

# March Madness

*A cumulative study of season data to predict tournament results.*

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# Introduction

March Madness is an annual NCAA Division 1 basketball tournament. The tournament occurs in the month of March, thereby earning its name. There are 64 teams in the tournament each year, seeded into four regions that each contain 16 teams. We will be taking a look at how far each team makes it into the tournament, based on their regular season data and prior tournament success.

# Data Summary

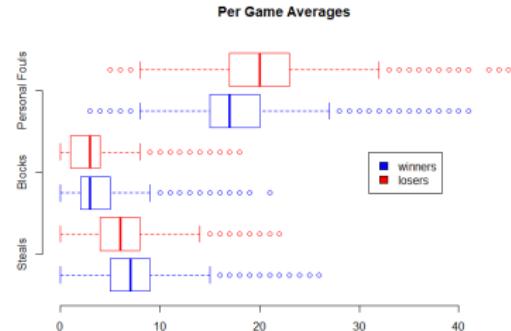
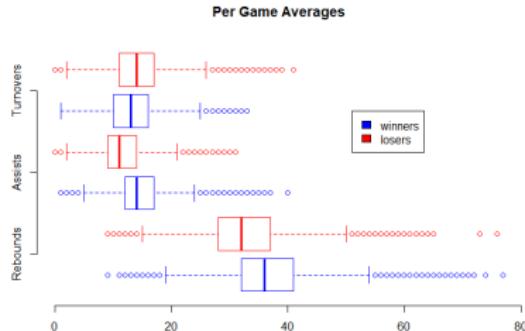
Our data consists of three main components:

- Detailed regular season data from 2003 to 2016 for 365 teams.
- Non-team specific game data from the years 1985 to 2016.
- Tournament data for each playoff team from the years 2003 to 2016.

# Pre-Analysis

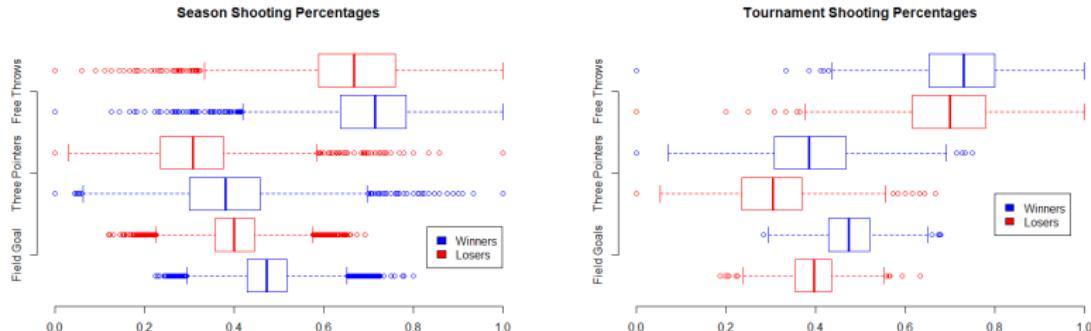
- Wanted to target predictors in future model.
- We want to predict teams success in the NCAA tournament
- Compared winning and losing team data for relevant statistics

# Pre-Analysis



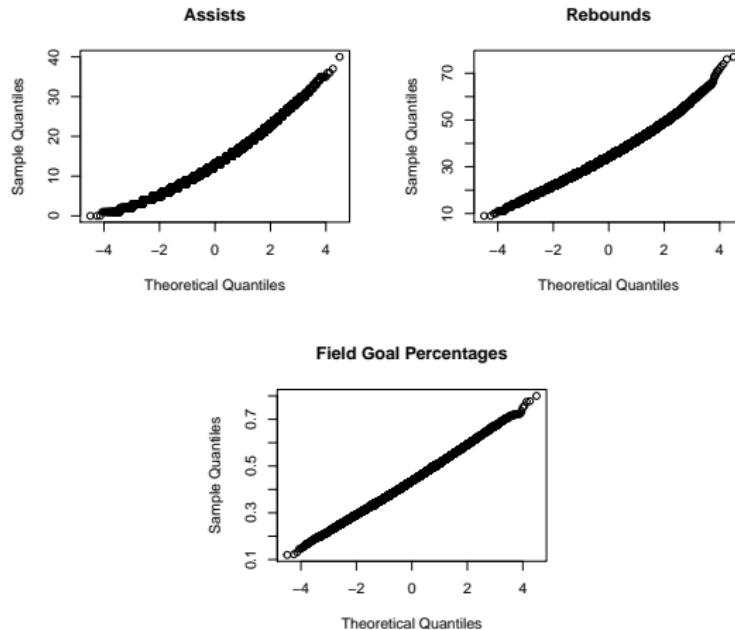
Winning teams hold higher averages in "positive" stats such as assists, rebounds, and steals.

