**Project 1 – Analysis of NFL Games Data**

**Team Members:**

Melissa Mayer

Matthias Boles

Justin Lawrence

Brian Nagle

Our group set out to discover what factors may influence the outcome of NFL football games utilizing the dataset: <https://www.kaggle.com/datasets/tobycrabtree/nfl-scores-and-betting-data>. We examined if correlation exists between home-field advantage, win percentage, and total scores of NFL games since 1966. We also examined variables such as weather, surface type, and stadium variations to determine which factors had the greatest impact.

Our analysis answered the following questions:

* What is the home team winning percentage?

Looking at scores of NFL games from 1966 – present, we calculated the percentage of home games won. We combined losses and ties into one category. The results indicated that 57.2% of home games were won, leading us to the conclusion that home-field advantage is not a myth.

A blue and orange pie chart

Description automatically generated

* Regular Season vs Playoff Win Percentage

We further explored this question to see if the same conclusion held true for both regular season and playoff games. Home games were won in the playoffs at a 2:1 ratio (337:167), as the graph below demonstrates.

A blue and orange bars with white text

Description automatically generated

* Does weather affect outcome?

The dataset contained several variables related to weather, so we set out to explore if weather conditions affected the game outcome. There were 3 weather types including cold, warm, and moderate weather. Comparing the percentage of games won in different weather types to the overall win percentage, we observed that 60.2% of games in moderate weather, 58.2% of games in cold weather, and 54.5% of games in cold weather were won, compared to an overall win percentage of 57.2%

A blue and orange pie chart

Description automatically generated

* Grass vs turf?

Next, we compared home game results on grass and artificial turf surfaces. Home games played on grass fields were won at a rate of 57.9%, and home games played on turf were won at a 55.9% rate.

A blue and orange pie chart

Description automatically generated

* Open stadium vs. dome?

We also compared home team results for outdoor stadiums vs. domed stadiums. In outdoor stadiums, 57.9% of home games were won compared to indoor stadiums where 54.7% of games were won.

A graph of a loss or indoor and win

Description automatically generated with medium confidence

* How is the total score impacted by windspeed and temperature?

We also sought to explore what might affect the outcome of the total score of the game and determined that there was a strong negative correlation between wind speed and the mean total points scored (R2 = 0.682).

A graph of a wind speed

Description automatically generated with medium confidence

* Average Points Score and Temperature

Although there was a very weak correlation between average points scored and temperature, at the lowest and highest temperatures, there was a wide variation in scoring, particularly in the coldest weather, temperatures near 0° Fahrenheit.

**A graph of a graph with blue dots and red text

Description automatically generated**

Based on our analysis, we concluded that this information could be useful when looking to build a new stadium. We determined that the ideal stadium for the home team should be in a moderate weather location, with a grass field, outdoors, and with low windspeed. These might be considerations for a new team or franchise planning to relocate. There are of course many other factors that affect NFL game results, which this analysis did not explore, such as individual player and team statistics. We conclude that these environmental factors have a minimal effect but were worth examining to see their potential impact.

Current Location of Outdoor Stadiums by Weather

A map with different colored dots

Description automatically generated