RD infro technology

ARTIFICIAL INTELLIGENCE INTERNSHIP - TASK REPORT

Intern Details

Name: SANTHOSH K R

College: Rajalakshmi Institute of Technology, Chennai

Department: B.E. CSE - AI & ML

Internship Period: June - July 2025

Task Title: Developing an AI Agent for Tic-Tac-Toe

Objective

The objective of this task was to design and implement an artificial intelligence (AI) agent capable of playing the classic game Tic-Tac-Toe against a human player. The AI should be able to make optimal moves and either win or force a draw under all circumstances.

Tools & Technologies

- Programming Language: Python
- Libraries: NumPy, random (for basic implementation), optionally matplotlib (for visualization)
- Development Environment: Google Colab / Local Python IDE

Workflow and Methodology

Understanding Game Rules

The game board is a 3×3 grid. Two players take turns marking cells, one using 'X' and the other 'O'. The goal is to place three of one's marks in a horizontal, vertical, or diagonal row.

Designing the AI Agent

Implemented using the Minimax algorithm, a classic decision rule for minimizing the possible loss in a worst-case scenario. Evaluated all possible future moves and selected the move that maximizes the AI's chances of winning while minimizing the opponent's chances.

Implementation Steps

1. Board Representation: Represented as a 2D list or NumPy array.
2. Move Generation: Generated all possible valid moves at each turn.
3. Minimax Algorithm: Evaluated terminal states (win, lose, or draw). Assigned utility scores and used recursion to simulate all possible future game states.

4. Optimization: Added pruning to reduce unnecessary calculations and improve efficiency.

Testing

Played against the AI manually to validate its decision-making. Verified that AI never loses and always forces at least a draw.

Results & Observations

The AI agent consistently played optimally and did not lose any games during testing. Demonstrated strong decision-making and adaptability to different human strategies. Highlighted the importance of algorithmic thinking and game theory in AI design.

Conclusion

This task helped me understand the application of classic algorithms like Minimax in game AI development. It strengthened my practical skills in Python, problem-solving, and algorithm implementation, preparing me for more advanced AI and reinforcement learning projects.

Supporting Files

- GitHub Repository: https://github.com/santhosh-kr714/TIC-TAC-TOE-AI

Signature

SANTHOSH K R