**Olympics History:**

**A Data Visualization Application**



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**Date of Submission: May 22, 2015**

**Table of Contents**

[1. Summary 2](#_Toc418996917)

[2. Application Overview 2](#_Toc418996918)

[3. Application Users 2](#_Toc418996919)

[4. Application Presentation 2](#_Toc418996920)

[5. Application Components 3](#_Toc418996921)

[5.1. Website Template 3](#_Toc418996922)

[5.2. Tableau 4](#_Toc418996923)

[5.2.1. Multiple Visualization Types 5](#_Toc418996924)

[5.2.2. Data Spotlighting 5](#_Toc418996925)

[5.2.3. Data Tips 6](#_Toc418996926)

[5.2.4. Multi-Y Graphs 7](#_Toc418996927)

[5.2.5. Sortable Table 8](#_Toc418996928)

[5.3. GitHub - 9](#_Toc418996929)

[6. Data Sources 9](#_Toc418996930)

[7. Webpage Text 11](#_Toc418996931)

[8. Data Visualizations 11](#_Toc418996932)

[8.1. Effect of Geopolitics on Olympic Medal Wins – Charting the Rise and Fall of Superpowers 11](#_Toc418996933)

[8.2. Dollars for Medals – Relation between a Nation’s GDP and the Number of Medals Won at the London 2012 Olympics 12](#_Toc418996934)

[8.3. Quantifying the Most and Least Athletic Countries – Country Population Per Medal at the London 2012 Olympic Games 12](#_Toc418996935)

[8.4. Growth in the Number of Olympic Events 13](#_Toc418996936)

[8.5. Summer Olympic Games Host Cities 13](#_Toc418996937)

[8.6. Athletes Attending the 2012 London Olympics by Country 13](#_Toc418996938)

[8.7. Total Summer Olympic Medals Won 13](#_Toc418996939)

[8.8. United States Medal Wins – A Home Advantage 13](#_Toc418996940)

[8.9. If Michael Phelps were a Country 13](#_Toc418996941)

[List of Webpage Text References 14](#_Toc418996942)

# Summary

On May 12, 2014, Team Thundercats presented our final project for CS235. Our web application uses varying data visualization tools to provide insight into the history of the summer Olympics.

This document provides a brief description of our application including its key features, a source code overview, our presentation methodology as well as a discussion and comparison of five design patterns that were shared between our mobile and web applications.

# Application Overview[[1]](#footnote-1)

It is common for a person to have multiple daily calendars stored on different, disconnected platforms. Managing and visualizing these disparate calendars can be cumbersome and difficult. Our application simplifies this otherwise burdensome task by integrating all of a user’s different calendars into a unified platform where a user can visualize and modify all of his/her calendars through a single, cohesive interface.

In addition to scheduled meetings and appointments, an individual usually must also complete a set of tasks, chores, errands, etc. Our application also integrates the ability to create and manage a user’s tasks in the form of an advanced “to-do list”.

By incorporating into a single platform an individual’s calendar with the tasks s/he must perform, a user is able to easily visualize and prioritize all of his/her daily activities. Therefore, our applications’ integrated approach helps prevent the inefficiencies and issues (e.g. belated completion of tasks) associated with what for most is an unstructured system to daily activity management.

# Application Users

The potential user base for our Olympics history application is very broad. It is intended to cover any user who is interested to know more about the summer Olympics including how different factors have affected medal totals including population size, economics, geopolitics, host city, etc.

# Application Presentation

Similar to the approach we used with our web application, our mobile application presentation only had a very small number of slides. A slide-focused presentation can quickly cause the audience to lose interest and/or become distracted. It was our position that a very short presentation followed by a longer demonstration would be more engaging and informative to the audience. Given the very positive feedback we received from both Professor Mak and the class after our web application demo, we saw no need to change our approach for this presentation. Overall, we felt the mobile application presentation was successful and engaged the audience. Our PowerPoint presentation, named “CS235 - Assignment #4 - Mobile Prototype.pptx”, is included with this submission.

