NBA Spread Prediction

By:
Bryce Anthony , Archie Frank, Michael d'Amore, John Miller, Mervin McDougall

Problem Definition

Goal: To predict the NBA winning team and the point spread using a neural network.

- The surge of online sports betting industry
- What is a spread?
- Win-loss prediction
- More informed betting decisions

Data Sources and Scraping

- Basketball Reference -https://www.basketball-reference.com/
- NBA Stats - https://www.nba.com/stats
- Data Scrape (python) and CSV download

Advanced Stats:

- PER (Player Efficiency Rating) – All-in-one basketball rating, that boils down all of a player's contributions into one number. Using a detailed formula it rates every player's statistical performance.(It has drawbacks)
- WS (Win Shares) - The estimated amount of wins a contributed by a player
- AST% (Assist Percentage) - An estimate of the percentage of teammate field goals a player assisted on while on the court
- VORP (Value over Replacement Player) -A box score estimate of the points per 100 TEAM possessions that a player contributed above a replacement level player, translated to an average team and proportional to an 82 game season
- BMP (Box Plus Minus) – Estimate the player's contribution in points above league average per 100 possessions played.
- OBMP (Offensive Box Plus Minus) - a statistic that measures a player's impact on team offense
- DBMP (Defensive Box Plus Minus) - a statistic that measures a player's impact on team defense

Exploratory Data Analysis

- Arena, Home Team, and Away Team data was converted to sparse matrices
- Spread was not included but was derived from home team points and away team points
- Correlated features identified during the EDA were removed. Eg. home_fta, which is correlated with home_fta_pct

