**Heuristic analysis**

**Summary**

Heuristics are evaluation metrics to find different ways if the current position is a good position to be in. This is evaluated using a cost value or score to maximise. To identify if the current position is good in a game of isolation, the program needs to evaluate the position of the player, the opponent and the game state. To achieve an optimal heuristic it needs to be an admissible heuristic that never overestimates the cost of reaching the goal.

* Goal
* What herustics were chosen and why
* Justification for final heuristic

**Heuristic** 1

This function evaluates the player's position, if the player is closer to the centre of the board, they have a higher probability of winning. I noticed through human to human plays, we were gravitating to the centre of the board as a defensive manoeuvrer. This central position is evaluated against the opponent’s position.

If the player’s position is closer to the center than the opponent, the score will result in a positive, else a negative. If both players are equal distance from the centre, it will result in a score of 0.

Results of the match

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Match # | Opponent | AB\_Improved | | AB\_Custom | |
| Won | Lost | Won | Lost |
| 1 | Random |  |  |  |  |
| 2 | MM\_Open |  |  |  |  |
| 3 | MM\_Center |  |  |  |  |
| 4 | MM\_Improved |  |  |  |  |
| 5 | AB\_Open |  |  |  |  |
| 6 | AB\_Center |  |  |  |  |
| 7 | AB\_Improved |  |  |  |  |
| Total Win Rate: | |  | |  | |

**Heuristic** 2

This function evaluates the player's position and the opponent’s position and aggressively chases opponent. This is a variation difference of numbers (improved\_score) to assign a higher penalty of being further away from opponent

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Match # | Opponent | AB\_Improved | | AB\_Custom\_1 | |
| Won | Lost | Won | Lost |
| 1 | Random |  |  |  |  |
| 2 | MM\_Open |  |  |  |  |
| 3 | MM\_Center |  |  |  |  |
| 4 | MM\_Improved |  |  |  |  |
| 5 | AB\_Open |  |  |  |  |
| 6 | AB\_Center |  |  |  |  |
| 7 | AB\_Improved |  |  |  |  |
| Total Win Rate: | |  | |  | |

**Heuristic** 3

This function uses a weighted score to combine both evaluation functions to hopefully form one superior one. This was decided as a heuristic as a person doesn’t just use one strategy in a game, it depends on the position of the player. The weighting

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Match # | Opponent | AB\_Improved | | AB\_Custom\_2 | |
| Won | Lost | Won | Lost |
| 1 | Random |  |  |  |  |
| 2 | MM\_Open |  |  |  |  |
| 3 | MM\_Center |  |  |  |  |
| 4 | MM\_Improved |  |  |  |  |
| 5 | AB\_Open |  |  |  |  |
| 6 | AB\_Center |  |  |  |  |
| 7 | AB\_Improved |  |  |  |  |
| Total Win Rate: | |  | |  | |

Heuristic ideas

* Distance from edge
* Being close to the opponent
* Mobility function the
* Already used
  + Have more moves than the opponent
* Using a weight heuristic

Tips

* Includes the state of the board
* About the player’s and opponent’s moves
* Again, in your analysis you should try to explain why your heuristic that looks good on paper doesn't actually perform well in the game.)
* This simply means do not just include a table. Instead, include a written analysis of how the Student performed using each of your 3 original heuristics and how well ID\_Improved did, as well. In that analysis you will naturally mention how the other agents performed, too, since they were the opponents.
* Calculate position strength