Isolation Heuristic Analysis

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This project aims to build adversarial search agent to play the game "Isolation". This report includes the summary of the performance of the custom heuristics against a baseline agent using alpha-beta search and iterative deepening. Three different heuristic have been Implemented.

1. **AB_Custom**

   len(my_moves) - len(opp_moves)2**

   We minimize the opponent's move here.

2. **AB_Custom2**

   len(my_moves) - len(opp_moves)

   This reflects my advantages compared to the opponent.

3. **AB_Custom3**

   len(my_moves) - len(opp_moves) + opp_distance_to_center - my_distance_to_center

   If current position is at the center of the board, that means the player has more moves.

   This function takes into consideration two factors as my total advantages**.**

Agent	Performance	Rank
AB_Improved	76.8%	2
AB_Custom	77.5%	1
AB_Custom2	74.3%	3
AB_Custom3	72.1%	4

The custom_score function has been Implemented to execute the AB_Custom because:

1. It outperforms all other heuristics with win rate of 77.5%.
2. It not only considers my advantage compared to the opponent, but also more stricter to our player.
3. It is simple to calculate and does not need much computation time which allows the player to go deep along the search tree meanwhile keep a reasonable complexity.

Evaluation results:

Opponent	AB_Improved	AB_Custom	AB_Custom2	AB_Custom3
Random	40|0	40|0	40|0	40|0

MM_Open	36|4	36|4	35|5	34|6
MM_Center	36|4	37|3	36|4	35|5
MM_Improved	34|6	35|5	34|6	33|7
AB_Open	25|15	24|16	21|19	20|20
AB_Center	23|17	24|16	25|15	23|17
AB_Improved	20|20	21|19	17|23	17|23
	76.8%	77.5%	74.3%	72.1%