Golf Analysis Application Introduction

For this assignment, I focused on my golf progress this past summer at Lake Park, a par 3 golf course near my house in Milwaukee. Golf basically consumed my entire summer 2023 as I golfed upwards of 50 rounds there with many friends. Throughout each round of golf, I tracked my progress using an Excel sheet on my phone. When deciding what to create for my visualization, I thought about what the most useful insights might be for my friends and I: a time series summary of our progress throughout the summer and histograms to represent our shot distributions on each hole.

Designing the Application

When creating these dynamic graphs, I started with defining the UI logic: adding in some filtering and sorting features (date ranges with a sliding input bar, player selection checkboxes, hole selection checkboxes). For the histograms, I wanted to add more dynamic functionality so that players can distinguish where their shots fall in the overall distribution, and to sort by which holes were the best (lowest average strokes). For this implementation, I added boolean checkboxes, toggling the features on and off. On the server logic side, I first had to transform and filter the data based on the user queries. This included the `observeEvent` functions for selecting all players/holes, reactively filtering and summarizing the data, setting the color palettes, specifying axes scales, computing averages for histograms, and building the final `ggplot` renderings. Lastly, I added some stylistic detail with the html and css renderings back into the UI to give the application more of a "golf course" appearance with sand traps and green fairways. I relied on ChatGPT for some of the assistance functions like determining axes scales and outlining and implementing the complex dynamicPlotOutput histograms.

Reactive Graph Structure

<u>Inputs</u>

- *Date Range* (dateSlider): Users select a start and end date to filter the dataset
- *Selected Players* (selectedPlayers): Users select players to include in the analysis
- *Selected Holes* (selectedHoles): Users select specific holes to include
- *Player Colors* (colorToggle): A checkbox that dictates whether to color code the data by player or use a single color (dark green).
- *Order by Avg Strokes* (averageOrdering): A checkbox to determine if the histograms should be ordered by average strokes or appear chronologically.

<u>Reactive Expressions and Observers</u>

- *Filtered Data*: Reactive expression that filters `golf_data` based on the inputs from dateSlider, selectedPlayers, and selectedHoles.

- *Observe Events for Select/Deselect All*: These observers listen for clicks on the "Select/Deselect All" buttons for players and holes, updating the corresponding checkboxGroupInputs based on the current selection status.

Outputs

- *Player's Progress Over Time* (progressPlot): A line graph output that visualizes the average strokes over time for the selected players and date range. It responds to changes in dateSlider, selectedHoles, and selectedPlayers.
- *Histograms of Strokes per Hole* (dynamicPlotOutput and histogramsPlot): These outputs generate histograms showing the distribution of strokes per selected hole for the selected players and date range. They respond to dateSlider, colorToggle, averageOrdering, selectedPlayers, and selectedHoles.

Insights Gained

Together, these two dynamic visualizations provide powerful analytics for examining player progress, strengths and weaknesses, and standings among competition.

Line Graph Insights:

- I am ahead of my competition (consistently nearing par -- average 3.0 strokes -- by the end of the summer)
- I had noticeable improvement throughout the summer (my line trends downward).

Histogram Plots Insights:

As for the histogram visualization, I wanted to determine my best and worst holes.

- No surprise hole 14 was my best (the shortest hole on the course), averaging an impressive 2.95 shots.
- Similarly, my poor performance on hole 12 is expected as it is by far the longest hole on the course, averaging 3.71 shots.
- However, I am shocked that holes 7 and 9 are among my worst, both averaging 3.67 strokes. Sure, these holes are not easy, but they are not long. On second thought, though, these holes had really tough pin placements and elevated greens, making a good first shot more difficult.

Overall, this R shiny golf application provides a dynamic platform to visualize your progress over time, compare different rounds, and analyze your strokes hole-by-hole. It is an invaluable tool for any golfer looking to take their game to the next level, as long as the score is kept in reproducible, tidy formats. At the end of the day, this application is a prime example of using technology to amplify our love for the game. It makes the journey for golfing excellence more accessible and rewarding than ever.