Project Milestone 3: Group 11

Jinghao Liu, Marwan Lloyd, Skylar Shafer, Max Zou

**Introduction:** At its core, our project looked to provide useful visualizations on the relationship between aging and athletic performance. This final goal is a drilled down version of our loftier beginning goal of rating athletes across sports as they aged, as that initial problem involved too many parts to visualize well. Thus, the results are a product of quality over quantity.

Sports analytics is a topic that a lot of work has been done in already, but we feel as though our dashboard provides a collection of efficient visualizations for an analyst wanting to determine the traits that most often correspond to

**Literature Review:** Our final dashboard drew inspiration from several ideas we found across literature of previous sports analytics projects.

**Design(s):**

Over the course of our design’s lifecycle, we have continually tried new ideas, discarding those that we feel do not bring optimal results. To begin, we worked with a few datasets to find multiple, in pursuit of an optimal solution. We experimented with datasets on FIFA player ratings, as well as another on the traits of players in the English Premier League, before setting a general Olympics dataset on the traits of historical athletes including the year of competition, where it was held, whether it was summer or winter games, height, weight, age, and nation.

After deciding on our dataset, we had a number of potential utilities that we wanted to pull out of the dataset. In particular, we initially decided we wanted to prioritize the effect of aging in sport on athletes of different genders. So, a few of our initial prototypes focused on this vision. We designed models that displayed medal count by age and gender filtered by sport, to see what age range typically has the most success in each sport for each gender. We feel as though this is a valuable piece of insight, as you can then look deeper into sports with small age ranges, and assess if this is due to the nature of the competition, for example, it being too physically strenuous for an athlete who participates in it to have a long career of doing so. From this, information can potentially be extracted on what kinds of exercise are best/worst for longevity, whether it be for an athlete training and hoping for a long career, or a regular person who wants to live a length and healthy life with as little of a reduction in athletic ability as possible.

Another topic which we later approached is what height and weight typically led to success for a given competition, and how this has changed over time. In the nature of sport, the typical build of an optimal athlete in that sport changes over time, as the strategy of said sport evolves. We wanted to explore this topic as well as those of gender and age, and so another one of our prototypes created a scatterplot which provided information on the traits of competitors, as well as their gender, and whether they won medals. I think the primary interesting aspect of this scatterplot is its customizability. An interesting section of Shiny capabilities which we utilized, and did not know going into this project, was that you can use *aes\_string* instead of *aes* for describing aesthetics, and this allows you to change these attributes based on reactive user input, as the user input comes in as strings. So, the user can then select axes to adjust the scatterplot by, out of height, weight, year of competition, and age of competitor, while learning of each competitor’s medal success and gender via the color and shape attributes of a given point.

A final topic that we explored deeper was how the age distribution of competitors has changed over different intervals of competition. In doing so, we created another panel which gave the competitors at every age for a given sport, with an adjustable time interval in order to see how the age distribution of athletes for sports by gender has changed in different time periods.

As our prototype period came to an end, we felt conflicted. We had initially decided on a reduced scope, focusing on age and gender in sport, but over time, we had come to produce a number of visualizations with their own utility for a user interested in sports analytics. In turn, we felt as though we best did our project justice by creating a dashboard including visualizations focused on multiple facets of these athletes and their traits, each focused on a different kind of insight that we felt was displayed efficiently and intuitively. Thus, we combined multiple prototypes, focusing them on the one dataset, and creating a tabbed dashboard that allowed the user to click between the different perspectives of the data offered.

Our first two tabs in the dashboard will focus on

Our next tab is a version of the Age vs. Medal visualization. It shows the age distribution of all athletes in the Olympics, for both genders, with option to choose among different sports and to filter the years which these athletes participated. Because the Olympics is a representation of the best athlete performance chosen from all over the world. A simple count of number of participants is representative of the population of all athletes for the purpose of this research. The graph chosen is a simple line graph for a direct visualization of the distribution across all ages. The graph of genders is overlayed, it is included as the scope was increased and this addition feature shows the difference of distribution between genders. It is interesting to compare the distribution of athletes between genders across different kind of sports. For some sports like gymnastics and swimming, the age distribution of female is clearly left to the male graph. Indicating that among the best athletes in the field, women gymnastics and swimmer reach their peak performance at a younger age compared to men. In fact, for most of the sports, female athletes have a lower age distribution. With the year slider input, the range of years of data to include can be adjusted. With a range set to 20 years and dragging the slider, the user can compare the change of athlete age distribution throughout the years. For example, in the case of water polo, female athletes started to participate only after the year 2000. Moreover, the change of age distribution can also be observed using this feature. When selecting “Speed Skating”, it is clear that the distribution of age changed from a peak around 20 years old in the 1920s when they were first introduced to the Olympics to a peak of 25 years old nowadays.

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Speed Skating Athletes Age Distribution (Left: 1920-1930; Right: 2006-2016)

The groups consider this observation as a result on the medical and technology advances in the field, allowing athletes to perform the sport safer and with better support (coaching, dieting, health monitoring), which extended their careers, giving the more experienced athletes an advantage.

The fourth tab is

Finally, our last tab is

**Conclusion:**

We acknowledge that we chose a topic that was broad and diverse, with many Olympic athletes competing across a range of unique sports. That being said, we feel as though our visualizations provide an efficient toolbox for analysts to gain insightful information on the traits of Olympic athletes with regard to year of competition, age, height, and weight, with a focus on differences in gender, as well.