WIU CENTENNIAL HONORS COLLEGE
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Abstract

Poster

Major Engineer Physics

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Search Algorithm Analysis for Tic-Tac-Toe

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Minimax and Monte Carlo tree search (MCTS) are two tree search computer algorithms utilized to predict the best possible moves for players in board games such as Tic-Tac-Toe, Chess, and Connect Four, among many others. We have implemented Minimax and MCTS to play Tic-Tac-Toe. To comparatively study the effectiveness of the two algorithms we pit them against each other or have them play against a player that chooses moves at random. We determine win/loss/draw statistics for thousands of runs of the games to understand the effectiveness of the algorithms. As Minimax turns out to be an optimal algorithm for Tic-Tac-Toe the comparative statistical study allows us to understand the optimal parameters needed for tuning the performance of MCTS. We plan to use this information to create a hybrid algorithm that can perform well in a quantum version of Tic-Tac-Toe and more complex games such as Connect Four and Chess. We also envision implementing our hybrid algorithms to quantum versions of Connect Four and Chess.