We received three specific points of feedback during our presentation. They are summarized below with our comments:

# Application Components

Our application has three primary components, which are described in the following sections. In addition, we included with our submission our source code which is in the zip file named “CS235 – Final Project – Source Code.zip”.

As a note to any users of our application, we fully populated the navigation menus to give the site an increased feeling of realism. However, only of a subset of the links take the user to actual pages. For a list of the application’s working pages, kindly see the section entitled “Data Visualizations” where each subsection corresponds to a page on our site.

## Website Template

Our application adapted an existing HTML5 and CSS template[[2]](#footnote-2). We selected this template because it had a professional appearance and because it made effective use of multiple web design patterns including:

**Visual Framework** – Across all pages, our application has a common framework that allows users to access all of the application’s features. This allows us to provide a persistent and consistent navigation platform which in turn enables users to build a strong, working base of knowledge on how to access various site features.

What is more, an advanced features of this template’s navigation structure is that it includes embedded images as part of the page’s navigation (shown inside blue rectangles in figure 1). This allows users to use recognition when identifying the menu item that aligns with their goals and not solely recall.

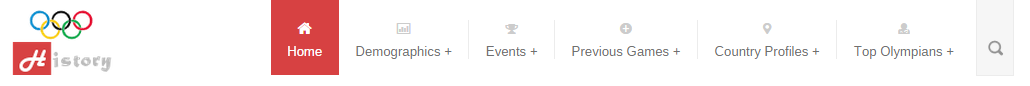


Figure – Persistent Navigation with Embedded Images for Recognition

**Carousel** – On the front page, there is a carousel of iconic Olympic images. Most users (in particular those who are already have some knowledge about the Olympics) will recognize that many of these images came from multiple Olympics games, as far back as 1936. This recognition will help solidify in users’ minds that this site relationship between history and Olympics in this application.

**Escape Hatch** – In the upper left corner of each page is our application’s “Olympics History” logo (see figure 2). By clicking on the logo, the user is returned to our application’s home page. This approach allows users to feel free to explore each page with reduced fear of not being able to return.



Figure – Olympics History Application Logo

**Breadcrumbs** – With the exception of the home page, all pages on the site have breadcrumbs that allow users to know the current page they are on and to return to parent pages in the navigation tree.

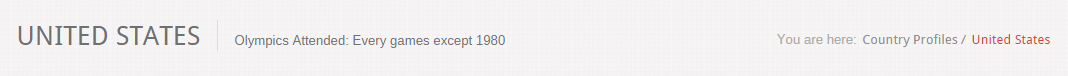


Figure – Breadcrumbs in the Applications “United States” Page

## Tableau

Since this project is at its core focused on data visualization, the software used to visualize that data is critical. The reasons we chose Tableau as the data visualization tool for our application were:

**Full Student Version** – As part of its “academic program”, Tableau offers the full version of the software free to students. For more information on this, please see here:

<https://www.tableau.com/academic/students>

**Large User Base** – A user must spend a non-insignificant amount of time experimenting with Tableau before s/he is able to efficiently create good visualizations. For our team, it generally took at least 8 hours before we reached that threshold. If Tableau did not have as large of a user base as it does, it would have taken us much longer because we would not have had the opportunity to reference all the user generated tutorials and Youtube videos that helped us learn the tool’s fine details.

**Advanced Feature Set** – Different features within Tableau allow users to include multiple data visualization design patterns into their applications. The follow subsections enumerate different data visualization design patterns we used in our application. Note that this is not a complete list. Rather, we focused on those aspects we found could be described effectively in a text document.

### Multiple Visualization Types

The heart of any data visualization are the different types of visualizations it can create. The following is a list of the types of visualizations we used in our application; below each type are the names of visualizations that used that visualization model.

