Assignment on Adversarial Search

Tic Tac Toe with Minimax and Alpha-Beta Pruning

Objective:

The objective of this assignment is to implement the classic game of Tic Tac Toe as an adversarial search problem and develop an AI player using the minimax algorithm with alpha-beta pruning. Students will create a program that allows human vs. computer and computer vs. computer gameplay and should print the game board on the console after every move.

Requirements:

Game Implementation:
Implement the Tic Tac Toe game with a 3x3 grid.
Develop a console-based program that facilitates gameplay.
Print the current state of the game board after each move, using 'X' and 'O' to represent player moves.

Minimax Algorithm:
Implement the minimax algorithm to determine the computer's moves.
Utilize alpha-beta pruning to enhance the efficiency of the minimax algorithm.
Ensure that the AI player (computer) always makes optimal moves based on the current state of the board. (For example, you can assign a positive score (+10) for the AI player's winning or potential winning positions, and a negative score (-10) for the opponent's winning or potential winning positions.)

Game Modes:
Human vs. Computer: Allow a human player to play against the computer AI, with the ability to set the AI's search depth.
Computer vs. Computer: Implement a mode where two AI players can compete against each other, with adjustable search depths for both.

Gameplay:
Enable human players to input their moves via the console interface.
Ensure that the AI player makes its moves automatically and displays them on the console.
Implement the rules for winning the game, declaring a draw, or ending the game when a player wins.

Console Output:
Print the game board on the console after every move, using 'X' for one player and 'O' for the other player.
Display whose turn it is and the result of the game (win, draw, or ongoing) using text-based messages.

Functions:
You may choose to implement your game by utilizing the provided placeholder code here. However, it is not obligatory to strictly adhere to the outlined structure.

Note: Students are not required to implement a graphical user interface (GUI). The assignment focuses on the functionality of the game and AI decision-making. ****Any attempt of plagiarism will result in significant penalties****