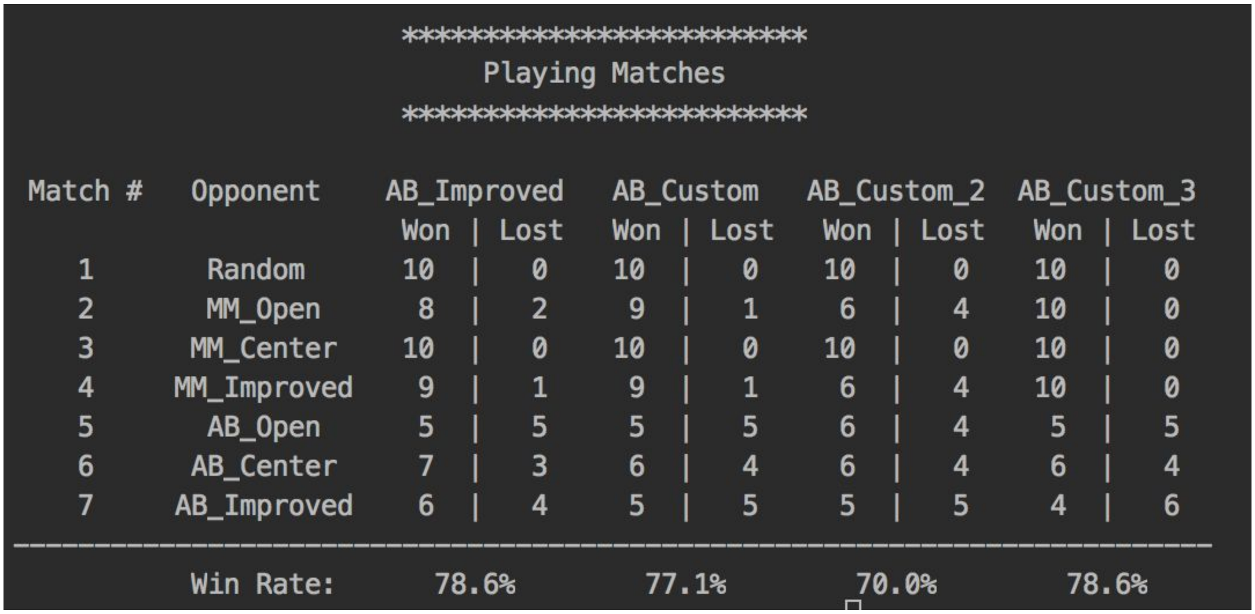
Performance of the Heuristic Functions

Overall Results



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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      10  |   0    10  |   0    10  |   0    10  |   0
    2       MM_Open      8  |   2     9  |   1     6  |   4    10  |   0
    3      MM_Center    10  |   0    10  |   0    10  |   0    10  |   0
    4     MM_Improved    9  |   1     9  |   1     6  |   4    10  |   0
    5       AB_Open      5  |   5     5  |   5     6  |   4     5  |   5
    6      AB_Center     7  |   3     6  |   4     6  |   4     6  |   4
    7     AB_Improved    6  |   4     5  |   5     5  |   5     4  |   6
--------------------------------------------------------------------------
           Win Rate:      78.6%        77.1%        70.0%        78.6%
```

custom_score

$$\frac{a / b}{spaces}$$

This heuristic function returns the number of moves available to the player divided by the number of opponent moves and then divided by the total number of blank moves. I add 1 to prevent dividing by 0. I choose this function because the more moves I had the higher the chances of winning and the lower the blank blank spaces ment the game was coming to an end soon. Overall, it's pretty simple but effective. It had a 77.1% winning rate which was not bad for just a simple function. When running the tournament script, the function performed well vs Random, MM_Open, MM_Center, and MM_Improved opponents but not so well with AB_Open, AB_Center, and AB_Improved. I believe that the function lost most of the games vs the AB_Center due to my game agent no selecting the center move or one that reacts properly to center moves.

custom_score_2:

$$1|0$$

This heuristic function returns 1 if the number of available moves is greater than the opponents or 0 if not. I choose this function as it will return 1 if the player has higher chances of winning. Even though this evaluation function is simple, it achieves a winning rate of 70.0%. It did well on most opponents except the AB_Improved. I believe this is due to my function returning 1 as long as the player has more number of moves.

custom_score_3:

$$\frac{a}{b}$$

This heuristic function returns the number of moves divided by the number of opponent moves available. I used 1 as a fallback if the opponent has no available moves. The reason I choose this function is because the returned number would be high if the player has high number of available moves and the opponent has less. This heuristic function achieves a winning rate of 78.6% which is similar to my first function. I think it had a similar score because I'm dividing the same numbers. Like my previous functions, it performed badly vs the AB_Open, AB_Center, and AB_Improved. This is probably due to my agent no selecting moves optimized for center and reflection moves.