
Monte Carlo Tree Search for the Pokemon Trading Card Game

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Abstract

The Pokemon Trading Card Game is a popular turn-based card game usually played by two players. Its partially observable, stochastic, multi-agent nature combined with its complex rules, large state space, and demand for long-term planning make it an interesting target for modern artificial intelligence research efforts. An agent based on a Monte Carlo Tree Search (MCTS) algorithm with added knowledge via a heuristic function was developed and tested in games of PCG against human players and other agents. Although the MCTS agent performed well against random agents, its performance against human players was worse than expected. Possible explanations for this performance gap are explored and suggestions for future research and technical enhancements are proposed.

1. Introduction

The Pokemon Trading Card game has several characteristics that make it an interesting problem in artificially intelligent agent design. The general format and objective of the game, as well as its formal environment characterization and other important characteristics are summarized below.

1.1. Background: The Pokemon Trading Card Game

You have cards and play them and stuff

1.2. Summary: Game Environment

It's partially observable and all that other junk It's got a large branching factor It requires long-term planning in an uncertain game tree

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2. Methodology

In an effort to develop an agent which could play the Pokemon Card Game competently against human players, the developers implemented a custom state representation and game logic from scratch, then created an agent based on Monte Carlo Search Trees and a well-tuned heuristic function.

2.1. Game Logic and State Representation

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The text of the paper should be formatted in two columns, with an overall width of 6.75 inches, height of 9.0 inches, and 0.25 inches between the columns. The left margin should be 0.75 inches and the top margin 1.0 inch (2.54 cm). The right and bottom margins will depend on whether you print on US letter or A4 paper, but all final versions must be produced for US letter size.

The paper body should be set in 10 point type with a vertical spacing of 11 points. Please use Times typeface throughout the text.

2.2. The Agent Program

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2.2.1. MONTE CARLO TREE SEARCH IMPLEMENTATION

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3. Results

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4. Conclusion

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Acknowledgments

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