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Method:

The Gomoku game, with a board size of 15 x 15 and a win size of 5, was the subject of the project. We developed an advanced evaluation function for helping the min player to beat the professor's AI. The evaluation function carefully evaluated the state of the board at that moment, pointing out important components like free spaces, possible winning patterns, and the opponent's most recent moves. Through this process, it acquired a deeper understanding of the game's dynamics, enabling it to make more informed decisions choices as per the rules of Gomoku.

Several criteria were added to the evaluation function to improve the AI's decision-making. The main strategy involved giving priority to moves made in the center of the board, as control over this area frequently results in stronger gameplay positions. Furthermore, the current state's winning patterns that have been observed were given a great deal of weight. Moves with the potential to advance the game toward victory were rewarded with higher scores for their contributions to or extensions of these patterns. Assessing the game states enabled the AI to think a few steps ahead while also being aware and adaptable to the ever-changing nature of the domain.

Discussion:

Our AI's performance in the Gomoku project showed an interesting contradiction: in wins, it used its full potential and did so with remarkable success, but in losses, it was vastly outmatched by its adversary. This divided performance demonstrated its strengths in executing pre-programmed strategies in conventional game scenarios, but it also brought attention to a significant weakness in managing complex, unanticipated events, suggesting that it needs more flexibility and strategic depth.

As we move forward with this project, our main goal would be to solve the edge cases that our AI is currently unable to handle. These situations frequently result from complex board arrangements or unanticipated moves made by the opposition AI, which our existing model is unable to sufficiently account for. The main difficulty encountered during the project was enhancing the function that evaluates scores, which required an in-depth understanding of Gomoku's complex mechanics and the capacity to convert this information into a functional algorithm. This task demonstrated the difficulties of precisely evaluating a variety of board states and predicting the best moves by combining technical knowledge with strategic insight of the Gomoku.

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