**Exercise 1 Report:** *Olympic Medal Performance by Gender from 1924 to 2014*

**Motivation:** Gender disparities in sports are widely known. For example, in the US Men’s basketball is much more popular than women’s basketball, and male soccer players are paid more than female soccer players. With regards to the winter Olympics, the question arises, does gender disparity also exist, when looking at the different rates of medal earnings among men and women? One thing must be acknowledged, some sports were not accessible to women until much more recently. The question can still stand, for any one country, did the rates of male/female medal accumulation equalize after that sport was open to females?

**Tasks:** To visualize the difference in medal earnings it is necessary to see how this difference manifests by sport and by nation. The tasks will be:

* Explore the different rates of medal accumulation by sport by gender.
* Explore the different rates of medal accumulation by country.

Task 1 will show when women started being able to earn medals in certain sports. Task 2 will illustrate the proportion of male to female medals earned by each country each year.

**Visualization:** Visualization 1 is a side-by-side view of men and women medal accumulations by country, comprised of two subplots. Each subplot is a line chart with five series, one series per top five country, where the top five countries are defined by the total medals earned over the entire Olympics data-set. The x-axis is winter Olympics dates (years) and the y-axis is Cumulative Medals Earned. Users may interact with the plot by selecting the sport type on the top left hand of the left visualization. There are seven sports in the data-set, each is selected from the drop-down menu. New selections update the visualization to show information for the selected sport.

Chart, bar chart

Description automatically generated

*Visualization 1 – Line Plot*

Visualization 2 shows the break down of male and female yearly medal earnings by country, with male and female performance shown in respective plots. Each subplot is a stacked bar chart with the x-axis being winter Olympics date (years) and the y-axis is Yearly Medals Earned. Each bar shows the break down by sport for medals earned in that year. Users may select from a drop-down menu of the top five countries, where the top five countries are defined by the total medals earned over the entire Olympics data-set.

Chart, bar chart

Description automatically generated

*Visualization 2 – Bar Plot.*

**Expressiveness and Effectiveness.** In the visualization, two main visualizations are considered when determining the expressiveness of the design: Visualization 1 and Visualization 2, both described in the Visualization section above.

Considered first is Visualization 1, which is comprised of two plots that share a common y-axis. The two plots represent male and female athletes, respectively. Since the primary attribute being compared across gender and country is an ordered magnitude (cumulative medal count), the channel “position on a common scale” is utilized. This channel is the most effective channel for comparing ordered magnitudes (*Figure 5.6 in Munzner*). Specifically, the magnitude of the cumulative medal count is shown on the y-axis, which allows for direct comparison across gender and country.

Considered second is Visualization 2, which, like Visualization 1, is comprised of two plots that share a common y-axis, and with each plot representing male and female athletes, respectively. Ordered dates is shown on the x-axis and the quantity of yearly medals earned is shown on the y-axis. For each year, all seven of the sports in the dataset are shown, which leads to a natural choice in selecting a bar plot to represent each category (sport). The color hue channel is selected to show each of the seven sports per year. Color hue is the second most effective channel to choose in representing categorical data, but it is more effective than a spatial region channel (*Figure 5.6 in Munzner*). This is due to the ineffectiveness of the spatial region representing more than three sports.

**Interaction:** Each of the visualizations allow for interactivity in exploring the relationships between gender, country, and medal counts. The first visualization allows for changing the sport by way of a drop-down menu, with all seven sports available for selection. The top five countries by cumulative medal count are then depicted in the line plot. The second visualization allows for changing the country. This is achieved with a drop-down menu that allows for changing the country between any one of the five top countries (by medal count). The results of this selection are then reflected in the bar plot, with only data depicted from the selected country.

**Conclusion:** Gender differences by sport vary by sport as much as they do by country. Take skating for example. Female skaters did not begin to earn medals at nearly the same rate as males until 1960. After 1960, countries like the Canada, The United States, and The Soviet Union saw cumulative female medals in skating nearly match those of men. Showing that for these countries, males started to earn fewer medals per year. For Finland, we see that they won no more medals for male skating events past 1955, and no female medals after 1970 so both lines flatten out afterwards. For Norway, hardly any women won medals at all whereas males continued to have a steady accumulation of medals up until the very last Olympic game in our data.

When we switch to a sport like Ice Hockey, for our countries we see that it is an overwhelmingly male sport with female medals never reaching the same level as male medals.