Heuristic Analysis

Different features from the major categories „space“, „time“ and „move count“ were examined. The features were evaluated on their own, and in combination with other features. Further, different weights were applied, leading to a huge search space. All heuristic functions were handcraftet and combined by intuition, so many useful combination may be missing.
The following graphic shows five runs of the most noteworthy functions.

Match #	Opponent	AB_Improved		AB_Custom		AB_Custom_2		AB_Custom_3	
		Won	Lost	Won	Lost	Won	Lost	Won	Lost
1	Random	10	0	9	1	10	0	10	0
2	MM_Open	7	3	8	2	7	3	7	3
3	MM_Center	10	0	8	2	10	0	7	3
4	MM_Improved	8	2	7	3	8	2	9	1
5	AB_Open	6	4	4	6	5	5	6	4
6	AB_Center	7	3	6	4	7	3	5	5
7	AB_Improved	4	6	5	5	5	5	7	3
	Win Rate:	74.3%		67.1%		74.3%		72.9%	

Match #	Opponent	AB_Improved		AB_Custom		AB_Custom_2		AB_Custom_3	
		Won	Lost	Won	Lost	Won	Lost	Won	Lost
1	Random	10	0	10	0	10	0	10	0
2	MM_Open	9	1	8	2	8	2	9	1
3	MM_Center	10	0	8	2	10	0	10	0
4	MM_Improved	8	2	8	2	5	5	9	1
5	AB_Open	4	6	7	3	6	4	3	7
6	AB_Center	6	4	7	3	8	2	6	4
7	AB_Improved	6	4	4	6	6	4	7	3
	Win Rate:	75.7%		74.3%		75.7%		77.1%	

Match #	Opponent	AB_Improved		AB_Custom		AB_Custom_2		AB_Custom_3	
		Won	Lost	Won	Lost	Won	Lost	Won	Lost
1	Random	10	0	10	0	10	0	10	0
2	MM_Open	9	1	8	2	10	0	8	2
3	MM_Center	9	1	9	1	10	0	10	0
4	MM_Improved	6	4	5	5	10	0	7	3
5	AB_Open	5	5	3	7	6	4	5	5
6	AB_Center	6	4	7	3	4	6	7	3
7	AB_Improved	7	3	6	4	3	7	5	5
	Win Rate:	74.3%		68.6%		75.7%		74.3%	

Match #	Opponent	AB_Improved		AB_Custom		AB_Custom_2		AB_Custom_3	
		Won	Lost	Won	Lost	Won	Lost	Won	Lost
1	Random	10	0	10	0	9	1	10	0
2	MM_Open	8	2	8	2	10	0	9	1
3	MM_Center	9	1	10	0	10	0	10	0
4	MM_Improved	8	2	9	1	6	4	9	1
5	AB_Open	7	3	5	5	7	3	6	4
6	AB_Center	7	3	5	5	8	2	3	7
7	AB_Improved	4	6	5	5	4	6	4	6
	Win Rate:	75.7%		74.3%		77.1%		72.9%	

Match #	Opponent	AB_Improved		AB_Custom		AB_Custom_2		AB_Custom_3	
		Won	Lost	Won	Lost	Won	Lost	Won	Lost
1	Random	10	0	9	1	10	0	10	0
2	MM_Open	8	2	9	1	8	2	9	1
3	MM_Center	10	0	9	1	10	0	10	0
4	MM_Improved	9	1	9	1	9	1	6	4
5	AB_Open	5	5	4	6	5	5	5	5
6	AB_Center	6	4	6	4	5	5	5	5
7	AB_Improved	5	5	4	6	4	6	5	5
	Win Rate:	75.7%		71.4%		72.9%		71.4%	

AB_Custom

Intention:
Staying close to opponent but be the one closer to the center. It was observed that the single features „close to opponent“ and „favor center“ are helpful. The hope is a combination of both will increase the strength

Result:
The average winning rate is 71.4%. which is even a bit lower than the results for the single features. Moreover, the matches show a high variance. The combination doesn´t work as expected.

AB_Custom_2

Intention:
Keep your enemies close. This simple function only tries to set the own player as close as possible to the opponent.

Result:
While this tactic may be useful in many sports, it´s not obvious why it works as a standalone feature in this game. The average winning rate is 75.15% and all matches show a similiar pictures. While this seems to be a good result, it is notable the function shows a negativ statistic against AB_Improved.

AB_Custom_3

Intention:
Counting moves has a strong impact. Functions with different fixed weights for own and opponent moves were investigated. This function adapts the weights regarding the progress of the game.

Result:
The average winning rate is 73.72% which seems to be equal to the variations of move count with fixed weights. It´s worth mentioning this function delivered stable results in all matches. More interestingly, it´s the only observed function showing a positiv statistic compared to AB_Improved

Summary

Many features shine on their own, so it´s tempting to combine the best of them. Unfortunately it is more likely they neutralize each other than to gain a performance boost. To find good combinations and weights without using an automated script seems to be pure luck.
I choose AB_Custom_3 because it delivered the most stable results over many test runs. The results were stable around 74%. Moreover it´s simple to implement and can compete with AB_Improved.
It´s a bit sad, after trying so much, no significant better function was found.