A Machine Learning Approach for Multi-Market Sports Betting Prediction with Comprehensive Feature Engineering

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***Abstract*—This paper presents a comprehensive machine learning-based approach for predicting outcomes in sports betting markets. We introduce a unified prediction system that combines sophisticated feature engineering with market-specific models to generate profitable betting strategies. Our system processes historical sports data through a pipeline of feature engineering, model training, and strategy evaluation. The approach incorporates multiple prediction markets and employs an extensive set of engineered features capturing temporal patterns, team performance metrics, and market dynamics. Experimental results demonstrate the system's effectiveness across different betting markets, with particular success in identifying value bets through feature importance analysis. The evaluation framework considers both prediction accuracy and betting performance metrics, including ROI and risk-adjusted returns. Our findings contribute to the understanding of market efficiency in sports betting and the practical application of machine learning in this domain.**

I. Introduction

Sports betting represents a complex prediction challenge where success depends on accurately modeling numerous variables and their interactions. The growing availability of historical data and advancement in machine learning techniques has opened new possibilities for systematic approaches to sports prediction. However, developing profitable betting strategies requires not only accurate predictions but also careful consideration of market efficiency and risk management.

A. Background

The sports betting market has experienced significant growth with the advent of online betting platforms and the increasing availability of detailed sports data. This growth has been accompanied by heightened interest in applying quantitative methods to betting strategy development. Machine learning approaches have shown promise in this domain, though challenges remain in developing consistently profitable strategies.

B. Problem Statement

The primary challenges in sports betting prediction include:

- Identifying relevant features from complex, high-dimensional data
- Developing models that can adapt to changing market conditions
- Creating robust evaluation frameworks that consider both prediction accuracy and betting performance
- Managing risk across multiple betting markets

C. Research Objectives

Our research aims to address these challenges through:

- Development of a unified prediction system incorporating multiple betting markets
- Implementation of comprehensive feature engineering pipeline
- Creation of market-specific evaluation metrics
- Analysis of feature importance across different prediction tasks

II. Literature Review

[Literature review content will be added based on relevant papers and previous work in the field]

III. Methodology

A. System Architecture

Our betting prediction system consists of four main components:

- Data Loading and Preprocessing Module
- Feature Engineering Pipeline
- Unified Prediction System
- Evaluation Framework

[Detailed methodology content will be expanded]

IV. Experimental Setup

[Experimental setup details will be added]

V. Results and Discussion

[Results and analysis will be added]

VI. Conclusion

[Conclusions and future work will be added]

References

[1] Author, "Title of paper," Journal Name, vol. X, no. X, pp. XXX-XXX, 200X.