

Mauro Restuccia
mrestuccia@mac.com

March 15, 2017

Heuristic Analysis

The isolation games needs an heuristic to be able to predict the best available position when search for a final solution becomes unlike like. At the same time needs to be able to evaluate really fast to allow to be able to do perform several levels of depths on a given time.

To perform this analysis I ran 20 consecutive tournaments for each heuristics to conclude based on the results.

Heuristics

score_3opposition

- Basic modification of the "improved" heuristic, this heuristic considers your available moves, but even consider more important the opposite player moves. It's a attack strategy maintaining the player close the the opposite player.
- Average Result:
 - ID_Improved: 66.50%
 - Student: 72.28%
 - Differential: 5.78%
 - Number of tournaments lost: 1

score_weighted_status

- Calculate every blank giving a weight based on the location. Center gets 1, Around the center 0.5 then 0.33, 0.25 as the distance get to the edges. The logic is that is not only relevant how many valid moves do you have, but also, the position of those moves. It consider all you weighed legal moves vs. your weighed opponent legal moves as equal.
- Average Result:
 - ID_Improved: 69.62%
 - Student: 71.63%
 - Differential: 2.01%
 - Number of tournaments lost: 7

score_simple_plus_current

- Heuristic based on the same idea of counting the positions available, but giving an extra weight to the current position in relationship to the center. It consider near the center the L shape.

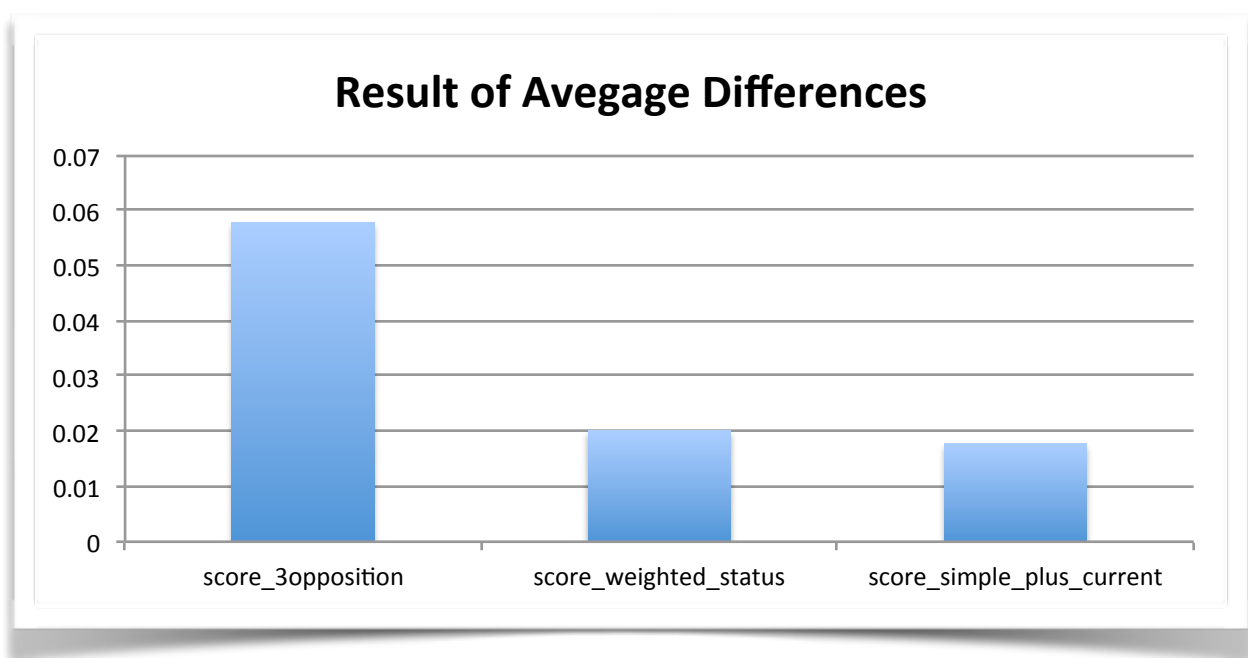
This is a balanced strategy. Legal moves are compared between the player and the opponent, but then check and add a small priority on the the player current position in relationship with the center.

- Average Result:
 - ID_Improved: 70.51%
 - Student: 72.28%
 - Differential: 1.77%
 - Number of tournaments lost: 7

Results of 20 tournaments

score_3opposition			score_weighted_status			score_simple_with_bonus		
ID_Imp	Student	Diff	ID_Imp	Student	Diff	ID_Imp	Student	Diff
65.71%	75.00%	9.29%	65.00%	68.57%	3.57%	73.57%	73.57%	0.00%
62.86%	76.43%	13.57%	72.14%	78.57%	6.43%	72.14%	66.43%	-5.71%
67.14%	70.71%	3.57%	65.71%	72.14%	6.43%	66.43%	74.29%	7.86%
67.86%	70.71	2.85%	72.86%	72.14%	-0.72%	67.86%	71.43%	3.57%
70.71%	73.57%	2.86%	67.86%	67.14%	-0.72%	71.43%	73.57%	2.14%
67.14%	72.14%	5.00%	70.71%	74.29%	3.58%	71.43%	70.71%	-0.72%
72.14%	75.00%	2.86%	70.71%	75.71%	5.00%	70.71%	77.14%	6.43%
66.43%	76.43%	10.00%	77.14%	69.29%	-7.85%	75.00%	70.71%	-4.29%
68.57%	71.43%	2.86%	67.86%	74.29%	6.43%	70.71%	77.14%	6.43%
72.14%	71.43%	-0.71%	71.43%	69.29%	-2.14%	67.14%	69.29%	2.15%
62.14%	75.71%	13.57%	70.00%	75.71%	5.71%	67.86%	73.57%	5.71%
71.43%	75.00%	3.57%	72.86%	73.57%	0.71%	70.71%	67.86%	-2.85%
67.14%	70.71%	3.57%	67.14%	65.71%	-1.43%	72.14%	75.71%	3.57%
68.57%	79.29%	10.72%	72.14%	71.43%	-0.71%	74.29%	71.43%	-2.86%
66.43%	72.86%	6.43%	72.86%	76.43%	3.57%	72.86%	71.43%	-1.43%

score_3opposition			score_weighted_status			score_simple_with_bonus		
ID_Imp	Student	Diff	ID_Imp	Student	Diff	ID_Imp	Student	Diff
52.14%	65.71%	13.57%	70.00%	71.43%	1.43%	66.43%	74.29%	7.86%
62.86%	65.00%	2.14%	66.43%	75.00%	8.57%	71.43%	72.86%	1.43%
62.86%	70.00%	7.14%	70.71%	65.00%	-5.71%	70.71%	71.43%	0.72%
64.29%	66.43%	2.14%	62.14%	70.71%	8.57%	71.43%	68.57%	-2.86%
70.00%	74.29%	4.29%	65.71%	65.71%	0.00%	67.14%	72.86%	5.72%
67.86%	70.00%	2.14%	70.71%	72.14%	1.43%	69.29%	73.57%	4.28%



Conclusion

The heuristic score_3opposition was selected based on the results.

It utilizes a very simple heuristic and an offensive strategy.

The simple heuristic respond faster allowing to go deeper more often than the other more complex heuristic presented.

This combined with the offensive strategy consistently demonstrated better results. It considers both players, but pay more attention to minimize the opponent.