**Normal Bar Chart**

Dollars for Medals – Relation between a Nation’s GDP and the Number of Medals Won at the London 2012 Olympics

Quantifying the Most and Least Athletic Countries – Country Population Per Medal at the London 2012 Olympic Games

**Stacked Bar Chart**

United States Medal Wins – A Home Advantage

If Michael Phelps were a Country

**Line Graph**

Effect of Geopolitics on Olympic Medal Wins – Charting the Rise and Fall of Superpowers

Growth in the Number of Olympic Events

**Filled Map**

Total Summer Olympic Medals Won

**Symbol Map**

Summer Olympic Games Host Cities

Athletes Attending the 2012 London Olympics by Country

Note that preceding list of visualization types is only a subset of those supported by Tableau.

### Data Spotlighting

Data spotlighting allows users to select to emphasize a particular portion of the data without losing its context with respect to the rest of the data. Figures 4 and 5 show the same graph displayed normally and with data spotlighting respectively. Note that in Figure 5, the red line becomes prominent as the rest of the data is dimmed.

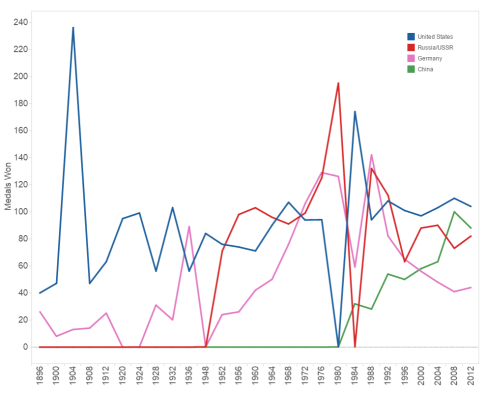


Figure – Olympics Geopolitics Graph Displayed Normally

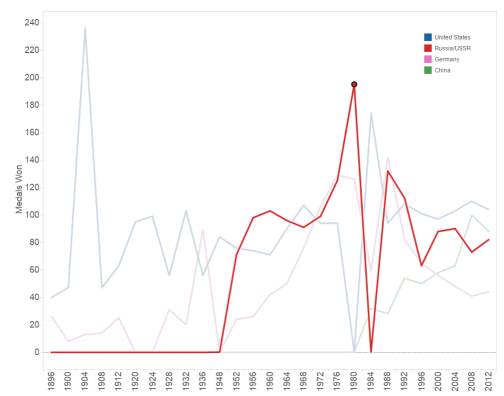


Figure – Olympics Geopolitics Graph Displayed with Data Spotlighting

Data spotlighting is enabled in all of our application’s data visualizations.

### Data Tips

In displays where there is a significant amount of data, getting the exact value of a particular entity may be difficult. Data tips allow users to get more information about a specific portion of the data by hovering over it. Figure 6 shows a data tip (surrounded by a green rectangle) in our data visualization “If Michael Phelps were a Country”. Note that it displays the country name along with the number of bronze medals and the total number of medals Poland won; this tool tip makes information readily available to a user which would otherwise be more onerous to determine.

