Project 2: *Hot Hand Fallacy*

The goal of this experiment is to test the hot hand phenomenon, which says that players are more likely to make shots on a streak. I simulated 10,000 shot sequences to test the hot hand fallacy. Using Python, I modeled a basketball player's shooting stats to analyze whether shot outcomes are independent and to examine the probability distribution of making shots after streaks. My student ID is 3487428, the true shooting percentage is 58%; I have simulated sequences of length 50, and I examine what occurs after streaks of 2 straight 1’s.

A graph of a number of hot streak probabilities

Description automatically generated

Distribution of probabilities of hitting a shot after two consecutive makes.

minimum 0.0, median 0.571, maximum 0.889, mean 0.554, Q1 0.471, and Q3 0.647.

Because each shot is an independent event with probability 0.58, the expected probability of hitting a shot after making two is still 0.58. For the hot streaking to be a real phenomenon, we would expect to see an increase in shot make probability after hitting two in a row. The results from my trials support the idea of the hot hand fallacy. If hot hand existed, then the graph would show a more left skewed distribution, as there will be greater probability of a shot going in after consecutive makes.

This graph has a more symmetric distribution around values from 0.5 – 0.66. Peaks at around 0.50 and 0.66 can be explained due to the small sample size of 50 shot attempts. In smaller samples it is more likely for probabilities of 1/2 or 2/3. The interquartile range (Q3 - Q1) is approximately 0.176, indicating that most probabilities fall within this narrow interval around the mean. Additionally, the mean and median of the dataset is ~0.554 and ~0.571 respectively. Neither of these shooting percentages after two consecutive scores exceed 0.58, so there is little evidence that hot hand exists.

For a player with no hot hand, we expect the event of each shot to be independent, and the probability of a shot after a streak to be equal to the true shooting percentage. The results of my trials align with this expectation; the observed probabilities of a shot after streak are roughly symmetrically distributed around the true shooting percentage of 0.58. Along with the lack of evidence for increased probability after streaks, my experiment’s conclusion supports the hot hand fallacy.