The game of isolation is a game that involves many different types of strategies. Like any game, these strategies are very dynamic in the progression of a game, and the most important objective changes depending on the state of the environment an agent is playing on.

1. Heuristics
   a. heuristic_score_simple
      i. In this heuristic, I set a baseline of what a simple scoring system would look like, where the agent will optimize for moves where the agent has more moves than the opponent.
      ii. Results
         1. ID_Improved: 77.86%
         2. Student: 85.00%
         3. Differential: 7.14%
   b. heuristic_score_weighted
      i. Similar to the heuristic_score_simple, however now I've attempted an alternative based on weights. Therefore, an agent having more moves is more important, than having less moves for an opponent through the whole game.
      ii. Results
         1. ID_Improved: 77.14%
         2. Student: 74.29%
         3. Differential: -2.85%
   c. heuristic_score_moves_to_board
      i. Next, I added in the importance of 'time' with increasing the relevancy of of spots left in the board. So as the agent progresses through the game in time, the weighting of how important my moves changes.
      ii. Results
         1. ID_Improved: 76.43%
         2. Student: 80.00%
         3. Differential: 3.57%
   d. heuristic_score_weighted_with_board
      i. Next, in addition to setting weights to different values (e.g. number of moves for the agent, the opponents, etc.) the added value is the number of blank spaces available on the whole.
      ii. Results
         1. ID_Improved: 80.00%
         2. Student: 72.14%
         3. Differential: -7.86%
   e. heuristic_score_weighted_with_board_defensive_to_offensive
      i. Next, by first starting where the heuristic function will output a higher value for states where the agent has more moves than the opponent, would be considered a defensive strategy. Whereas, as the game

progresses and there are less spaces available, the agent will get assigned a higher value when attempting to minimizing their opponents moves.

    ii. Results
1. ID_Improved: 72.86%
2. Student: 72.86%
3. Differential: 0%

f. heuristic_score_weighted_with_board_offensive_to_defensive

    i. Finally, this heuristic is a flip of the previous heuristic, where first an offensive strategy is implemented by valuing states where the agent can minimize the movies of the opponent, then a defensive strategy closer to the end of the game where creating more space for the agent is important.

    ii. Results
1. ID_Improved: 75.71%
2. Student: 86.43%
3. Differential: 10.72%

g. heuristic_score_block_opponent

    i. Finally, this heuristic is a very aggressive / offensive approach, where it is always chasing the moves of the opponent.

    ii. Results
1. ID_Improved: 78.57%
2. Student: 70.00%
3. Differential: -8.57%

Summary

In the end, the **heuristic_score_weighted_with_board_offensive_to_defensive** heuristic was chosen, which seemed to consistently produce the greatest results. This heuristic incorporated such concepts as a defensive vs. offensive part of the game by valuing moves that increase the availability of spaces vs. trying to minimize the opponents moves. Also, it incorporates the concept of time, so the strategy will change over time as the available board moves less and less. Finally, different values are weighted in different ways, to showcase that the most important strategy throughout the game will change.