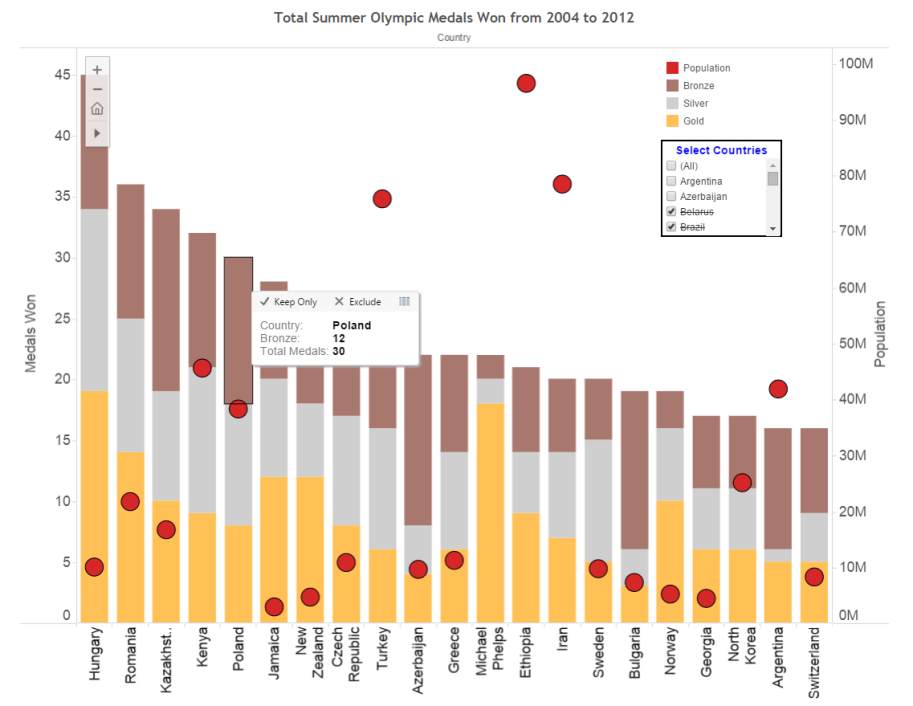


Figure – Data Tip for the Displaying the Total Number of Medals Won by Poland and How Many were Bronze

Data tips are enabled in all of our application’s data visualizations.

### Multi-Y Graphs

When trying to identify a relationship between two distinct but related data variables, it is often not possible to use the same scale/axis to display them both. In such cases, using multiple Y-axes is the best solution. Figure 7 has two Y-axes; on the left Y-axis, the population per Olympic medal is displayed while on the right Y-axis is the number of medals one. Note that the common X-axis is a set of countries.

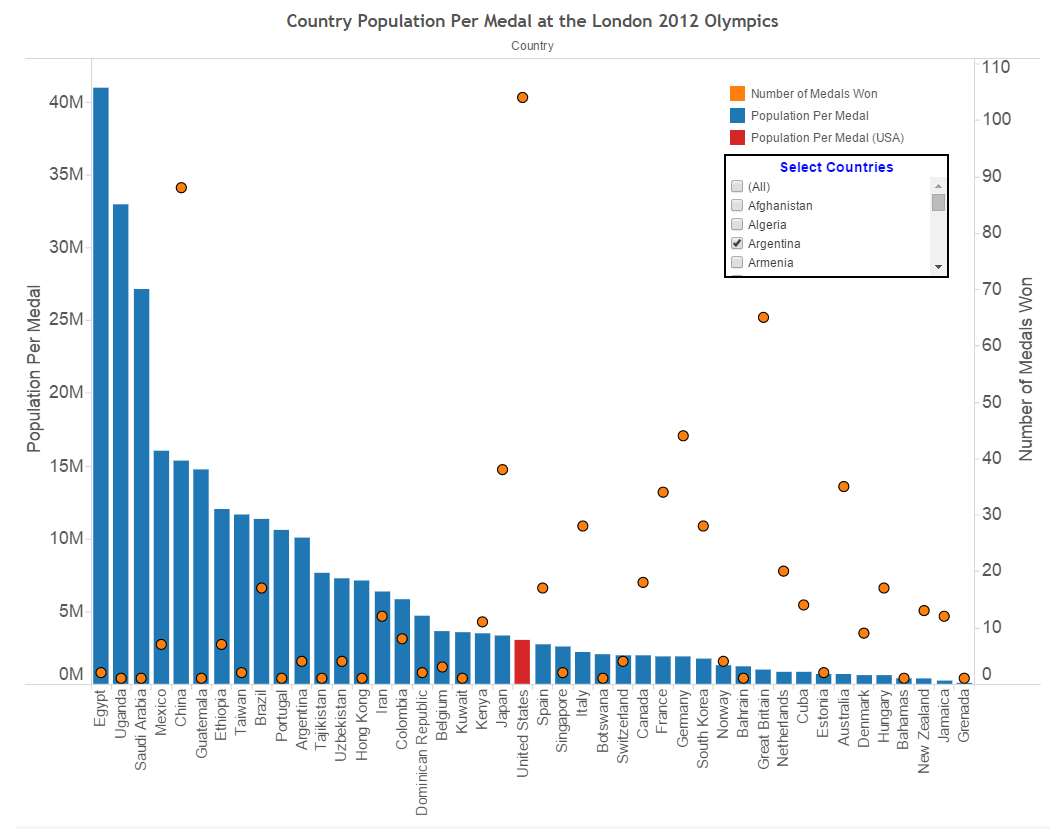


Figure – Multi-Y Graph Comparing Population per Medal versus Total Medals Won

Our application used multi-Y graphs in the following data visualizations:

### Sortable Table

The Sortable Table design pattern is something of a misnomer as while it specifically mentions tables by name, the pattern applies to much more than that. As shown in the in-class lecture material, it can also apply to bar graphs as well.

