Heuristic Analysis

JuHyung Son

I noticed that the AI player become smarter when I give weights to #my_move and #opponents_move. Also each weight is a hyperparameter, so It needs some experiments to find best hyperparameter.

1.#my_moves - #opponent_moves*weight
As the lesson told,#my_move -#opponent_move*weight makes the computer more aggressive player when the weight is larger than 1. With my experiment #my_move - #opponent_move*weight with weight 1.5 shows best result. This heuristic wins opponents that are using random, minimax heuristic except MM_Imporved. With AB heuristics, computer and opponent has almost same game skill. This heuristic is weak at AB with the open heuristic.

2. #my_moves*weight1 - #opponent_moves*weight2
This time I added one more weight 1.5 on #my_moves. By giving more score for good #my_moves, I expected this will show better result. This heuristic also shows good result with minimax. But for AB, this could not win more than 5. Specially this is weak at AB_Improved. Against MM_open, AB_open, AB_improved the win:lose was 5:5.

3. #black_space+#my_moves-#opponent_moves
In third heuristic, #black_spave, #my_moves and #opponent_moves are considered. This heuristic has #black_space. This #black_space always gives positive score that keeps getting smaller. Which is somewhat meaningless. So I expected this will have same result with custom_score1. But surprisingly, It shows worst result of 21% of win rate.

	AB_Improved win:lose	AB_custom win:lose	AB_custom2 win:lose	AB_custom3 win:lose
Random	9:1	10:0	10:0	4:6
MM_Open	8:2	9:1	5:5	0:10
MM_Center	8:2	9:1	8:2	5:5
MM_Improved	8:2	5:5	6:4	0:10
AB_Open	5:5	4:6	5:5	1:9
AB_Center	5:5	6:4	5:5	3:7
AB_Improved	3:7	5:5	4:6	2:8
Win rate	65.7%	68.6%	61.4%	21.4%

As a result, If I join the Isolation AI tournament, I will go with AB_custom. This heuristic wins MM heuristic. Among custom_scores, this shows highest win rate with pretty large

difference. Also this heuristic shows higher win rate compared to AB_Improved. Additionally, against AB_Improved, AB_custom is better than the others.