Project 1 : MINICHESS

Team : **Ctrl-Alt-Defeat**

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Introduction:

The Minichess AI project is a Python library designed to create an AI for playing Minichess, a simplified chess variant. The AI evaluates the board, calculates optimal moves, and makes decisions based on factors like piece value and game state. It uses the Minimax algorithm, a game theory strategy for assessing possible moves. The goal is to develop an AI that plays Minichess effectively and strategically.

Features :

- **5x6 Chessboard:** Enjoy a unique and smaller board size for faster gameplay.
- **Play Modes:** Choose from **Human vs Human, Human vs AI, or AI vs AI.**
- **Smart AI:** The AI opponent uses standard algorithms like Min-Max for challenging gameplay.
- **User-Friendly Interface:** Experience an intuitive UI and delightful sound effects.
- **Move Counter:** Keep track of the total move count.

Parts of code:

1. **main.py :** Mainly frontend based & run game loop
2. **ai.py :** Use heuristic technique minimax and alpha-beta pruning algorithm based
3. **engine.py :** How the moves are tracked and checkmate ,stalemate checked

Evaluation Criteria:

1. **Assign Piece Value:** Assigns a base value to each piece (e.g., pawn = 1, rook = 4).

2. **Positional Score:** Assigns all piece's good positions and adjusts each piece's value based on its board position, scaled by a factor (0.1 or 0.2).

3. **Valid Move Generation:** Ensures moves are legal, checking if they leave the king in check.

4. **Endgame Conditions:** Detects checkmate or stalemate when no valid moves are available.

Implementation:

1. **Evaluation Function:** Scores moved by piece value and positional value.

2. **Minimax Algorithm:** Finds optimal moves up to depth 4, maximizing for white, minimizing for black.

3. **Alpha-Beta Pruning:** Improves efficiency by eliminating irrelevant branches.

4. **Depth Balance:** Depth 4 offers a balance between strategy and speed.

Reference : https://en.wikipedia.org/wiki/Minichess#5%C3%976_chess
https://www.youtube.com/watch?v=l-hh51ncgDI

Git Link : https://github.com/Nasir-1310/MiniChess-Ctrl-Alt-Defeat-