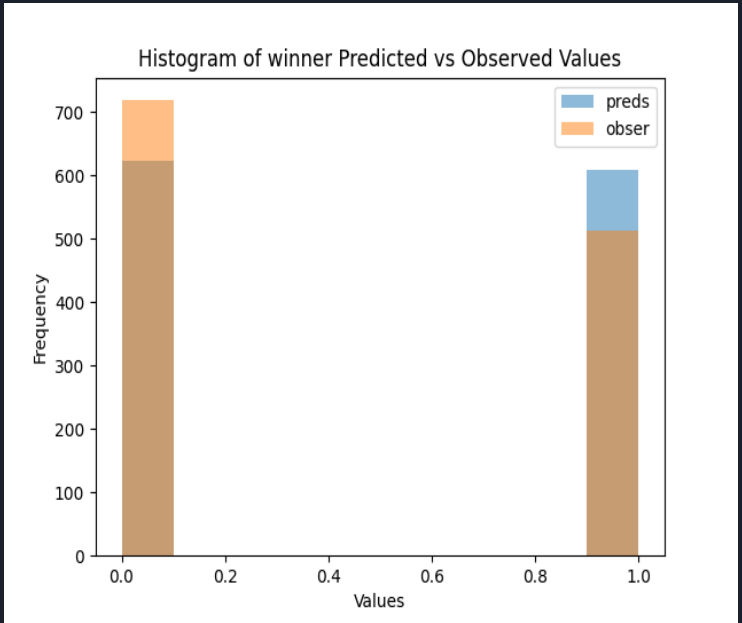
Training and Experimentation

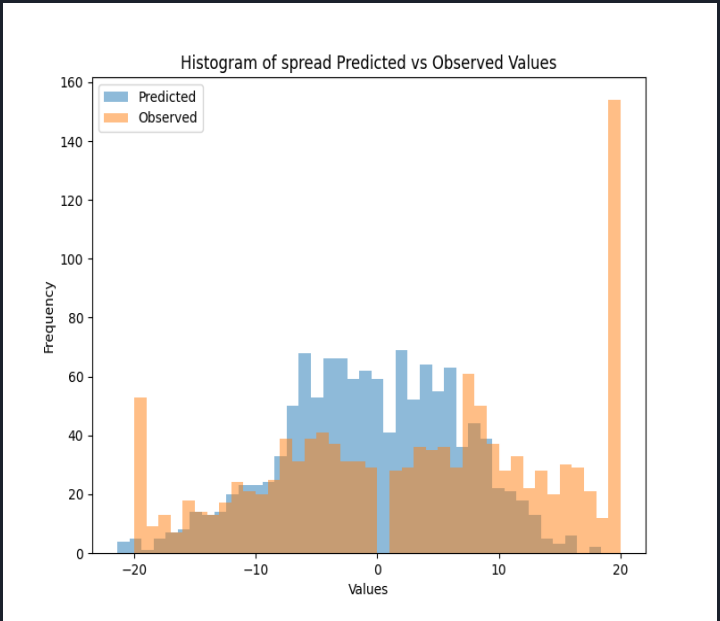
- Gelu. (best response)
- SeLu
- Swish
- Mish
- ReLu
- Lazy ReLu
- Soft Max
- Soft Plus

- Adam
- AdaMax
- Nadam (best response)
- Batch normalization
- Dropout training
- Transfer Learning
- Bucketization of outcome
- Feature selection

Results

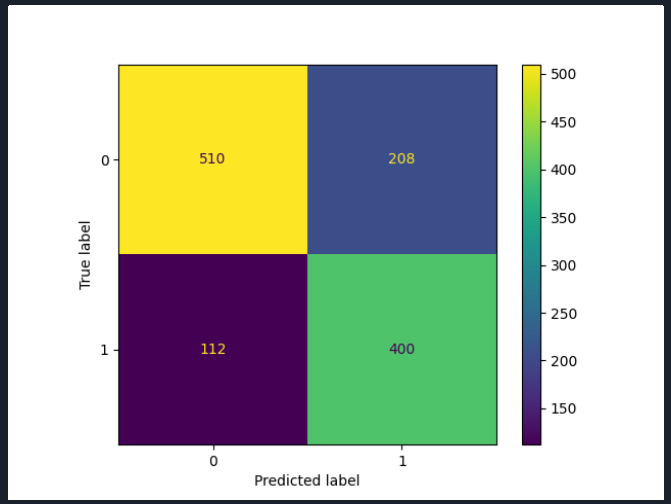
Win loss somewhat accurate prediction but our spread is not accurate. Our model is overfitting the training data. Our conclusion is that predicting the spread goes beyond the statistics and data we have access to. The following results depict findings having trained on 2016 and tested on 2017 data.

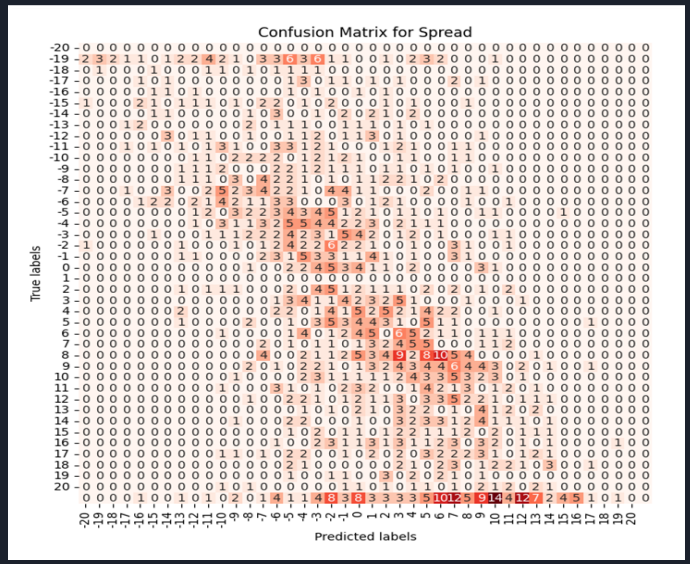




Test Results:
Accuracy: 73.98
F1-score : 76.12%
Precision score: 81.99%:
Recall score : 81.9%

Train Results:
Accuracy: 76.50 %
F1-score : 80.35 %
Precision score: 78.49%:
Recall score : 78.48%





0 = home team win
1= home team loss