Heuristic evaluation for the Isolation Game Project

Three heuristics are evaluated in order to improve the performance of the alpha beta-pruning algorithm in the context of the Isolation game.
The heuristics are compared against each other as well as a set of basic heuristics.

Each of the heuristic tested try to capture some game paradigm that seems to provide better victory outcome. Those paradigms were discovered through game playing simulations.

Number of possible moves is often a good predictor of advantage on the board.
As well as proximity of the moves to the center and dispersion of the moves on the board

Heuristic 1

Heuristic 1 tries to evaluate 2 moves ahead. It look at the potential moves and for each see if the next move would be a valid move. This is done through a fat hashtable lookup to minimize the complexity. In addition, it gives a "bonus" factor for board where the possible moves are dispersed.

The score is evaluated both for the agent and its opponent and the difference is used as the scoring.

Heuristic 2

Heuristic 2 is similar to heuristic 1 but only look one move ahead.
This is again done through a quick hashtable lookup.

The score is evaluated both for the agent and its opponent and the difference is used as the scoring.

Heuristic 3

Heuristic 3 is exclusively looking at the dispersion of the possible move on the board. It divides the board into four quadrants and count how many quadrants are reached by the possible moves to get a value from 1 to 4.
It then uses this value as a multiplier with the number of moves.

The score is evaluated both for the agent and its opponent and the difference is used as the scoring.

Results

The results are encouraging although it has been very difficult to make significant improvement over the AB_Improved opponent. Each of the new heuristics have shown better results with heuristic one outperforming the others slightly.

```
Match #   Opponent    AB_Improved   AB_Custom   AB_Custom_2
AB_Custom_3
                        Won | Lost   Won | Lost   Won | Lost   Won |
Lost
    1       Random       8  |   2     8  |   2     8  |   2    10  |
0
    2       MM_Open      4  |   6     5  |   5     6  |   4     6  |
4
    3      MM_Center    10  |   0     7  |   3    10  |   0     9  |
1
    4     MM_Improved    5  |   5     8  |   2     7  |   3     6  |
4
    5       AB_Open      5  |   5     7  |   3     6  |   4     5  |
5
    6      AB_Center     4  |   6     8  |   2     5  |   5     7  |
3
    7     AB_Improved    8  |   2     6  |   4     6  |   4     4  |
6
--------------------------------------------------------------------
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           Win Rate:      62.9%        70.0%        68.6%        67.1%
```