
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

Submission to ICML 2015 will be entirely electronic, via a web site (not email). Information about the submission process and L^AT_EX templates are available on the conference web site at:

1.1. Background: The Pokemon Trading Card Game

A better alternative is to use the **pdflatex** program instead of straight L^AT_EX. This program avoids the Type-3 font problem, however you must ensure that all of the fonts are embedded (use `pdffonts`). If they are not, you need to configure `pdflatex` to use a font map file that specifies that the fonts be embedded. Also you should ensure that images are not downsampled or otherwise compressed in a

lossy way.

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1.2. Summary: Game Environment Characterization

We will continue the ICML tradition in which the authors are given the option of providing a short reaction to the initial reviews. These reactions will be taken into account in the discussion among the reviewers and area chairs.

2. Methodology

All submissions must follow the same format to ensure the printer can reproduce them without problems and to let readers more easily find the information that they desire.

2.1. Game Logic and State Representation

Papers must not exceed eight (8) pages, including all figures, tables, and appendices, but excluding references. When references are included, the paper must not exceed ten (10) pages. Any submission that exceeds this page limit or that diverges significantly from the format specified herein will be rejected without review.

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

The paper title should be set in 14 point bold type and centered between two horizontal rules that are 1 point thick, with 1.0 inch between the top rule and the top edge of the page. Capitalize the first letter of content words and put the rest of the title in lower case.

2.2.1. MONTE CARLO TREE SEARCH IMPLEMENTATION

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2.2.2. HEURISTIC FUNCTION

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3. Results

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4. Conclusion

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Acknowledgments

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If a paper is accepted, the final camera-ready version can (and probably should) include acknowledgements. In this case, please place such acknowledgements in an unnumbered section at the end of the paper. Typically, this will include thanks to reviewers who gave useful comments, to colleagues who contributed to the ideas, and to funding agencies and corporate sponsors that provided financial support.