Performance Comparison of $C = \sqrt{2}$ and $C = 1.5$

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1 Introduction

In this experiment, I compared the performance of a checker-playing agent using two different values for the constant C in the evaluation function. The theoretical optimal value for C, based on known game-theory principles, is $C = \sqrt{2}$, which was used as the benchmark for this comparison. The second value, $C = 1.5$, was chosen arbitrarily to explore how slight deviations from the optimal value might affect the performance of the agent.

2 Results and Observations

When using $C = \sqrt{2}$, the agent was able to more accurately evaluate board positions, resulting in more optimal moves. This theoretically optimal value appears to balance the tradeoff between exploring potential future moves and exploiting current opportunities on the board. As a result, the agent exhibited a more strategic and well-rounded approach to playing the game, with an improved ability to plan ahead.

In contrast, when using $C = 1.5$, the agent's performance was noticeably less efficient. The agent tended to make more immediate, less strategic moves, often favoring short-term gains without considering longer-term consequences. This led to more errors and suboptimal plays, especially in complex board states that required deeper foresight.

Overall, the experiments demonstrated that $C = 1.5$ did not provide the same level of performance as $C = \sqrt{2}$. While $C = 1.5$ still resulted in a playable agent, its moves were less refined, highlighting the importance of tuning C closer to the theoretical optimal value to achieve the best results in this checkers-playing agent.