In our application, the default was to always sort data according to the left Y-axis. However, if the user wanted to sort according to the right Y-axis, s/he can do so by hovering the mouse over axis title and selecting sort ascending or descending.

Figure 8 shows the same graph sorted by the left Y-axis (see left graph) and by the right Y-axis (see right graph).

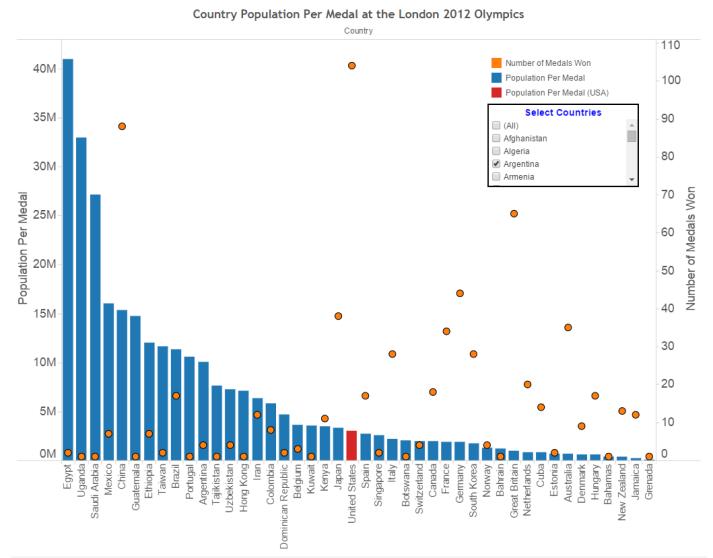
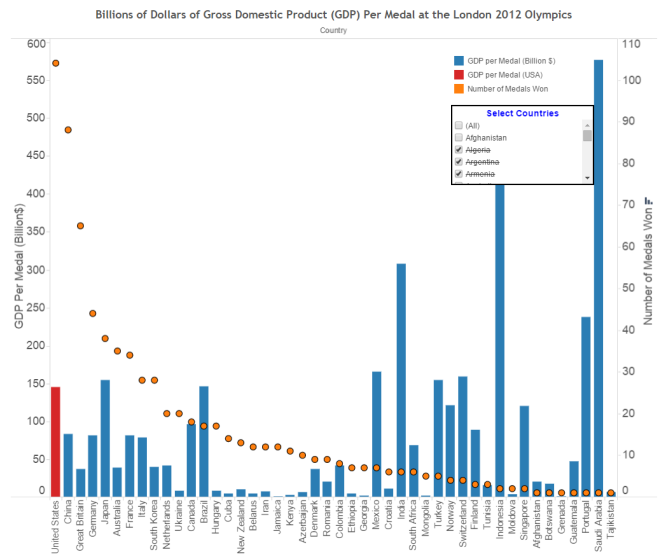
 

Figure – Multi-Y Graph Sorted by Either the Left or Right Axes

Our application supports sortable tables on the data visualizations with multiple Y-graphs namely:

## GitHub – The Application Runtime Platform

Throughout the semester, Team Thundercats used GitHub as our revision control repository. One of GitHub’s lesser known features is that built into every GitHub repository is a free web server. To run our application, we recommend that you access our GitHub page directly. A link to the application’s home page is below.

<http://rawgit.com/ZaydH/CS235/master/Final_Project/index.html>

As a service to future students, we will keep our project live in perpetuity as part of our group’s GitHub repository. It is our humble recommendation that for subsequent classes, it be a requirement that the students publish their projects to a course GitHub repository so future students may view them easily for inspiration, ideas, and to better understand the professor’s expectations.

