ARTIFICIAL INTELLIGENCE LAB

OFFLINE-4

IMPLEMENTATION OF ALPHA BETA PRUNING

GAME:OTHELLO

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RULES OF OTHELLO:

Each player can place his disk of a specific color at some specific valid positions in the 8*8 board. The position will be valid if:

There must be at least one disk of his opponent in a straight line or diagonal enclosed between two of the player's own disk. If so, then all those disks that his opponent has enclosed in that line will be flipped and player will receive additional points equal to the number of disks flipped.

The game has 3 outcomes: any of the players win or it is a draw. End of the game is determined by testing whether there is any valid move left for either player. If not, then the game ends. Winner is the one with highest number of disks in the board.

If the player whose turn is now, doesn't have any valid move left, the game will pass to the other player if he has a valid move left.

The game may end even if there are blank spaces in the board. So the end condition of the game is not only whether the board has become full or not, but in reality it is whether both players have run out of valid moves or not.

HEURISTICS USED:

The function evaluation is my heuristic function. Here I have assigned initial alpha=-1000000 and initial beta=1000000. If the game reaches a terminal case, utility value 10000 is returned if AlphabetaAgent wins, value=10 if he loses and value=5000 if it is a draw.

When depth becomes 0, though it is not the terminal case , by heuristics I returned a high value(value=5000) for case of win and a very small value for case of lose(value=100), but this evaluation value for win is less than ideal win value and for loss it is more than ideal value. This has been done because the actual termination has not been reached.

Also, in Othello, the corner positions are extremely crucial to win. Because it is impossible to flip a disc placed in a corner since it can never be flanked between two opponent's discs. A disc placed in a corner is the most simple example of a stable disc. In addition, once a corner gets occupied by a disc, the adjacent discs of same color often become stable discs too. The more the stable discs, the more the chances to win.

So I calculated the number of corner discs owned by each opponent and if a player has greater number of corner discs his heuristic value is increased by 500. This has been done because due to owning more corner positions, he is more favorable to win the game now.