Heuristic Analysis

For the Isolation Game player, three following heuristic function has been implemented and tested. Finally, the result of each heuristic function will be discussed and compared.

Heuristic Function 1 - calculates distance from the corners. How much our position is far from the corners, means our chance to win is higher as our player will have additional legal moves.

Heuristic Function 2 - calculates difference between number of my moves and opponent's move left. This intuitive evaluation function tries to encourage the advantage of my situation against my opponent. The higher number of moves left for my player, give us more stable position than my opponent. However coefficients are tweaked with giving coefficient of 10 to our agent move and -1 to my opponent's move.

Heuristic Function 3 - calculates the distance between myself and my opponent. This function works based on the fact that if our player positioned away from opponent, then it will have higher chance to find more suitable move in the future. Farther distance means the place that will be locked by my opponent is less.

After implementation of those heuristic functions, the result shows that the distance from the corner does not show an acceptable result. It gets the worse result in all matches on compare with ID Improved except in one case.

	ID_Improved		Function 1	
	Win	Lost	Win	Lost
Random	8	2	7	3
MM_Open	6	4	4	6
MM_Center	9	1	10	0
MM_Improved	7	3	7	3
AB_Open	5	5	5	5
AB_Center	7	3	4	6
AB_Improved	5	5	5	5
Win Rate	67.1%		60.0%	

In another hand, the second function has achieved the better result in compare with first function as it wins 70% of the matches in compare with ID Improved with win only 67.1%. It shows that setting the right coefficient for the evaluation function can have a significant effect on the result.

	ID_Improved		Function 2	
	Win	Lost	Win	Lost
Random	8	2	9	1
MM_Open	6	4	8	2

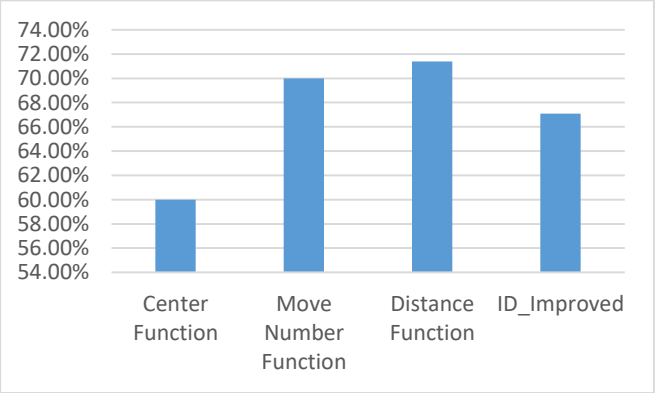
MM_Center	9	1	9	1
MM_Improved	7	3	9	1
AB_Open	5	5	4	6
AB_Center	7	3	5	5
AB_Improved	5	5	5	5
Win Rate	67.1%		70.0%	

Finally, the last function, which take the distance between players shows the best result here. This function wins 71.4% of the matches while ID Improved wins 67.1%. This function give slightly better result in compare with the second function.

	ID_Improved		Function 3	
	Win	Lost	Win	Lost
Random	8	2	10	0
MM_Open	6	4	8	2
MM_Center	9	1	10	0
MM_Improved	7	3	6	4
AB_Open	5	5	4	6
AB_Center	7	3	6	4
AB_Improved	5	5	6	4
Win Rate	67.1%		71.4%	

Comparisons between the performances of the mentioned methods are visualized as follows.

	Win Rate
Center Function	60.0%
Move Number Function	70.0%
Distance Function	71.4%
ID_Improved	67.1%



The suggestion for the score function is the manhattan distance. Win Rate for this function is improved in compare with ID_Improved function and also the Move Number Function. Besides that it benefited from the faster time complexity as manhattan distance calculation is working with numbers however the ID_Improved require some loop in order to find the result. Complexity of O(1) give it a chance to run faster and furthermore it can run in deeper search to get the better result.