HEURISTIC ANALYSIS REPORT
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In this project, three heuristics were already provided - open_move_score, center_score, and improved_score. I created three other custom heuristics that played against these heuristics, and their performances were compared against the given AB_Improved heuristic. Below is the summary of the results and the justification of each heuristic's implementation as well as performance.

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	10	0	7	3	8	2	8	2
3	MM_Center	10	0	10	0	10	0	10	0
4	MM_Improved	7	3	9	1	8	2	7	3
5	AB_Open	3	7	6	4	6	4	5	5
6	AB_Center	5	5	5	5	5	5	7	3
7	AB_Improved	6	4	7	3	6	4	4	6
Win Rate:		**72.90%**		**77.10%**		**75.70%**		**72.90%**	

Heuristic 1: **custom_score_3**

This heuristic evaluates the given position on the board based on the number of available moves of both player and its opponent, the more available moves the player has compared to its opponent, the better the position is. It assumes that if opponent has less remaining moves, then the games is eventually winning for the player, as opponent will soon run out of moves. Also, it is an aggressive version of the AB_Improved in that it tries to remain two steps ahead of the opponent. The formula used is own_moves - 2 * opp_moves. As can be seen from the result table above, it performs on par with the AB_Improved. But in most of the cases, it proved to stay just above the AB_Improved in performace. However, this heuristic misses to address other essential strategies of game like the distance from the center or the distance from the opponent.

Heuristic 2: **custom_score_2**

This heuristic evaluates the position based on the distance of player and its opponent from the center, plus the distance between the players. It addresses an important strategy of any board game, controlling the center. In a knight move game, knight placed towards the center of the board will have more moves to play than the one at the edge. Comparing the player's center distance from that of opponent assures that the opponent is farther from the center. It proved to perform little better than AB_Improved, here at 75.70% compared to AB_Improved's 72.90%. It also has the advantage of being fast.

Heuristic 3: **customer_score**

This heuristic improves upon the previous heuristic. Even though previous heuristic was able to grab the center, it can fail after the board is very occupied with most of the moves towards the center. This heuristic ensures that player still has more moves remaining while grabbing the center. It puts weights on each of the features (number of moves compared with opponent, distance towards center, and distance from the opponent) and it considers number of moves to be more important by providing it more weight. This heuristic was always able to beat provided improved score heuristic.

Conclusion

I recommend using heuristic **customer_score** because of the following reasons:

1. It can leverage the positional advantage (remaining towards center) while also ensuring the maximum available moves.
2. It considers and weighs the combination of all major features(number of moves, distance from center, distance from opponent) on the board, which is important because some feature like number of legal moves could be more valuable at any position, whether the player is at center or away/close from opponent.
3. It performs better in practice compared to all other heuristics.
4. The running time complexity is as good as Improved Heuristic. It is fast to calculate the score and hence can support maximum position evaluation in the given time frame.