to process during runtime, and our code just skimmed through them when the time came to pump out graphical elements.

We learned that the Soviet Union achieved three times as many medals as modern Russia has, in the span of only around twice the editions of the Olympics.

We found out about obscure games such as Jeu de Paume and Basque Pelota where only a couple countries got medals. Jeu de Paume is a French game but none of the medalists were from a French team.

## Things to improve on

If we were to start over, we would have skipped the useless data processing experiments we did and gone straight to the data that mattered. But experimenting was probably a useful step to help us figure out how each arrangement of data is best for what we want to draw.

Furthermore, we would have organized our code better from the beginning, to facilitate the increments we made throughout the development. For example, the tooltips weren’t something we had originally planned and they required some dark magic using SVG, HTML and JavaScript in ways they should probably not be mixed. The animation through the years also required some structure changes in the code, and we still had to correct some small bugs.

If we had more resources to work on our visualization, we’d like to first perform a small style overhaul to the interface and general look of our solution. We would also allow for a choice of an arbitrary amount of sports, instead of forcing the user between choosing either one or all of them. We would also attempt to merge the two tabs Standings and Standings Comparison into one, after we figured out how to organize the views on the page.

We’ll finish off by saying this was enriching project that went as we planned, in some aspects better than we expected, that we would like to do some further improvements on, and that taught us skills in building visualizations as well as facts about the Olympic Games.



Figure 4. Sample of a wide figure. Be sure to place at the top or bottom of the page. Ensure that important information is legible in both black-and-white and color printing. Image: CC-BY-ND ayman on Flickr.

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