heuristic_analysis

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1 Discussion

In my implementation, custom_score() uses the weighted sum of two quantities, one is the difference between the number of moves of the current player and that of its opponent, and the other is the square of the distance from the center of the board to the position of the player., custom_score2() uses the difference between the number of moves of the current player and twice of number of moves of its opponent, and custom_score3() uses the sum of two quantities, one is the difference between the number of moves of the current player and that of its opponent, and the other is the square of the distance from the center of the board to the position of the player.

The results are listed in Figure 1, custom_score() is the best one. It puts less weight on the distance from the center term. In contrast, custom_score3() puts the same weight on two terms. custom_score2() tries to choose moves that leave very few number of moves for the opponent. However, it turns out this doesn't lead to better performance.

Finally, custom_score() is the one to use, because it combines two heuristics, it also uses well-balanced weights on the two heuristics. It achieves a higher winning rate than the AB_improved evaluation function. The distance from the center of the board is also very easy to calculate, free lunch. Including the distance doesn't add burden to the computations.

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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      6  |   4    10  |   0     9  |   1     8  |   2
   2       MM_Open     8  |   2     7  |   3     5  |   5     6  |   4
   3      MM_Center    8  |   2     9  |   1     7  |   3     9  |   1
   4     MM_Improved   6  |   4     8  |   2     6  |   4     7  |   3
   5       AB_Open     5  |   5     5  |   5     7  |   3     4  |   6
   6      AB_Center    5  |   5     3  |   7     7  |   3     5  |   5
   7     AB_Improved   5  |   5     7  |   3     5  |   5     2  |   8
--------------------------------------------------------------------------
          Win Rate:      61.4%        70.0%        65.7%        58.6%
```

Figure 1: Performance of different heuristics