

Analysis of Evaluation Function

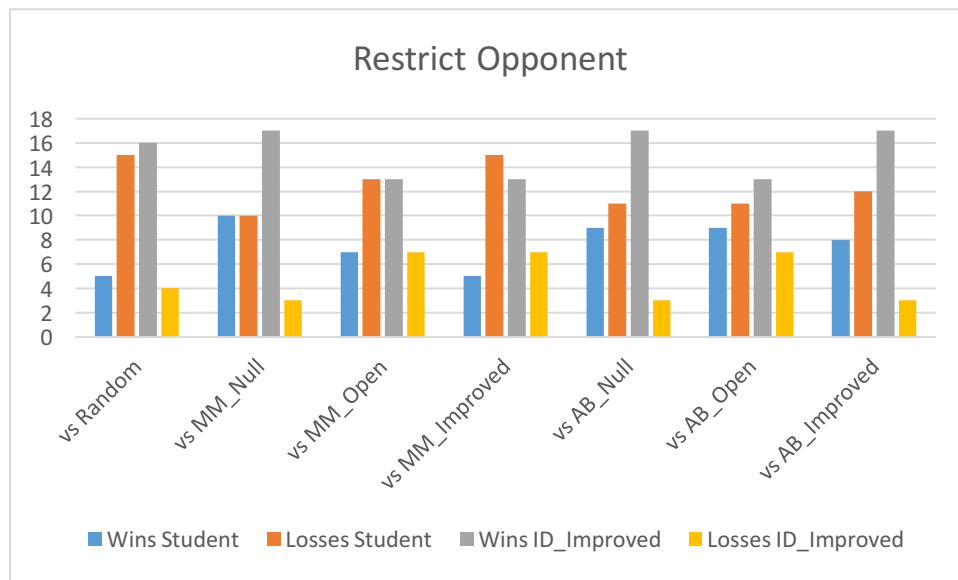
Restrict Opponent

As an easy introduction I tried a slightly modified version of the improved score. This change was also suggested during the lectures.

$$\text{own_moves} - (2 * \text{opp_moves})$$

It's focus is to minimize the opponent's move as much as possible.

The performance against the test opponents was under 50% and performed considerably worse than the original improved score evaluation, which showed a performance of 70.71%, whereas ID_Improved showed a performance of 72.86%. The values of ID_Improved over all tournaments seem to vary between 5-6% points.



Results Winrate:

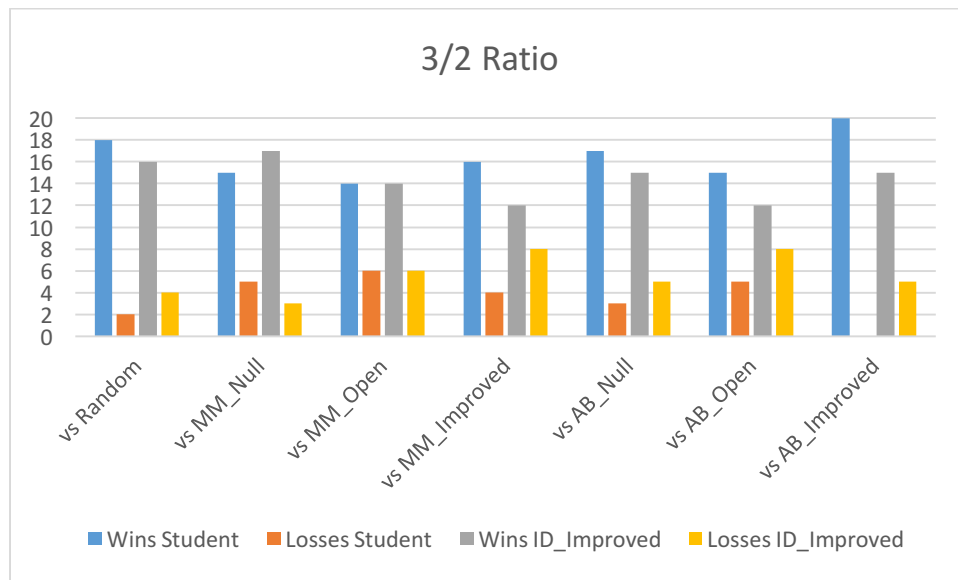
Student	37.86%
ID_Improved	72.86%

3/2 Ratio

Since the “Restrict Opponent” performed badly, it is only logical to adapt the ration of my_moves and opponent_moves in the opposite way:

