**BEATING THE ODDS: CAN A MACHINE LEARNING PROJECT PROVIDE THE WINNING FORMULA?**

**Enzo Adriano, Charles Campisi, Ian Valentik, Nick Weaver**

**INTRODUCTION:**

Our team determined that we would like to attempt to predict the final outcomes of National Football League (NFL) games using a machine learning program to see if we could develop a system which predicts games better than the traditional gambling lines.

The three main features we will be examining will be straight game predictions (winners and losers), spread game predictions (favorite or underdogs based on the point spread), and over/under for the final total score of the game. Typical NFL weeks contain 14 to 16 games, allowing us 42 to 48 opportunities to test our mettle.

**MATERIALS AND METHODS:**

We used NFL odds data from Australian Sports Betting from 2015 to Present. This included home team name, away team name, home score, away score, home line open, and total score open.

We also used Football Outsiders Defense-adjusted Value Over Average (DVOA) data. The DVOA data we used consists of how a specific team performs as a rushing offense, passing offense, rushing defense, passing defense, and special teams compared to league average.

Once the two data sources were compiled and cleaned, they were loaded into a data warehouse utilizing AWS/Postgres and analyzed using linear and logistic regression models enhanced via GridSearch.

**RESULTS:**

While many of the margins were very close, we would have won a majority of the bets for the first 13 games in Week 7, had we placed bets on every games. Our best games were KC/DEN, LARM/ATL, DET/MIN, & CHI/NO. The one thing that makes these games unique is that they were all games where the away team won and two of the away teams had a line advantage at the beginning of the betting.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Home** | **Away** | **HomeLine** | **PredictTotal** | **Madden Diff** | **Over/Under** | **Home Cover?** | **Class Guess** | **HWHL** | **Pick** | **Spread** | **O/U** |
| **DEN** | **KC** | **4.5** | **50.5** | **-8.211432752** | **46.89316825** | **0** | **-7** | **1** | **KC** | **KC** | **Under** |
| **GB** | **OAK** | **-7** | **46** | **4.210950269** | **47.44835251** | **0** | **3** | **0** | **GB** | **OAK** | **Over** |
| **ATL** | **LARM** | **4** | **52.5** | **-6.496639554** | **49.48647614** | **1** | **-3** | **1** | **LARM** | **LARM** | **Under** |
| **WAS** | **SF** | **9.5** | **43** | **-18.09145868** | **37.08475758** | **0** | **-20** | **1** | **SF** | **SF** | **Under** |
| **IND** | **HOU** | **-2.5** | **47.5** | **-2.448492254** | **48.86121821** | **0** | **3** | **1** | **HOU** | **HOU** | **Over** |
| **DET** | **MIN** | **0** | **44** | **-3.15186575** | **44.43977267** | **0** | **3** | **1** | **MIN** | **MIN** | **Over** |
| **CIN** | **JAC** | **3** | **47.5** | **-7.846792397** | **47.713096** | **0** | **-14** | **1** | **JAX** | **JAX** | **Over** |
| **NYG** | **ARI** | **-3** | **50** | **1.5565088** | **47.24244169** | **1** | **3** | **0** | **NYG** | **ARI** | **Under** |
| **BUF** | **MIA** | **-15.5** | **41** | **23.19690123** | **43.0799837** | **1** | **25** | **0** | **BUF** | **BUF** | **Over** |
| **TEN** | **LACH** | **-1** | **40.5** | **-0.966700552** | **40.62969336** | **0** | **-3** | **1** | **LACH** | **LACH** | **Over** |
| **SEA** | **BAL** | **-4** | **50.5** | **1.690444123** | **53.10720844** | **0** | **3** | **0** | **SEA** | **BAL** | **Over** |
| **CHI** | **NO** | **-3** | **38.5** | **0.331406586** | **39.90868275** | **0** | **3** | **1** | **NO** | **NO** | **Over** |
| **DAL** | **PHI** | **-2.5** | **47.5** | **0.550412591** | **52.31088425** | **0** | **3** | **0** | **DAL** | **PHI** | **Over** |
| **NYJ** | **NE** | **9.5** | **43.5** | **-18.72124982** | **34.66088336** | **0** | **-20** | **1** | **NE** | **NE** | **Under** |
|  |  |  |  |  |  |  |  |  | **9 - 4** | **7 - 6** | **10 - 2 - 1** |

**CONCLUSIONS:**

While one week of success does not mean we have concerned Las Vegas, it is a positive start. The Over/Under success was impressive, but testing the analysis over multiple weeks will determine our long-term success rate.

Going 9-4 picking the winners is not bad; however, the payouts for picking the favorites can be quite small and we will need to succeed at a higher rate to achieve a more substantial payoff.

Our weakest performance was in predicting the games against the spread, but 7-6 prior to the Monday night is still a winning week and Monday Night Football keeps hopes alive of a 8-6 record and a 57% win rate.

We will continue to test the model and work to improve it as the 2019 regular season progresses.

**WORKS CITED:**

Football Outsiders. (n.d.). Retrieved from <https://www.footballoutsiders.com/>.

Australia Sports Betting. (n.d.). Retrieved from <http://www.aussportsbetting.com/data/historical-nfl-results-and-odds-data/>

**ACKNOWLEDGEMENTS:**

Thanks to Tom Seeber for letting us pursue this project; we’re sure plenty of other faculty would have deemed it not worthy.

Thanks to Alex Mathews for being the only TA who stuck with us all semester.

Thanks to James Labadorf for coming in during the semester and stepping up to serve as our TA.

Thanks to the whole class! We all had a great time meeting everyone and we learned more than we could have imagined.