# Tic-Tac-Toe AI Game Explanation

In this Tic-Tac-Toe game, two players (User and AI) alternate turns. The board is a 3x3 grid where each player attempts to align three of their symbols (X or O) in a row, column, or diagonal to win. If all cells are filled without a winner, the game ends in a tie.

## AI Mechanism: Minimax Algorithm:

The AI in this game uses the minimax algorithm, a classic AI technique used in two-player games. Here’s how it functions:

1. 1. Recursive Decision-Making:

* The AI evaluates each possible move and anticipates the user’s responses by exploring all potential game states to find the optimal move.

1. 2. Maximizing and Minimizing:

* - The AI’s goal is to maximize its chances of winning, while minimizing the user's chances.  
  - Each game state is assigned a score:  
   - +1 for an AI win  
   - -1 for a user win  
   - 0 for a tie

1. 3. Alpha-Beta Pruning:

* To make the decision-making faster, the AI skips unnecessary moves that don’t improve the outcome, known as "pruning," which optimizes the algorithm.

1. 4. Optimal Move Selection:

* Using the minimax function, the AI evaluates all possible moves and selects the one with the highest potential score, ensuring the best possible outcome.

## Code Structure:

Key functions:

- minimax: Main function that finds the best move.  
- Max\_Value and Min\_Value: Helper functions that simulate maximizing the AI’s score and minimizing the user’s advantage, respectively.  
- result: Simulates the result of a move on the board.  
- utility: Determines the score of the board when the game is over.

This algorithm ensures that the AI plays optimally, making it impossible for the user to win if both play perfectly.