# Pre-Analysis



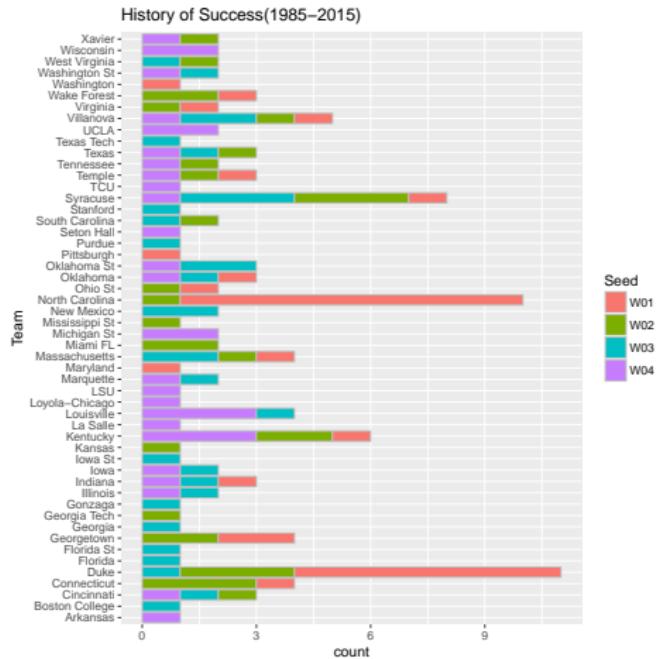
As anticipated, the winning teams averaged higher in all categories, but there are some outliers in the season data.

# Pre-Analysis



We examined the distribution of parameters of interest. Unsurprisingly , due to the large sample size, the variables are normally distributed.

# Pre-Analysis



# Initial Model

$$Y_{daynum} = \beta_0 + \beta_{conf} + \beta_{fgp} + \beta_{tpp} + \beta_{ass} + \beta_{rb} + \beta_{app} + \epsilon$$

We initially looked into this model, where the betas represented the following:

- conf: the conference the team plays in
- fgp: the field goal percentages
- tpp: three point shooting percentage
- ass: assists
- rb: rebounds
- app: prior tournament success

# Processing

In processing our data to develop the model, we went through a number of steps:

- Separate out the needed data for each team for each year
- Eliminate unusable predictors, and search out missing values
- Calculate the averages of each team's stats for each year
- Compile the averages into a new csv file that we could use moving forward
- Develop a process for representing how far a team has made it in the tournament

# Full Model

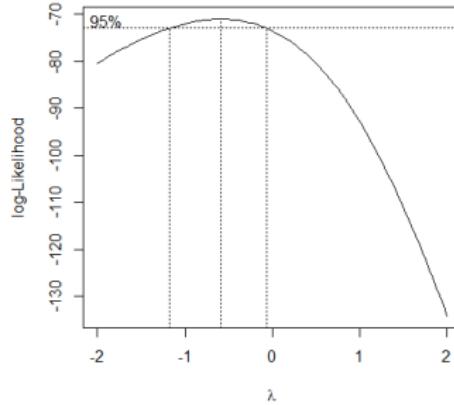
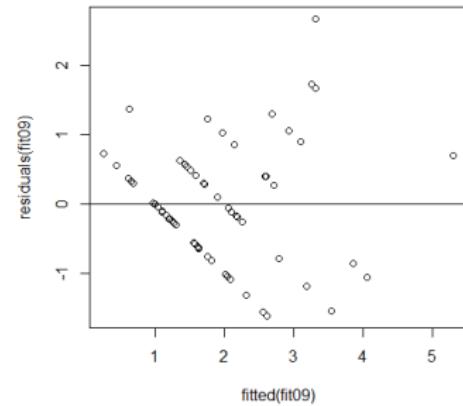
- We fit a full model to each year

$$Y_{GP_{year}} = \beta_0 + \beta_{avgScore} + \beta_{avgASS} + \beta_{avgFT} + \beta_{avgPF} + \beta_{avgTP} \\ + \beta_{avgFT} + \beta_{avgRB} + \beta_{avgTO} + \beta_{avgSTL} + \beta_{avgBL} + \beta_{GP_{year-1}} + \epsilon$$

\*average stats come from initial year's data

# Model Analysis

- Analyzed residuals for non-constant variance



# Model Analysis

- Utilized stepwise AIC/BIC
- Implemented both backward/forward pass
- Repeated process on years 2003 to 2015
- Common predictors include GP, TO, ASS, FT, PF, and FG

# Final Model

- We adjusted our model accordingly

$$Y_{GP_{year}}^{-0.5} = \beta_0 + \beta_{avgASS} + \beta_{avgFT} + \beta_{avgPF} + \beta_{avgFG} + \beta_{avgTO} + \beta_{GP_{year-1}} + \epsilon$$

\*average stats come from initial year's data

# Predictions

- We attempted some predictions on the 2016 NCAA March Madness tournament

Duke:

```
> predict(fit09Adj2, predset09, interval="predict")
fit      lwr      upr
1 3.145849 1.042621 5.249077
```

Albany:

```
> predict(fit09Adj2, predset, interval="predict")
fit      lwr      upr
1 2.189929 0.2506521 4.129206
```

# Future Exploration

- Including conference data
- Accounting for teams that didn't make the tournament
- Using more than one year's previous Games Played in Tournament
- Add some new predictors, ex: points allowed
- Predicting stats other than games played, ex: games won during regular season

# Questions?