# Data Sources

Multiple different data sources were used to generate the different data visualizations included with our applications. Below is a list of the data sources we used; included with each is a reference to the data visualization where the data set was used:

1. **United States’ Olympic Medals Won by Games**
   1. **Description:** This dataset lists the number of gold, silver, and bronze medals won by the United States at each summer Olympic Games.
   2. **Data Source:** <http://www.olympic.org/united-states-of-america>
   3. **Data Visualizations:**
2. **China’s Olympic Medals Won by Games**
   1. **Description:** This dataset lists the number of gold, silver, and bronze medals won by the People’s Republic of China at each summer Olympic Games.
   2. **Data Source:** <http://www.olympic.org/people-s-republic-of-china>
   3. **Data Visualization:**
3. **The Soviet Unions’ Olympic Medals Won by Games**
   1. **Description:** This dataset lists the number of gold, silver, and bronze medals won by the Soviet Union at each summer Olympic Games.
   2. **Data Source:** <http://www.pbs.org/redfiles/sports/stry/medals.htm>
   3. **Data Visualizations:**
4. **The Russian Federation’s Olympic Medals Won by Games**
   1. **Description:** This dataset lists the number of gold, silver, and bronze medals won by the Russian Federation at each summer Olympic Games.
   2. **Data Source:** <http://www.olympic.org/russian-federation>
   3. **Data Visualizations:**
5. **Germany’s Olympic Medals Won by Games**
   1. **Description:** This dataset lists the number of gold, silver, and bronze medals won by Germany at each summer Olympic Games.
   2. **Data Source:** <http://www.olympic.org/germany>
   3. **Data Visualizations:**
6. **Total Medals by GDP**
   1. **Description:** This dataset quantifies the relationship between a nation’s economic output (measured as GDP – Gross Domestic Product) and the number of medals it won at the 2012 London Olympics.
   2. **Data Source:** <http://www.medalspercapita.com/#medals-by-gdp:2012>
   3. **Data Visualizations:**
7. **Total Medals Per Capita**
   1. **Description:** This dataset quantifies the relationship between a nation’s population and the number of medals it won at the 2012 London Olympics.
   2. **Data Source:** <http://www.medalspercapita.com/#medals-per-capita:2012>
   3. **Data Visualizations:**
8. **Olympic Events by Games**
   1. **Description:** This dataset provides a table enumerating the events each summer Olympics. Note that we excluded the 1906 Intercalated Games since that is no longer considered an official Olympic Games by the International Olympic Committee (IOC).
   2. **Data Source:** <http://en.wikipedia.org/wiki/Olympic_sports>
   3. **Data Visualization:**
9. **Summer Olympic Games Host Cities**
   1. **Description:** This dataset provides a list of host cities for each of the summer Olympic games.
   2. **Data Source:** <http://www.olympic.org/olympic-games>
   3. **Data Visualization:**
10. **Athletes Attending the London 2012 Olympics by Country**
    1. **Description:** This dataset provides a list of host cities for each of the summer Olympic games.
    2. **Data Source:** <http://en.wikipedia.org/wiki/2012_Summer_Olympics>
    3. **Data Visualization:**
11. **All Time Olympic Medal Totals by Country**
    1. **Description:** This dataset provides a table listing the number of summer Olympics medals won by each country.
    2. **Data Source:** <http://www.olympic.it/english/medal/id_summer.htm>
    3. **Data Visualization:**
12. **Olympic Medals Won by Michael Phelps**
    1. **Description:** This dataset provides a list of the Olympic medals won by athlete Michael Phelps at each of the summer Olympics at which he competed.
    2. **Data Source:** <http://www.olympic.org/michael-phelps>
    3. **Data Visualization:**

# Webpage Text

Since this project is intended to be a user interface design course’s culminating experience, we did not consider that it would be necessary (much less important) to write original text for each of the application’s pages. Rather, the vast majority of the text on our application’s pages is merely a tool to lend realism and context to the application. As such, other than the headlines for each of the pages and the graph titles, none of the text in our application is original. It was all sourced from different web pages we found.

