Heuristic Analysis

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The tournarment test consists of rounds of 5 matches each with a 150 miliseconds timeout. The results were compared to AB_Improved as baseline.

The x-axis correspond chosen custom heuristics:

1. AB_Improved
2. AB_Custom
3. AB_Custom_2
4. AB_Custom_3

Given opponent to the the number of possible moves to the adversary player, and player the number or moves of my agent, the custom heuristics score are given by:

1. player - 1.618033988749895*opponent
2. $player^2 - opponent^2$
3. player/opponent

Ten tournaments were executed, with 5 matches each, obtaining the following win rate percentual:

	win rate (% mean)	Win rate (% std)
AB_Improved	67.15	3.67
AB_Custom	70.7	2.50
AB_Custom_2	66.45	4.45
AB_Custom_3	51.05	3.58

Table 1. Average win rate

Thus, considering the presented data, the **choosen heuristic is AB_Custom**, because:

- It presented the better result if compared to AB_Custom_2 and AB_Custom_3.
- AB_Custom is **5,86% better than AB_Improved**

uture improvements to all strategies we should consider to enlarge the gap between them to AB_Improved are:

- Use multiprocessing or multithreading to calculate each branch of the moves possibility tree in parallel.
- Create opening moves, such as we previously did on AIND-Sudoku

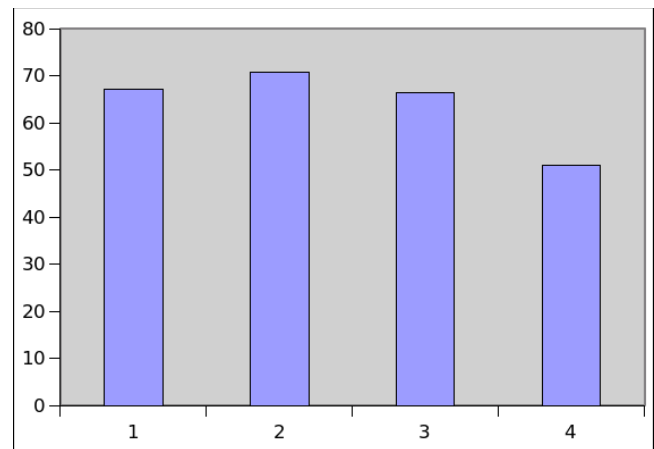Figure 1. Average win rate with standard deviation

Figure 2. Average win rate

We also should run a least 1024 tournaments in order to the measurements be statistically relevant, reducing the standard deviation, keeping in mind that 10 tournaments consumed 01h53min59s or real time.