$$(3 * \text{own_moves}) - (2 * \text{opp_moves})$$

Although it still lays an emphasis on the reduction of the opponents moves, its main objective is to maximize my possibilities. The results are promising. Surprisingly, the algorithm performed flawlessly against AB_Improved. Overall there is a 10 %-points performance increase over ID_Improved.



Results Winrate:

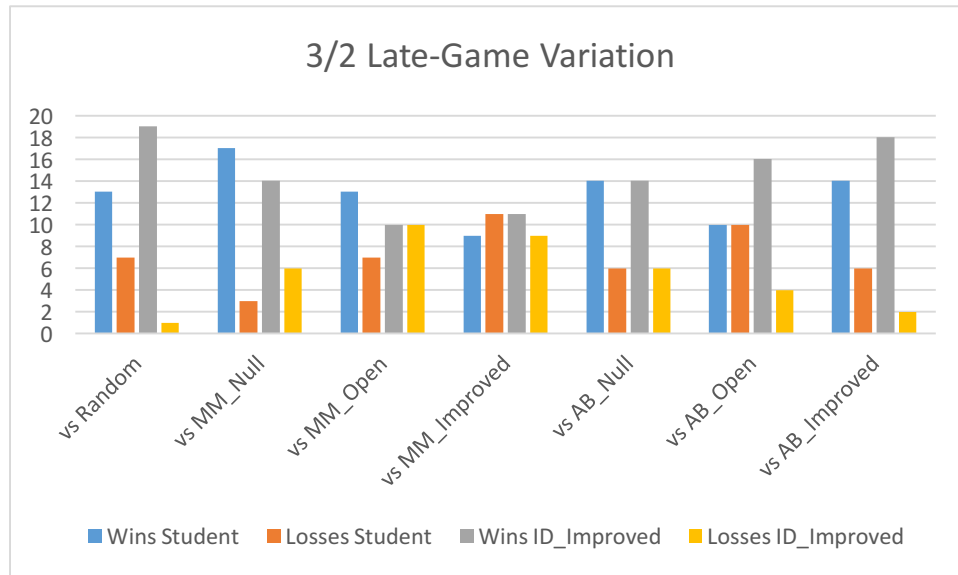
Student	82.14%
ID_Improved	72.14%

3/2 Late-Game Variation

As in late-game it might be advantageous to increase the focus on limiting your opponents possibilities, a variation was examined where the focus on the opponents move is linearly increased by the move counter of the game.

$$(3 * \text{own_moves}) - ((2 + (\text{game.move_count} / 15)) * \text{opp_moves})$$

The evaluation function performed worse than ID_Improved but still better than the first heuristic:



Results Winrate:

Student	64.29%
ID_Improved	75.71%

Final Choice

In the end, the only wise choice is to go with the "3/2 Ratio" evaluation function. The first reason is that it has performed outstandingly well with a 10 %-point increase over ID_Improved and more +20 improvement over the other heuristics. Additionally it has been shown in the tests, that a presumably late game focused heuristic is not working out. It could also be, that the assumption, that it is late game focused, is wrong. Trying to mix the late-game-focus with the better performing 3/2 Ratio heuristic ended up in a more complex, calculation heavier heuristic. The performance decrease over 3/2 Ratio can be explained by its higher complexity, which is a trade-off for less search-depth, as well as its increased focus on the late game. Maybe with more computational power the Late-Game variation performs better.