The section entitled “List of Webpage Text References” includes different pages we took content from. Any pages missing in this list is an oversight on our part since we fully acknowledge that all of the text content (excluding the previously mentioned exceptions) is not original.

# Data Visualizations

The following subsections enumerate the nine data visualizations included in our application. They also

## Effect of Geopolitics on Olympic Medal Wins – Charting the Rise and Fall of Superpowers

**Web Page Address:** <http://rawgit.com/ZaydH/CS235/master/Final_Project/geopolitics.html>

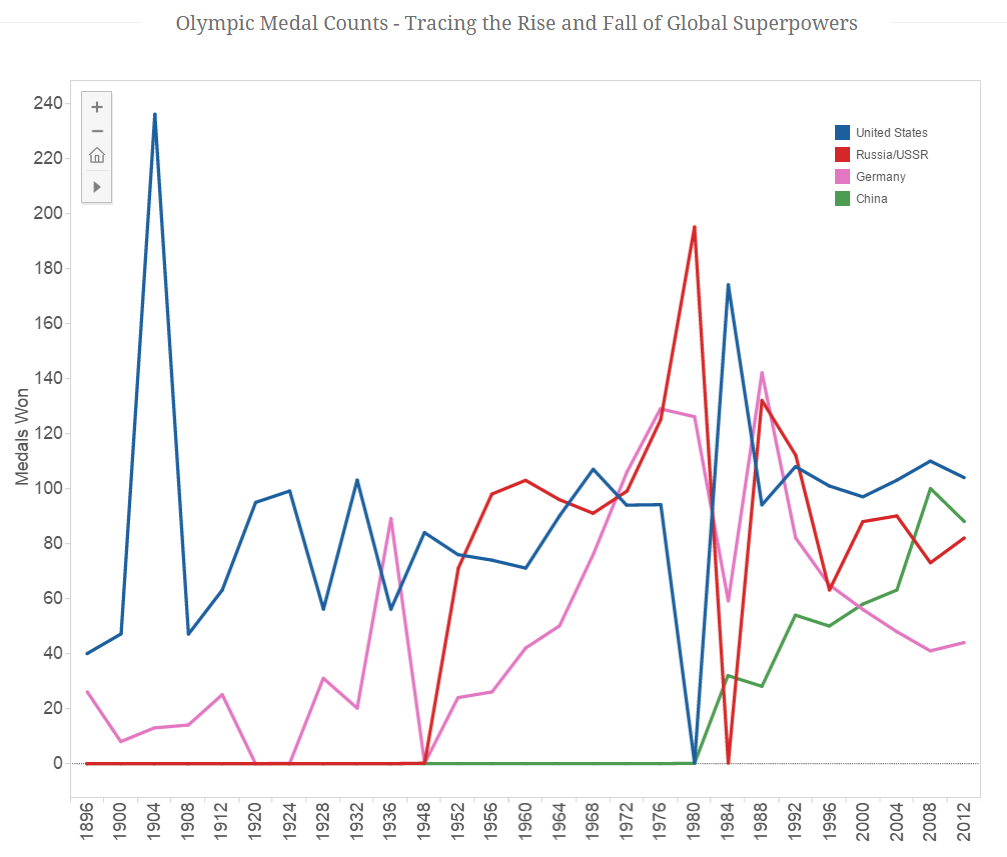


Figure – Effect of Geopolitics on Olympic Medal Count

Chapter 5 of the Olympics Charter states, “No kind of demonstration or political, religious or racial propaganda is permitted in the Olympic areas.” While this may technically be true, it somewhat belies the reality that the entire Olympic movement is often dominated by political propaganda. To illustrate this point, we have graphed the summer Olympic Medal totals of four nations. Through these nations,

**Germany** – Leading up to World War II, Nazi Germany was intent on showing the superiority of the Aryan race and at the behest of the Nazi propaganda minister Joseph Goebbels, Nazi Germany pushed its athletes to perform well at the 1936 Berlin games. Due to this pressure, Germany won more medals in those games than any other nation.

