Project 3: Build an Adversarial Game Playing Agent

Opponent	Number of matches	Time limit (ms)	Execution time (s)	Percentage of Winning
RANDOM	100	150	50.22	97.0%
RANDOM	100	150	48.39	89.0%
RANDOM	100	150	49.06	91.0%
GREEDY	100	150	62.02	61.0%
GREEDY	100	150	63.54	68.0%
GREEDY	100	150	62.14	74.0%
MINIMAX	100	150	72.68	47.0%
MINIMAX	100	150	68.58	51.0%
MINIMAX	100	150	80.50	48.0%
SELF	100	150	73.29	57.0%
SELF	100	150	75.04	54.0%
SELF	100	150	74.59	55.0%

1. **What features of the game does your heuristic incorporate, and why do you think those features matter in evaluating states during the search?**

$$h(n) = len(own\_liberties) - 2 * len(opp\_liberties) + 1.5 * (len(own\_liberties)\ and\ len(opp\_liberties))$$

The heuristic incorporates 2 values, the agent liberties, and the opponent liberties. It assumes that the more available spots for my agent, the higher the chances of winning are. On the other hand, it penalties the opponent's liberties, meaning the more spots my opponent has, the lower my chances of winning. Finally, it considers the merged situation, considering both, what my chances of winning.

2. **Analyze the search depth your agent achieves using your custom heuristic. Does search speed matter more or less than accuracy to the performance of your heuristic?**

Opponent	Number of matches	Time limit (ms)	Depth limit	Execution time (s)	Percentage of Winning
GREEDY	100	150	2	34.06	33.0%
GREEDY	100	150	3	42.93	73.0%
GREEDY	100	150	4	57.57	69.0%

In terms of winning, one can see that there is a drastic improvement between going from depth 2 to 3. However, increasing the depth to 4 did not yield much improvement. One can also notice that the number doubles when increasing the depth to 3.