PROJECT TITLE: Finding All-Star Shooters

DATASET: National Basketball Association (NBA) statistics from 2014-2018

PROJECT IDEA: Our project will consistent of classification-based and reinforcement learning-based determination of outstanding players based on NBA statistics from 2014-2018. The classification-based approach will incorporate a decision tree and kNN to determine the 2017-2018 All-Stars. The decision-tree based implementation will use All-Star player data from 2014-2017 to construct a classification for 2017-2018 players. The kNN based implementation will construct a graph of 2017-2018 All-Star statistics to classify a player based on nearest neighbors. Both algorithms will classify a set of 24 (12 from each conference) All-Stars and the misclassification rate will be compared to determine the better classifier.

The reinforcement learning-based determination of outstand players will utilize teammate shooting percentages for the 2017-2018. Unknown to the computer, we will develop a multi-armed bandit to predict the shooting percentage of each teammate with a goal of making the most shots over 10,000 iterations. Each made shot by a player will reward the program one point, while missed shots will award zero points. As a player is recognized to consistently have the highest shooting percentage, the program will exploit the player while also factoring in iterations to explore the shooting abilities of other teammates. By the end of the episode, shooting averages will be computed for all team members and the computer will distinguish the most outstanding player.

SOFTWARE: Python 3 and MATLAB

RELEVANT PAPERS:

Reinforcement Learning Multi-armed Bandits Chapter <https://web.stanford.edu/class/psych209/Readings/SuttonBartoIPRLBook2ndEd.pdf>

Relative Importance of Performance Factors in Winning NBA Games in Regular Season versus Playoffs

<https://www.degruyter.com/downloadpdf/j/jqas.2010.6.3/jqas.2010.6.3.1260/jqas.2010.6.3.1260.pdf>

WORK DIVISION:

Malik Majette: Reinforcement learning algorithm for predicting shooting percentages

Qua Jones: Decision tree algorithm for All-Star classification

Wenting Zheng: kNN algorithm for All-Star classification

MIDTERM MILESTONE:

* Data preprocessing
* Working Algorithms
* Initial Data Results