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J3A - Artificial Intelligence

Midterm Activity 2: Build a Minimax Tic-Tac-Toe (Player vs AI)

Explain Minimax in your own words

- For me, Minimax is a way the AI always plays perfectly in Tic-Tac-Toe. No matter who goes first, the AI always makes the best move. Even if the player goes first, the game will usually end in a draw, unless the player makes a mistake. The AI looks at all the possible moves for both players and chooses the move that gives it the highest chance of winning or at least not losing. The way it works is that the AI thinks ahead. It checks every possible move it can make, then predicts how the player might respond. It gives a score to each outcome: +1 if the AI wins, -1 if the AI loses, and 0 for a draw. Then it picks the move that leads to the best score. This is why it is almost impossible to beat the AI using Minimax. Even if the player thinks they have a good strategy, the AI will always find the best counter-move. This makes Minimax very strong for simple games like Tic-Tac-Toe, because it never makes mistakes. If the AI used Alpha-Beta pruning, it could make these perfect decisions faster by skipping moves that don't change the outcome.

Reflection: One insight or challenge you faced.

- One challenge I faced while doing this activity was understanding how the AI decides the best move. At first, the idea of checking every possible move and imagining how the player would respond was confusing. I didn't realize how the AI keeps track of all the possible outcomes until I saw it in action. Another interesting part was seeing that even if I go first, I can't beat the AI. The AI will either draw or win, depending on my mistakes. This made me understand how powerful Minimax is in making the AI smart. I also learned that Alpha-Beta pruning is very helpful because it makes the AI faster. Without it, the AI checks every single possibility, which takes longer. With pruning, the AI can skip moves that won't affect the final result but still pick the best move. This activity helped me understand how AI can "think ahead" and make decisions like a human would if they planned carefully. I also realized that logic, prediction, and planning are very important in problem-solving, not just luck. It was exciting to see how a simple game like Tic-Tac-Toe can teach you about these important ideas.