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Optimizing Football Betting Strategies Using Deep Neural Networks and Modern Portfolio Theory

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This paper presents a hybrid framework combining Deep Neural Networks (DNNs) and Modern Portfolio Theory (MPT) to optimize football betting strategies. Leveraging historical match data from five major European leagues (2014–2025), we engineer predictive features such as dynamic Elo rankings, expected goals (xG), and team performance metrics derived from raw game statistics. Diverse neural architectures, including convolutional (Conv1D) and recurrent (LSTM, GRU) layers, are systematically explored to capture spatial and temporal patterns in match outcomes and goal totals. Automated Machine Learning (AutoML) techniques further refine model selection and hyperparameter tuning, ensuring robustness. MPT principles are then applied to balance risk and return, evaluating strategies ranging from threshold-based betting to a modified Kelly Criterion. The synergy of advanced predictive modeling, automated architecture optimization, and systematic risk management provides a scalable, data-driven pathway to sustainable profitability in sports betting.

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