Isolation-Game-Heuristics Analysis

Overview :

It is required to introduce new heuristics for isolation game, apply them on my agent and compare their performance against each other and the basic heuristics mentioned in the course. Here I introduced three heuristics that will be described below.

Heuristics :

- *AB_score_1* ($\frac{15}{2} * my\_moves - 2 * opponent\_moves + \frac{1}{26} * blank\_slots$) :
    - The presented constants in the above expression is evaluated using Genetic Algorithms. It is tested and shows a great performance (won around 75% of the games on average).
- *AB_score_2* ($my\_moves - 2 * opponent\_moves$) :
    - This expression is used in the course content to nearly detect and handle horizon effects. It is tested and shows a good performance (won around 73% of the games on average).
- *AB_score_3* ($my\_moves - 2 * opponent\_moves + blank\_slots$) :
    - This is the same as the *Custom_score_2* but also taking the number of blank_slots into the account to increase score if there still exist many blank moves. It also shows a good performance (won 71% of games on average).

- *AB_score_4*$(2 * my\_moves - 3 * opponent\_moves)$ *:*
    - This expression is used for detecting and handling Horizon effects and also it increases the score based on the remaining moves and makes severer penalty if the number of available opponent moves are large. It shows nearly the best performance (won 80% of games on average).

Performance against test agents :

Here I have uploaded a sample of a played tournament against the test agents using the above heuristics.

Sample run of a tournament:

