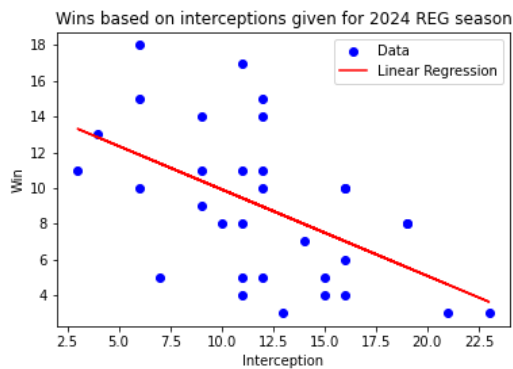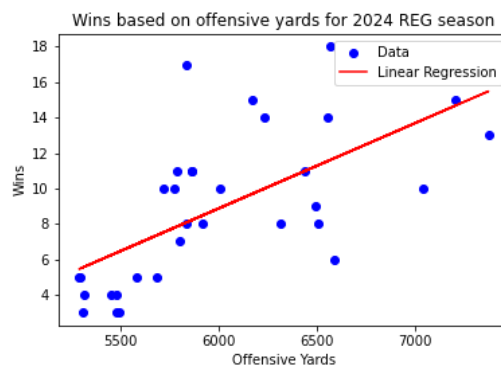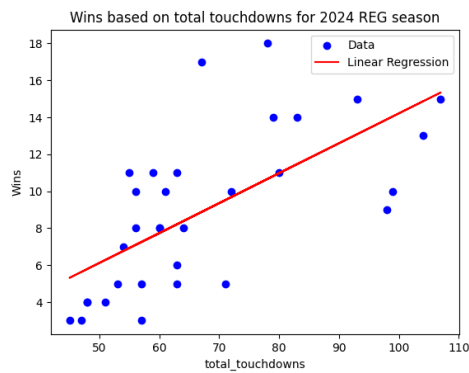# NFL Sports Betting Improvement Report

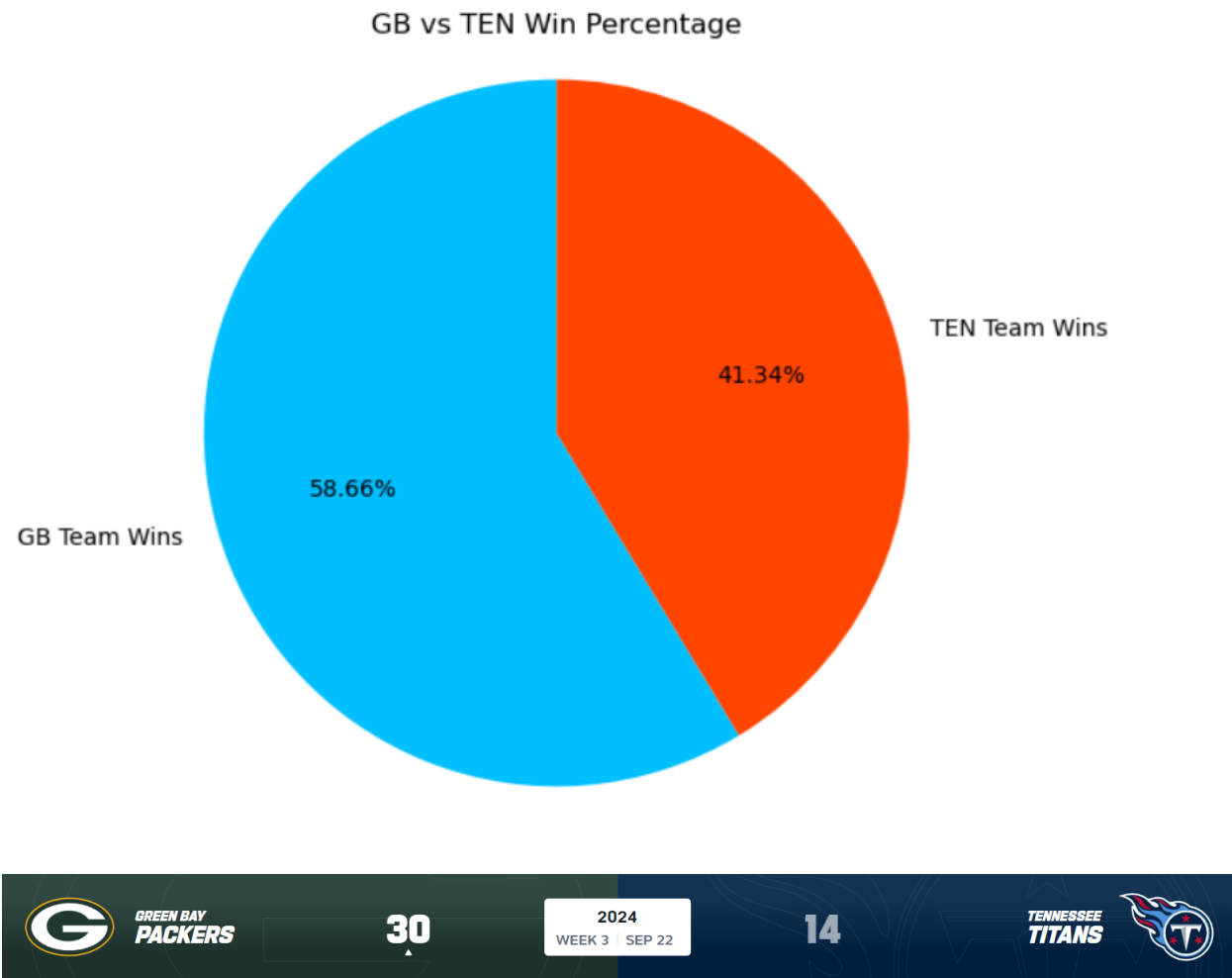Brody Goettl, Garrett Krajnik, Ian Nie, Matt Minor

