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AIND Project 2: Build a Game-Playing Agent

Heuristic Analysis

This paper summarizes the results achieved by comparing 3 custom heuristics described below against the 'ID_Improved' heuristic.

Heuristic 1:
This first heuristic implemented ("my_moves_vs_opponents_moves") favors the move which has more options than the opponent's moves. This was inspired by previous lecture and wanted to check if it would make a difference.

ID_Improved vs. Heuristic 1:

ID_Improved	Won	Lost		Student	Won	Lost
Random	17	3		Random	17	3
MM_Open	11	9		MM_Open	15	5
MM_Center	13	7		MM_Center	19	1
MM_Improved	14	6		MM_Improved	11	9
AB_Open	10	10		AB_Open	10	10
AB_Center	13	7		AB_Center	12	8
AB_Improved	8	12		AB_Improved	9	11
ID_Improved	61.4%			Student	66.4%	

Heuristic 2:
This second heuristic implemented (“center_moves”) favors the move geared towards the center. It gives a weight of 20 (weight of 10 and factor of 2) if a move is at least 2 blocks from the edge and weight of 10 (weight of 5 with factor of 2) if a move is at least a block from the edge. This forces the player to stay around the center since that area has more option to move.

ID_Improved vs. Heuristic 2:

ID_Improved	Won	Lost		Student	Won	Lost
Random	17	3		Random	18	2
MM_Open	11	9		MM_Open	17	3
MM_Center	13	7		MM_Center	13	7
MM_Improved	14	6		MM_Improved	13	7
AB_Open	10	10		AB_Open	13	7
AB_Center	13	7		AB_Center	13	7
AB_Improved	8	12		AB_Improved	11	9
ID_Improved	61.4%			Student	70.0%	

Heuristic 3:
This third heuristic implemented (“lookup_center_moves”) builds on top of heuristic 2 as it
not only checks next moves but also the future moves. This forces the future moves of the player close to the center. I had the assumption that if the player is forced around the center then it has more available moves than the opponent.

ID_Improved vs. Heuristic 3:

ID_Improved	Won	Lost		Student	Won	Lost
Random	17	3		Random	17	3
MM_Open	11	9		MM_Open	12	8
MM_Center	13	7		MM_Center	17	3
MM_Improved	14	6		MM_Improved	14	6
AB_Open	10	10		AB_Open	13	7
AB_Center	13	7		AB_Center	15	5
AB_Improved	8	12		AB_Improved	6	14
ID_Improved	61.4%			Student	67.1%	

Heuristic Comparison:

I initially thought heuristic 3, “lookup_center_moves” would yield the highest winning percentage as it forces the player to pick next and future moves around the center. However, after 20 matches, it turned out heuristic 2 “center_moves” had better success than the other 2 heuristics. Below are the 3 reasons “center_moves” is better than the other 2 heuristics:

1. Its win rate of 70% is slightly better than 66.4% for heuristic 1 “my_moves_vs_opponents_moves” and 67.1 for heuristic 3 “lookup_center_moves”.
2. Its a very simple heuristic which forces the player to move to the center if there’s any available moves.
3. It indirectly consumes all the center moves which forces the opponent to pick moves that are away from the center. This forces the opponent to pick moves with less movements.