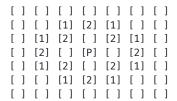


# **Heuristic Analysis**

For my agent the initial heuristic selection was based on intuition from playing the game a few times on paper manually.

Something I noticed quickly was that this variant of isolation is quite different from the one played in the classroom. The knights jump means that partitions just aren't as valuable, and that number of available moves isn't necessarily a great proxy for how many moves the user *might* arrive at, and that over time I tended (especially on larger boards) to move towards areas that were sparsely filled rather than densely filled (even if I happened to have a lot of moves available), and away from the edges.

To try to represent this I came up with the idea of tracking secondary moves (the places I could jump to on the next move after making a knights move) that were available from my current position. The most obvious ones are layed out like this:



each "1" represents a primary move for the player, each "2" is a secondary move that could be jumped to from a 1. If you are close to the edge, or jumping into densely blocked territory, you'll have less 2s available.

## **Heuristic 1: Weighted Mobility**

This one makes no use of the secondary moves, it just weights the players available moves based on my intuition (more moves for me is worth more than less moves for the opponent, unless he's down to just 1 legal move or less.

To do this I weighted *my* moves by 0.7, and the opponents moves by 0.3, but granted a 3-point bonus if the opponent was being restricted to 1 move or less.

## **Heuristic 2: Secondary Mobility**

This function makes use of secondary moves both for the player, and the opponent. It takes a bit of time to calculate so timeout thresholds have been increased.

This is the same idea as "my moves minus his moves", but adds an additional 50% credit for my secondary moves and his secondary moves.

#### Heuristic 3: Weighted Secondary Mobility

This scoring method combines 1 and 2, it both weights the primary moves available, and adds the secondary moves available (secondaries weighted by 0.5).

#### tournament results:

**************************************					
Match #	Opponent	AB_Improved	AB_Custom	AB_Custom_2	AB_Custom_3
		Won   Lost	Won   Lost	Won   Lost	Won   Lost
1	Random	6   4	10   0	8   2	9   1
2	MM_Open	7   3	6   4	6   4	7   3
3	MM_Center	9   1	7   3	7   3	9   1
4	MM_Improved	6   4	6   4	8   2	8   2
5	AB_0pen	5   5	5   5	6   4	4   6
6	AB_Center	6   4	6   4	6   4	5   5
7	AB_Improved	5   5	5   5	3   7	6   4
	Win Rate:	62.9%	64.3%	62.9%	68.6%

At least in this small sample of games, Weighted Secondary Mobility seems to play favorably against AB\_Improved (6 to 4) and eeked out a higher winning percentage overall (68.6% to 62.9%). These are pretty close results though, I think it would be fair to say that it's not demonstrably better, all 3 heuristics perform fairly close to the simpler (and faster to calculate) my\_moves - your\_moves.

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