CS165A
MP2
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Architecture

Built upon RandomHex.py. I added my own strategy strategy_NK_v1 to the game. In the function, strategy_NK_v1 first search all available positions. Then depend on the Min Max optimization method, the make_move function will search all possible next two moves and use evalurate_hscore heuristic function to evaluate the corresponding chess boards and return the best move accordingly. Connectivity score, empty score, potential connectivity score and vert/hori score are used to evaluate the heuristic function.

Search

Min max optimization is used to choose the best move based on future two steps predictions. Heuristic score will first be minimized and then maximized. The move with the highest score after minimization will be chosen as the next move. Four scores are used together and weighted differently in determine the final heuristic score. Four scores are:

Connectivity score: measures the connection between a chess and its six neighbors. Scores are added if its neighbor has the same color

Potential connectivity score: measures the potential connection between a chess and the chess that is one empty block away from it. Scores are added if chess one empty block from it has the same color.

Empty score: measures the number of empty spaces around a chess. Scores are added if there are empty spaces around the chess

Vert/hori score: hori score for red, vert score for blue, which measures the longest horizontal or vertical span of connected chess.

Due to Vert/hori score are most closely related to the winning condition. The heuristic function is mostly weighted on the Vert/horiz score. Then the potential connectivity score, connectivity score and the empty score.

Challenges

The main challenge I met in this game is the design of good heuristic function. Before the design of vert/hori score, my agent behaves poorly and could barely beat the random hex agent. The coming of vert/hori score really solved this problem, as my agent could pick fast and quick action in choosing the right play and win the game.

Weaknesses

Due to the heuristics function is highly based on the vert/hori score, if the opponent detect this trend and break my chain at the beginning, my agent behaves poorly. A potential solution is to come up with min-max tree with multi layers to have better idea about my opponents' moves and make better decision.

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