
The paper summarizes three heuristic functions used by the *AlphaBetaPlayer* function when performing iterative deepening search in the game isolation.

Rationale

The approach used was to start with the simple heuristics covered in the lectures and then test and implement more complex heuristics. Performance was measured as the sum of the win rates. Changes were incrementally applied and tested using tournament play to gain extensive experience understanding the impact of a variety of input factors on performance.

Three Heuristics

As hinted to in the lecture, the best heuristic was that that favored board position, as it allowed greater control in partitioning the move field. The score is calculated using a mixing function that adds value when the player is closer to the edge of the board when the game nears the end.

The second best performing heuristic was simple differencing of squared player moves minus the opponent moves squared.

A novelty heuristic was used see how adding a factor based on the game move count performed. In practice, it turns out that this factor did not significantly improve performance.

Conclusion

We covered three different implementations of the heuristic functions and their relative performance. The below summary presents the last seven tournament results. It is important to observe the win rate variance as the effect of applying minor adjustments and natural variation.

AB_Improved	AB_Custom_1	AB_Custom_2	AB_Custom_3
60.0%	60.0%	68.6%	58.6%
67.1%	64.3%	64.3%	58.6%
58.6%	61.4%	58.6%	57.1%
67.1%	62.9%	57.1%	68.6%
67.1%	55.7%	58.6%	64.3%
54.3%	64.3%	65.7%	62.9%
68.6%	65.7%	57.1%	60.0%