It must be noted that Germany is the only country to have lost two world wars. Its defeats are clearly shown in our data visualization as Germany won no medals in 1920, 1924, and 1948.

Once Germany had begun to rebuild after World War II, East Germany wanted to show its superiority over West Germany and began an extensive doping program. This led to surge of Olympic medal wins until the Berlin Wall fell in 1989 after which there was a precipitous drop in the number of medals won by the united Germany.

**Soviet Union/Russia:** Before 1950, the Soviet Union was very domestic centric in its politics, and only looked outside its borders regarding matters national security (e.g. Molotov-von Ribbentrop Pact, World War II related diplomacy, etc.). This inward focus is reflected in the fact the Soviet Union never competed in a summer Olympics before 1952.

By 1952, the Cold War had already become hot in places like the Korean Peninsula. What is more, communist and democratic nations were pitted against each other to show the superiority of their political systems. Similar to Nazi Germany in the 1930’s, the Soviet Union invested heavily in athletes, which is reflected in the number of summer Olympic medals it won. The only exception to this is when it boycotted the 1984 Olympics for the geopolitical reason that the games were held in Los Angeles.

**China:** Before 1980 when President Richard Nixon visited mainland China, the nation was politically isolated. The infrastructure had been largely destroyed by Japan in World War II and by civil war. This national isolation is reflected in that China won no Olympics medals before 1984. However, China as a nation is on the rise both economically and at the Olympic games. It has steadily won an increasing number of medals, and just like it does economically, China now only trails the United States in medals won at the summer Olympics.

**United States:** The 20th Century was America’s century. It won two World Wars and is the only one of the four major superpowers on this graph to not have had any political revolutions. Rather, the United States has been the hallmark of stability. This political stability is reflected in US’ comparitively stable medal win count. The only two outliers are the 1904 games, when the Olympics were still in their infancy, and in 1980-1984, when the games were dominated by Cold War politics.

## Dollars for Medals – Relation between a Nation’s GDP and the Number of Medals Won at the London 2012 Olympics

**Web Page Address:** <http://rawgit.com/ZaydH/CS235/master/Final_Project/economics.html>

## Quantifying the Most and Least Athletic Countries – Country Population per Medal at the London 2012 Olympic Games

**Web Page Address:** <http://rawgit.com/ZaydH/CS235/master/Final_Project/population.html>

## Growth in the Number of Olympic Events

**Web Page Address:** <http://rawgit.com/ZaydH/CS235/master/Final_Project/events.html>

## Summer Olympic Games Host Cities

**Web Page Address:** <http://rawgit.com/ZaydH/CS235/master/Final_Project/previous_games.html>

## Athletes Attending the 2012 London Olympics by Country

**Web Page Address:** <http://rawgit.com/ZaydH/CS235/master/Final_Project/previous_games.html>

## Total Summer Olympic Medals Won

**Web Page Address:** <http://rawgit.com/ZaydH/CS235/master/Final_Project/country_profiles.html>

## United States Medal Wins – A Home Advantage

**Web Page Address:** <http://rawgit.com/ZaydH/CS235/master/Final_Project/united_states.html>

## If Michael Phelps were a Country

**Web Page Address:** <http://rawgit.com/ZaydH/CS235/master/Final_Project/michaelphelps.html>

# List of Webpage Text References

|  |  |
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| [ ] | Team USA, (2015). *USOC - General Information | United States Olympic Committee*. [online] Available at: http://www.teamusa.org/About-the-USOC/Inside-the-USOC/History [Accessed 10 May 2015]. |

1. The “Application Overview” section is very similar to the text in our web application final report. Since the two applications are intended to have been developed theoretically by the same company targeting a single market and user base, we did not see that it made logical sense to have meaningfully different overviews. [↑](#footnote-ref-1)
2. For a link to the template, please see: <http://themeforest.net/item/alexx-multipurpose-html5-theme/3370259> [↑](#footnote-ref-2)