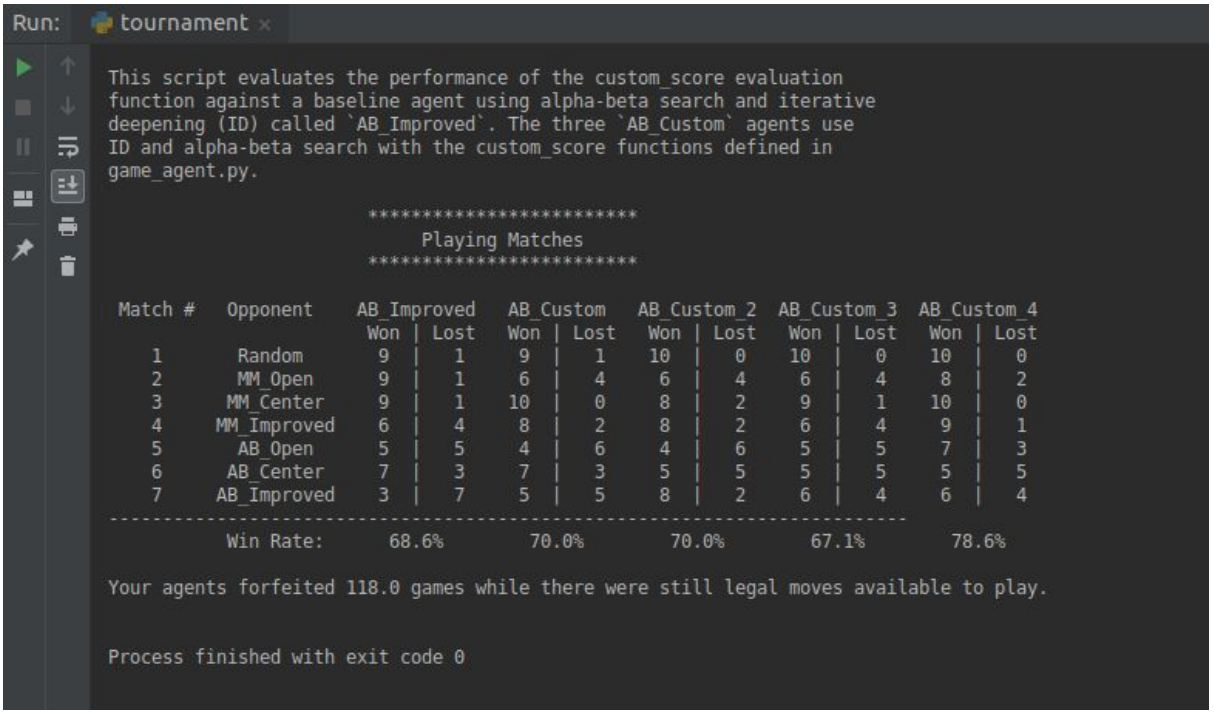
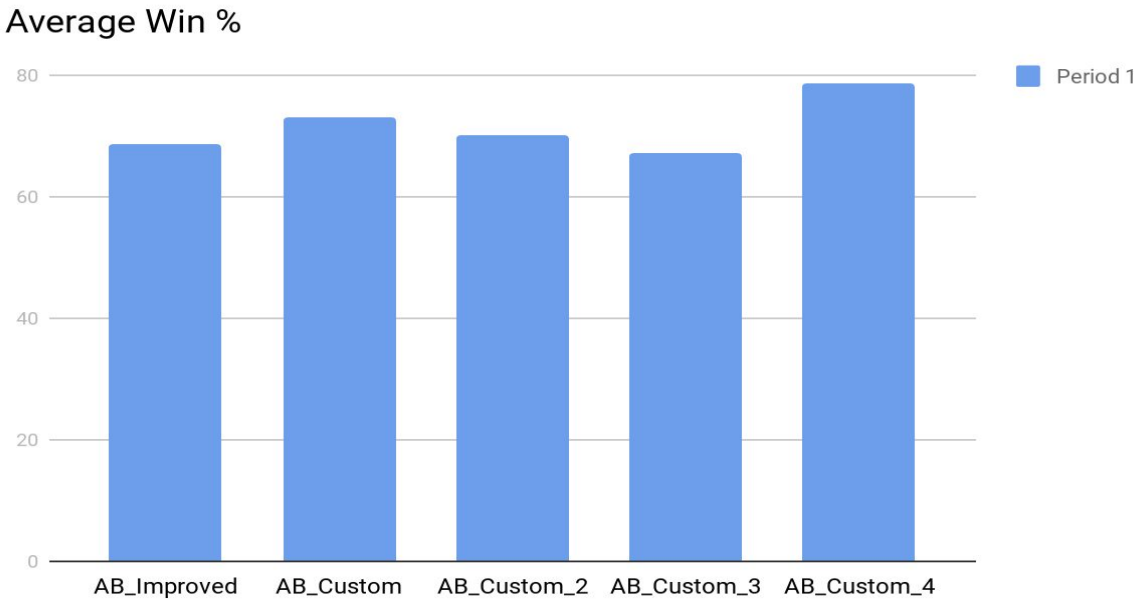
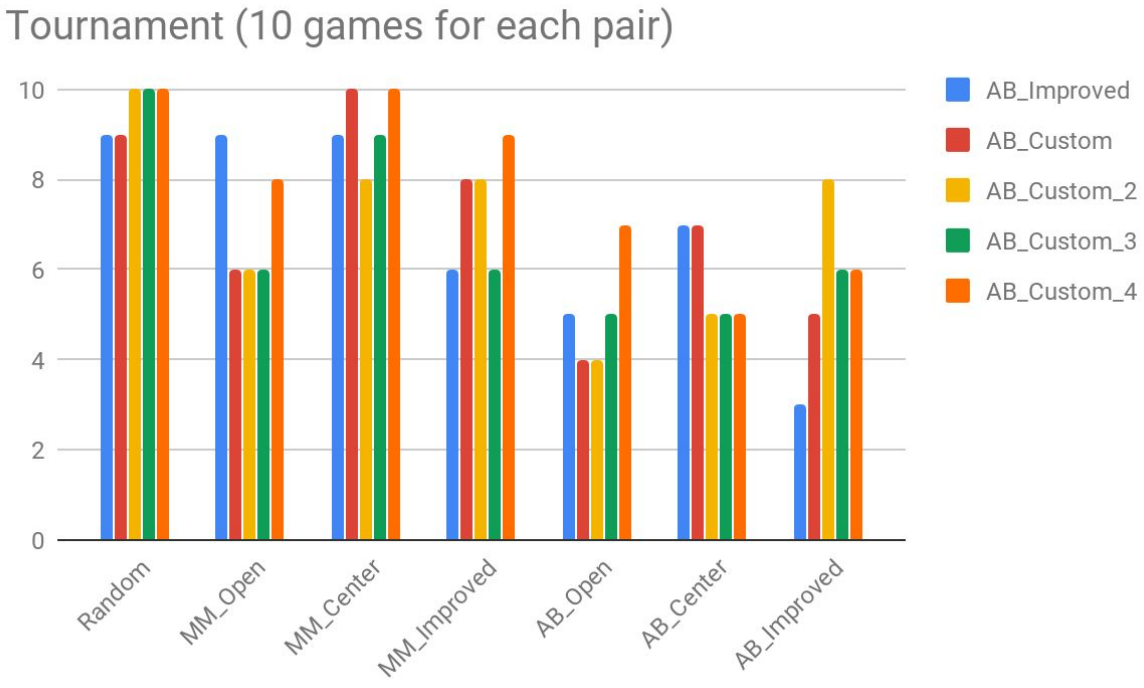


Chart Based on won percentage:



Tournament Analysis:



As shown above the last described evaluation function shows the best performance.

Recommendation on the Heuristic function:

From the analysis shown above and after running many tournaments, the best heuristic I see from my point of view is the last one ($2 * my\_moves - 3 * opponent\_moves$), as it covers many cases:

- the player can fall in including *Horizon effect*
- giving appropriate penalties for the agent if there exist a bad move in his tree
- giving the agent a good score if many moves are available to him.

Finally I recommend the last Heuristic for the Knights-Isolation_game.