Heuristic Analysis

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The theory I worked from was that the custom score would benefit from a weighted result between #my-moves vs #opponent-moves. I tested this theory using different ratios. The reasoning is that #my-moves is to be considered positive, and more likely to win with many available moves. It should also be considered on the negative side #opponent-moves. How much each of these parameters are weighted was varied and tested individually.

The function is the following: f1 *#mo-moves - f2* #opponent-moves I ran three different values for f1 and f2. The ratios I tested are listed below, together with their percentage result in the sections starting with custom_score. Two of the heuristic functions from the sample players implementation are listed first for reference.

Results:

Results are written only as percentage from running tournament.py, and reflects the number of wins.

sample_players.improved_score (baseline):

66.43%

sample_players.open_move_score (baseline):

55.71%

custom_score_weighted_1.5_to_1:

68.57%

custom_score_weighted_1_to_2:

68.57%

custom_score_weighted_1_to_1.5:

70.71%

Conclusion

Running the tests shows the best ratio to be 1:1.5 (#my-moves:#opponent-moves). The result shows that function to beat the benchmark of being better than the ID_Improved agent player, which uses the first baseline heuristic function. This proves the theory I had about a weighted ratio between #my-moves and #opponent-moves is an good heuristic function.

Reason 1:

It increases the heuristic value when my player has many open moves and possibilities to move.

Reason 2:

It penalizes the value when opponent has many open moves and possibilities to move.

Reason 3:

It considers an equal weight between the number of moves to favorite opponent. A weight shifted toward penalizing opponent moves more gave the best results. But only slightly. This probably means that very different ratio in a situation is rare and hard to find. The heuristic function needs to find the positions with only a small advantage and run with those.

This supports the claim from the lectures that you should keep your friends close, but your enemies closer (by a small factor of 0.5).