

## Predicting Match Outcomes in Team Sport via Machine Learning: Evidence from National Basketball Association

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**Abstract :** This paper develops a team sports outcome prediction system with potential for wide-ranging applications across various disciplines. Despite significant advancements in predictive analytics, existing studies in sports outcome predictions possess considerable limitations, including insufficient feature engineering and underutilization of advanced machine learning techniques, among others. To address these issues, we extend the Sports Cross Industry Standard Process for Data Mining (SRP-CRISP-DM) framework and propose a unique, comprehensive predictive system, using National Basketball Association (NBA) data as an example to test this extended framework. Our approach follows a holistic methodology in feature engineering, employing both Time Series and Non-Time Series Data, as well as conducting Explanatory Data Analysis and Feature Selection. Furthermore, we contribute to the discourse on target variable choice in team sports outcome prediction, asserting that point spread prediction yields higher profits as opposed to game-winner predictions. Using machine learning algorithms, particularly XGBoost, results in a significant improvement in predictive accuracy of team sports outcomes. Applied to point spread betting strategies, it offers an astounding annual return of approximately 900% on an initial investment of \$100. Our findings not only contribute to academic literature, but have critical practical implications for sports betting. Our study advances the understanding of team sports outcome prediction a burgeoning area in complex system predictions and pave the way for potential profitability and more informed decision making in sports betting markets.

**Keywords :** machine learning, team sports, game outcome prediction, sports betting, profits simulation

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