**AI-based Tic-Tac-Toe Game with Search Algorithms**

1. **Introduction**

The **AI-based Tic-Tac-Toe Game with Search Algorithms**is a Python-based project that combines game development, artificial intelligence (AI), and graphical user interface (GUI) design. The game allows users to play Tic-Tac-Toe in two modes: Player vs Player and Player vs Computer. The AI opponent uses suitable algorithm to make optimal moves, ensuring a challenging experience for the player. The project demonstrates the practical application of different algorithms used to build the game.

1. **Problem Statement**

Tic-Tac-Toe is a classic game that is often used to teach fundamental concepts in game theory and AI. However, building a functional and interactive version of the game with an AI opponent requires a deep understanding of algorithms, GUI development, and user interaction. This project aims to address the following challenges:

* + Implementing various AI techniques that can play optimally.
  + Providing an intuitive and engaging gameplay experience.
  + Enhancing understanding of decision-making algorithms in games.
  + Ensuring the game is user-friendly

1. **System Features**

The key features of the system include:

1. Two Game Modes:
   * Player vs Player: Two human players can play against each other.
   * Player vs Computer: A human player can play against an AI opponent.
2. Four AI Strategies:
   * Random move
   * Heuristics
   * Minimax Algorithm
   * Monte Carlo Search Tree - MCTS
3. Win/Draw Detection:
   * Automatically detects wins and draws and displays the result
4. **Technologies Used**

The following technologies and tools are used in the project:

1. **Programming Language**: Python
2. **Libraries**:
   * **Random:** For adding variability to AI moves when needed.
3. **Algorithms:** 
   * Random move
   * Heuristics
   * Minimax Algorithm
   * Monte Carlo Search Tree - MCTS