

Connect 4

Github Link: <https://github.com/MdAkramKhanJehad/Connect-4-AI>

Developers:

MD Akram Khan (BSSE 1007)

Ashraful Gafur (BSSE 1021)

Shezan Al Mahmud (BSSE 1023)

Technology Used: Python, Pygame

Features:

- Connect 4 board game
- Random start
- Turn indicator

Game Mechanics:

- Base algorithm : Minimax
- The game tree is reduced using Alpha-Beta Pruning.
- Heuristic Method:
In order to measure any player's probability of winning by completing the particular sequence, the amount of disks a player has in a winning pattern is a heuristic since there is no opponent's disc in that particular pattern.
- Evaluation Function:
For each winning pattern (Horizontal, Vertical, Positive slope, Negative slope), we count the number of AI and human discs in a given state.
If, there is no opposing discs in a pattern,
For AI,
 If 3 disc at a stretch, score += 25*constant
 If 2 disc at a stretch, score += 5*constant
 If 1 disc at a stretch, score += constant
For Human,
 If 3 disc at a stretch, score -= 25*constant
 If 2 disc at a stretch, score -= 5*constant
 If 1 disc at a stretch, score -= constant

→ Additional Logic:

- ◆ As the center column has the highest probability of getting a winning pattern, we have added positional value for it.
- ◆ Cutting off search is done at game tree depth = 5