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CHESS USING ALPHA BETA PRUNING

METHODS OF THE CHESS_ALPHA_BETA_PRUNING WORK IN THIS WAY:

Import chess and math libraries.

__init__(self):

- This method sets up the ChessSimulator class.
- It creates a chessboard for the game.

print_board(self):

- This method shows what the chessboard looks like.

make_move(self, move_str):

- This method lets a player make a move on the board.
- It checks if the move is allowed and does it if it is.

evaluate_board(self):

- This method checks how good the current board is for each player.
- It counts the number of pieces on the board for each player and decides a score.

alpha_beta_pruning(self, depth, alpha, beta, maximizing_player):

- This method helps the computer decide which move to make.
- It looks at possible moves, predicts how good they are, and decides the best one using a clever strategy.

find_best_move(self, depth):

- This method figures out the best move for the computer to make.
- It looks at different moves the computer can make and picks the one that seems best.

play(self, depth):

- This method manages the game until it's over.
- It takes turns between the computer and the player until someone wins or it's a tie. It keeps track of moves and shows the result at the end.
- each letter represents a specific piece, small letters represents another player

  K: King

  Q: Queen

  R: Rook

  B: Bishop

  N: Knight

  P: Pawn

INITIAL STATE: State of the board is represented as

r n b q k b n r

p p p p p p p p

. . . .

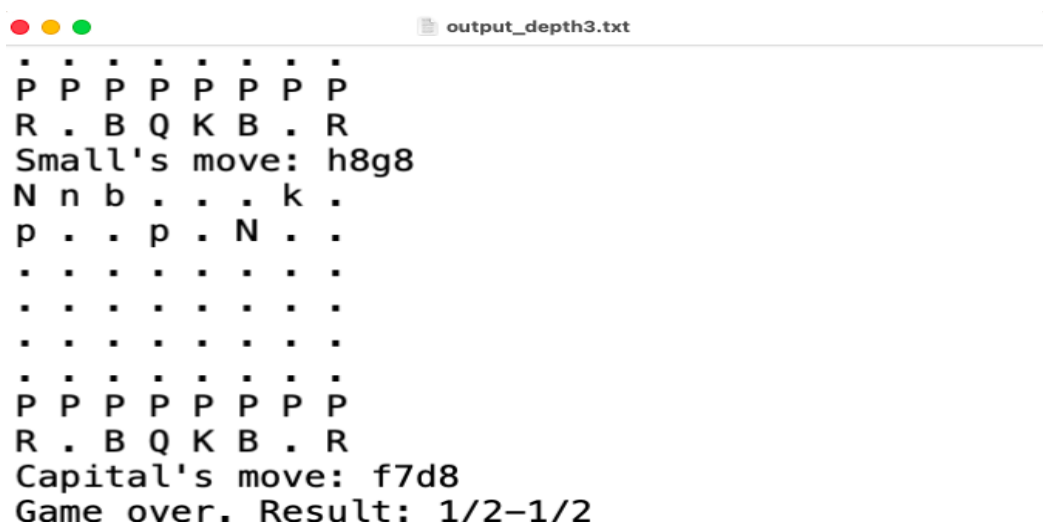. . . . .

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P P P P P P P P

R N B Q K B N R

- Moves are represented using standard notations example g1h3 represents movement from position g1 to h3, alphabet represents columns(starting from the left) and number represents row number starting from the down to up.
- In this project alpha_beta pruning is applied using a certain dept factor to get convergence.
- For depth=3 it is a draw for both the players

```
                        output_depth3.txt
.  .  .  .  .  .  .  .
P  P  P  P  P  P  P  P
R  .  B  Q  K  B  .  R
Small's move: h8g8
N  n  b  .  .  .  k  .
p  .  .  p  .  N  .  .
.  .  .  .  .  .  .  .
.  .  .  .  .  .  .  .
.  .  .  .  .  .  .  .
.  .  .  .  .  .  .  .
P  P  P  P  P  P  P  P
R  .  B  Q  K  B  .  R
Capital's move: f7d8
Game over. Result: 1/2-1/2
```

- For depth=5 getting the result takes a lot of time but converging towards winning of the max player.

- I made another version of alpha_beta pruning in which i played with the program, program won the state of the board is:

```
.  .  .  .  ┌  .  .  .
P  P  P  P  .  P  P  P
R  N  B  .  K  B  .  R
Move 19 — Capital's move: h5h6
r  n  b  q  .  .  r  k
p  p  p  .  p  .  .  .
.  .  .  .  .  .  .  Q
.  .  .  p  .  .  .  .
.  .  .  .  .  .  .  .
.  .  .  .  P  .  .  .
P  P  P  P  .  P  P  P
R  N  B  .  K  B  .  R
Game over. Result: 1-0
```