

Foosball Simulation: A Platform for Monte Carlo and Reinforcement Learning Research

Abstract:

This project presents a comprehensive approach to strategizing and visualizing foosball gameplay by incorporating Monte Carlo simulation and reinforcement learning techniques. It introduces a realistic open-source 2D foosball simulation environment (available on GitHub: [add link]). Importantly, the simulation environment adheres to the official dimensions of standard foosball tables and features realistic physics to ensure accurate modeling of gameplay dynamics.

The simulation allows the integration of Monte Carlo simulations, enabling experimentation with different strategies and supporting decision-making processes. A number of Monte Carlo simulations have been conducted to explore potential attack and defense strategies, with the platform enabling experimentation such as 'aggressive forward pressure' or 'zone defense'. Additionally, the project supports the integration of RL agents for experimentation. The integration of Proximal Policy Optimization (PPO) to enhance strategic learning has been explored as a proof of concept, demonstrating its potential to complement Monte Carlo methods in adaptive decision-making.

This combination of techniques offers a compelling platform for studying strategic decision-making in foosball. We envisage this project and the proposed simulation environment to support further research on strategic foosball planning and AI integration.

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