Heuristic Analysis

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Three heuristic are implemented in this project:

1. custom_score(): returns –inf if the current player loses the game, inf if the current player wins, and (# of player's legal moves - # of opponent's legal moves)^2 with the original move difference's sign if game is not ended.
2. custom_score2(): returns –inf if the current player loses the game, inf if the current player wins, and (# of player's legal moves + player's centrality) if game is not ended.
3. custom_score3(): returns –inf if the current player loses the game, inf if the current player wins, and a random number between -20 an 20 if game is not ended.

The tournament results are summarized in the figure below.

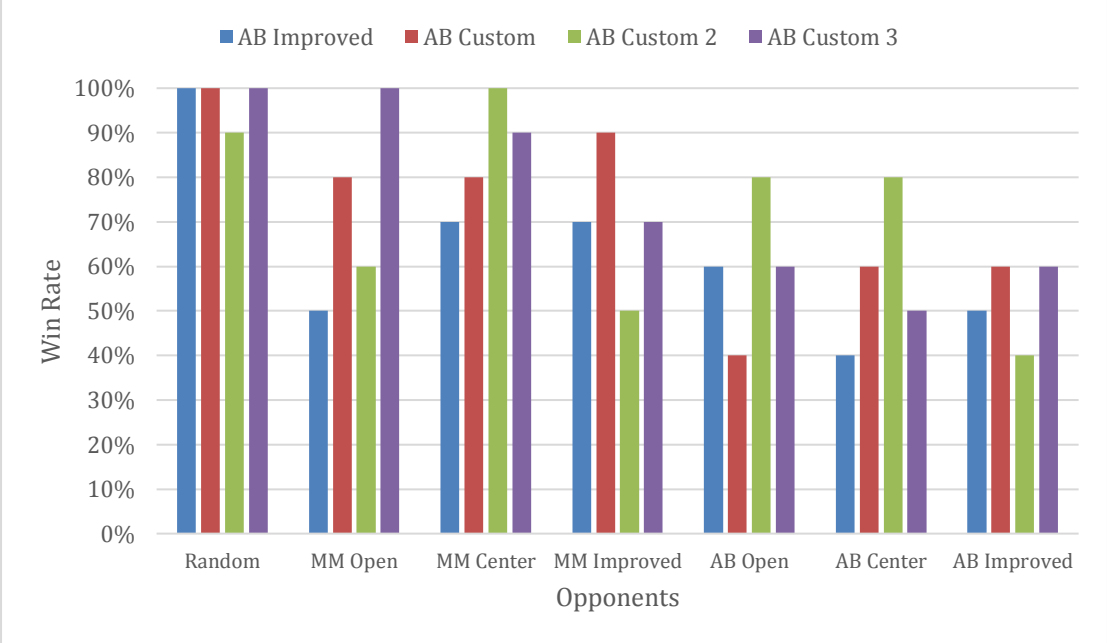

Figure 1. Summary of different agents and heuristics tournament result

The AB improved score agent has win rate of 62.8%, and the AB agent using custom scores 1, 2, and 3 has win rate of 72.8%, 71.4%, and 75.7%, respectively. AB agents using all four evaluation heuristics (improved and custom1-3) beat Random moves consistently. Our AB agents also beat the three MM agents, except for AB agent with custom2 heuristic versus MM agent with improved heuristic. When it comes to our AB agents v.s. computer AB agents, there isn't one heuristic that can consistently beat all three computer AB agents. Custom heuristic 1 lost to AB agent using open move score, custom heuristic 2 lost to AB agent using improved score. It's interesting that custom heuristic 3, the random number heuristic, performs the best against the computer AB agents…

Custom score 1 is recommended since it performed reasonably well against opponents and better than the AB improved score benchmark. Custom score 3 is not recommended due to randomness even if it performed best.