Mitchell Wilson

**Title:** Applications of Machine Learning and Neural Networks in Professional Basketball

**Team Members:** Mitchell Wilson

**Description:** Leveraging machine learning has applications in just about every area of basketball. I plan to use machine learning algorithms to predict when players and/or teams will have season-long performances that vary greatly from what most people would expect. In other words, who will break or bust.

**Existing Work:** Machine learning is no stranger to the NBA. Machine learning is used to predict the upcoming season’s most valuable player (MVP), defensive player of the year (DPOTY), finals champions, conference champions, scoring leader, rookie of the year (ROTY), etc. Most of the work I can find in this area involves predicting the scores of individual games. This makes sense, considering that individual games are likely to be the subject of most bets. More recently, teams have begun to install high-tech cameras in their practice facilities that capture and interpret absurd amounts of visual data. These types of software can pick up on lapses in shooting form, hot and cold spots on the floor, and much more. My work will be different from what you commonly see regarding the NBA and machine learning, because it will focus on predicting when predictions are likely to be wrong. For every break or bust season that a player has, there will be someone saying that they knew that would happen. For that reason, I will be using the predictions from places that are home to popular and trusted sports analysts such as ESPN and even popular gambling websites.

**Preliminary Plan:**

1. Construct dataset. I will gather data from websites such as Kaggle and Basketball-Reference on players who have famously had break or bust seasons
2. Write an introduction and determine the general structure and flow of my paper
3. Use a regression algorithm to see if I can weed out features that are useless for my predictions, and see if we can get some accuracy in predictions
4. Use a neural network that will output either break or bust. I would also like to keep track of a metric that will tell me how confident the network is in that prediction.
5. Visual data and predictions with graphs and tables to make it easy to understand
6. Put everything together and have a full rough draft
7. Get critique on rough draft, make necessary changes, and construct a final report

**References:**

Quantifying Shot Quality in the NBA (Chang et al. 2014)

Prediction of NBA Games Based on Machine Learning Methods (Y.H. Hu. 2013)

Recognizing and Analyzing Ball Screen Defense in the NBA (McIntyre et al.)

Using Automated Machine Learning to Predict NBA Player Performance (Miller. 2018)

Artificial Intelligence in NBA Basketball (Woo. 2018)