

Project: Connect 4

Github Repository Link: <https://github.com/Jahid1999/Connect-Four>

Developers:

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Technology Used: Java, JavaFX

Features:

- Connect 4 board game
- Choosing disc colour
- Turn indicator
- Help button for gameplay details

Game Mechanics:

- Base algorithm used for AI: Minimax
- Alpha-Beta Pruning is used to minimise the game tree.
- Heuristic Method:

The number of discs a player has in a winning pattern is a heuristic to estimate his chances of winning by completing that particular pattern (given that there is no opposing disc in that particular pattern).

- Evaluation Function:

At a particular state, for every winning pattern, we count the number of discs for AI and Human.

If, there is no opposing discs in a pattern,

For AI, score = $\text{pow}(\text{count}, \text{count})$

For Human, score = $-\text{pow}(\text{count}, \text{count})$

Then all the scores for every winning pattern are summed to get the final evaluation for that particular state.

- Cutting off search is done at game tree depth = 5
- Additional Logic:
 - ◆ In cases where Human can win with a single move, AI will block that move without making the game tree.
 - ◆ In cases where AI can win with a single move, AI will make that move without making the game tree.
 - ◆ Utility value for winning is inversely proportional to depth of the winning node in the game tree.