HEURISTIC ANALYSIS

For an Adversarial Game Playing Agent for Isolation

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Introduction

Isolation is a deterministic, two-player game of perfect information in which the players alternate turns moving a single piece from one cell to another on a board.

In this assignment, we are going to develope a custom_agent to play the isolation board game with the the custom heuristics that will be used by the minimax/alpha-beta tree search algorithm.

Results

The performance of various agents is as follow:

Agent	Performance (%)	Rank
Improved Score	67.14	3
Custom Heuristic (Amrita)	68.57	2
Custom Heuristic (Dong)	64.25	5
Custom Heuristic (Athar)	70.71	1
Custom Heuristic (Eng)	67.86	4

My teammate and I was taking 5 match as standard to conduct the evaluation to lessen the run time of the program.

My heuristic function

```
def my_heuristic_function(game,player):
    if game.is_loser(player):
        return float("-inf")

    if game.is_winner(player):
        return float("inf")

    my_moves = len(game.get_legal_moves(player))
    opponent_moves = len(game.get_legal_moves(game.get_opponent(player)))

    blank_spaces = len(game.get_blank_spaces())
    return float(my_moves * (blank_spaces - 1) - opponent_moves * (blank_spaces))
```

The costume heuristic function outputs a score equal to the difference of the production of moves available to the two players and the locations that are still available on the board.

It can be mathematically expressed as:

len (my available moves) * len (blank space-1)- len (available opponent move)* len (blank space)

blank Space: list of the locations that are still available on the board
available moves: list of all legal moves for the specified player.

Analysis
This function performs poorly and the winning rate is lower than other agents
It increases the difference of score of each trials, which may magnify the priority of one move.
Increase the difficulty of calculation and increase the time spent.