Our group is very interested in sports, and a big part of sports that has been expanding recently is the sports betting/gambling industry. Garrett, in particular, has been interested in sports gambling/betting, and we are all NFL fans, so we decided to make a model for improving our NFL betting. We decided to look at the data from the past NFL seasons and draw conclusions on winning percentages based on high-impact variables. Focusing specifically on last year, the 2024 NFL season, we looked at first downs, yards, interceptions, sacks, touchdowns, and many more factors. We assigned each of these stats a points value based on the correlation they had to winning, which we found by graphing these stats by wins, and finding high correlation relationships. Using this points system, we were able to conclude a winning percentage based on team matchups and week, which will improve our NFL betting, leading to more winnings for us.

To start, we analyzed which statistics were most important to an NFL team winning. We looked at the 2024 NFL team data, and compared it to the wins, which led us to conclude that some statistics were more very important to winning, while others had no correlation, or even a negative correlation. The stats we found were most important to include in our analysis were sacks, interceptions, touchdowns, first downs, field goals, and yards. Of these, sacks and interceptions were a large negative correlation to winning, while touchdowns and yards were a large positive correlation to

winning. Taking these statistics, we made our analysis code, which more often than not

accurately predicted who would win a game of the 2024 NFL season. We concluded

this by looking at the winning percentage of the Packers for each game, given by our

model, and the outcome of the game, which we looked up online. Only a couple of

games didn't end as predicted, but those games were given about a 50/50 chance for

the Packers to win.

```
Enter a team:  GB
Enter what week you want calculated:  3
GB: 58.66% | TEN: 41.34%
```

GB vs TEN Win Percentage

TEN Team Wins

41.34%

GB Team Wins

58.66%

GREEN BAY **PACKERS** 30 | 2024 WEEK 3 | SEP 22 | 14 TENNESSEE **TITANS**

Our first step was to get the data that we needed in order to actually start the analysis. We looked at all sorts of data sets, from NFL betting data to the last 20 years of NFL football data, but eventually found what we wanted: specific offense and defense data that was up to date within the past year. Taking this data, we looked into linear regression of the data by using Python, as well as the libraries: Pandas, Numpy, matplotlib.pyplot, and sys. Using all of these, we created the code talked about earlier in

this report that allowed us to determine which stats most correlated to winning. After we had this data, and using the same libraries, we started creating code for the NFL prediction model we were creating. First, we loaded the data into our Jupyter notebook, and then filtered it down to just be stats we cared about, as well as just the timeframe we cared about, 2024. Taking this filtered data, our group made code that assigned a point value based on the impact of stats and added them up week over week. After we added them up until the current week we wanted to analyze, we took the points from both the away and home teams and added them together, then we took the team we wanted to analyze the winning percentage for and divided the total points for the two teams by the total for that team. After multiplying the total by one hundred, we got the percentage chance to win for the given week for the team we are analyzing. We then created pie charts that took the winning percentage for each team and showed both of them for comparison purposes. To make it as user-friendly as possible, we added input functions that allowed the user to input the week that they want to analyze, as well as the teams they wanted to analyze. The code we ended up with was hard-coded with just 2024 NFL data, but at any given time, you could change that data to be updated data that gives you winning percentages for the next week of the NFL season and bet based on that.

There are a ton of things we thought about along the way to completing this project, and to be honest, none of us are completely satisfied with how little we were able to include. We were able to achieve a win percentage for each team, depending on the week and certain stats, but this only includes the stats that we picked with high correlation to winning. There are plenty of weaker correlation stats that still have good

correlation that we were unable to include, as well as special teams data and penalties. The big challenges we faced were related to the points system. We had to pull data from both teams in our data set and assign the proper points values without duplicating points or including the wrong week's data. A big thing that we would want to include moving forward would be some sort of momentum-based points accumulation. Whether we make teams accumulate points at a higher rate, or just get a flat rate more per game at home/during certain times of a game, it would be a huge addition. Win streaks, loss streaks, playoff contention, home vs away, and many more things are important to how well a team plays, but it's hard to set a strong set value to. We avoided the momentum aspect because of the difficulty in setting a value, but it would probably be the biggest factor we could use to improve our outcome in betting. We also would have loved to include real-time data analysis, rather than just a single year. In our project, we focused on just the 2024 season rather than past/future seasons, but real-time updating of data to improve winning percentage analysis would be great. We also didn't have a good way to analyze the first week of an NFL season, seeing as we didn't want to include preseason as a measure of winning, as the roster is very different from regular-season teams' rosters. The other issue with the week one analysis is the rollover from year to year. With free agency in the offseason, teams lose many players, and team construction is so different that we can't really pull data from the most recent season before, so we started our prediction analysis at week 2. Overall, we created a model that predicted the outcome of NFL games fairly accurately and, in the future, would be able to be updated with new data or potentially reworked into a real-time winning percentage analysis.

Works Cited

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