Heuristic analysis

February 20, 2017

our analysis should conclude with a comparison of the different heuristics and your reasoning for choosing the heuristic you ultimately use in your submitted agent.

I have implemented three different heuristic functons for the isolation game:

1. heuristic_func_1: Parametrized evaluation function using number of own moves and number of opponent player moves

$$func = ownMoves - 0.5 \times oppMoves + 1$$

Here ownMoves are number of moves available for own player, and oppMove are number of moves available for opponent player.

2. heuristic_func_2:

$$func = -oppMoves$$

oppMove is the number of moves available for opponent player.

3. heuristic_func_3:

if blank spaces are larger than 25:

$$func = 0.5 \times ownMoves - oppMoves$$

else:

$$func = ownMoves - 0.5 \times oppMoves$$

The function evaluates based on the number of occupied space. When board positions are less than half occupied, agent weighs to reduce opponent's legal move.

Performance Evaluation The performace of these three heuristic functions comparing to the basic heuristic function is plotted below.

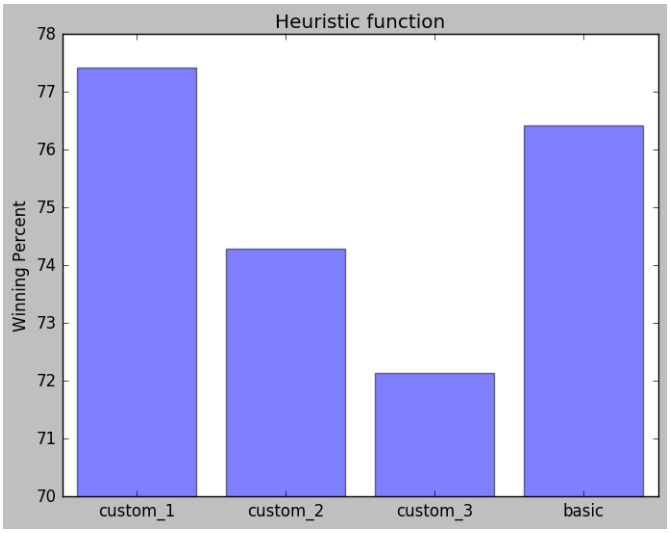

Fig.1 Winning rate for different heuristic function and basic heuristic function applied in the game.

The performance for each function on different game agent.

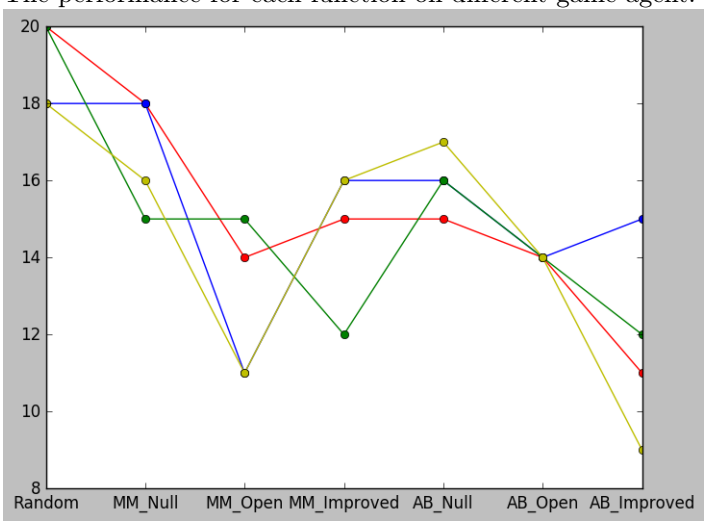

Fig.2 The performance of different heuristic function on different game agents. Blue one for custom function 1, red for custom function 2, green for custom functon 3 and yellow for custom function 4.

According to abover analysis, we would like to choose the custom function 1 $func = ownMoves - 0.5 \times oppMoves + 1$ as our choiced function in the game. Because this function has the (1) highest winning rate, (2) its performance is stable while versus different game agents and (3) when runnning multiple times, the hueristic function custom function 1 is always the best one comparing to other heuristic functions.