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Udacity Artificial Intelligence

Heuristic Analysis

Custom_score 1 is similar to the Improved_score where it outputs a score equal to the difference in the number of moves available to the two players. However, if your available move is 2 more than your opponents available moves, you start to chase after your opponent, having a heuristic formula own_moves-2*opp_moves.

Custom_score 2 is also a score based implementation of heuristics. Since each corner moves are less desirable than the center moves, each player's score is calculated by 2 times its available center moves plus 1 times its available corner move. Then we return the score difference between the two players.

Custom_score 3 is a combination of custom_score 1 + custom_score 2. Each player's score is calculated by 2 times its available center moves plus 1 times its available corner move. In addition, if the player's available moves are 2 more than the opponent's moves, then the player can start chasing after the opponent, returning a heuristic formula own_moves-2*opp_moves.

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                    **************************
                         Playing Matches
                    **************************

Match #   Opponent    AB_Improved   AB_Custom   AB_Custom_2  AB_Custom_3
                       Won  | Lost   Won  | Lost   Won  | Lost   Won  | Lost
   1       Random      33   |   7    33   |   7    33   |   7    31   |   9
   2       MM_Open     12   |  28    10   |  30    17   |  23    12   |  28
   3      MM_Center    23   |  17    22   |  18    27   |  13    23   |  17
   4     MM_Improved    8   |  32    10   |  30    16   |  24    15   |  25
   5       AB_Open     18   |  22    24   |  16    23   |  17    20   |  20
   6      AB_Center    19   |  21    19   |  21    14   |  26    24   |  16
   7     AB_Improved   22   |  18    19   |  21    20   |  20    27   |  13
--------------------------------------------------------------------------
          Win Rate:      48.2%        48.9%        53.6%        54.3%
```

By increasing the number of matches to 20 and running the tournaments.py, I concluded that heuristic 3 outperformed Improved_score and worked the best. By comparing my result with ones on the forum, I see that my laptop's CPU is also slower than the average, causing a ~50% win ratio for Improved_score. Lastly, the only way to really know the best evaluation function is to try lots of variances in them and see which one works the best.