

Artificial Intelligence for Root Board Game

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Introduction

A video game version of Root was released in 2020, but there are multiple reports by its players that the AIs make awful decisions that no humans would ever make in a similar situation. i.e., their AIs are bad. Especially Eyrie Dynasties' AI.

Objectives

- To create an artificial intelligence (AI) that can play the board game "Root".
- To find the best Monte Carlo Tree Search (MCTS) algorithm variant for playing the board game "Root" for each faction.

Methods

- Create a minimal version of Root video game.
- Implement the Open-Loop MCTS algorithm.
- Create 108 MCTS variants for each faction
- and have them fight against the other faction with the *base* MCTS variant → total 216 battles, 216000 rounds of simulation.
- Top 5 variants with highest win rate for each faction face a "Team-Round Robin" fight, i.e., they all fight each other.
- The variant from each faction with highest average win rate will be the best variant for that faction.

Results

The best MCTS variant for Marquise de Cat achieved 60% average win rate with the following parameters:

- reward-function*: vp-difference-relu
- expand-count*: 200 nodes
- rollout-count*: 1 rollout
- time-limit*: no-limit
- action-count-limit*: no-limit
- best-action-policy*: secure (maximum lower confidence bound)



The best MCTS variant for Eyrie Dynasties achieved 60% average win rate with the following parameters:

- reward-function*: vp-difference-relu
- expand-count*: 200 nodes
- rollout-count*: 1 rollout
- time-limit*: no-limit
- action-count-limit*: no-limit
- best-action-policy*: secure (maximum lower confidence bound)

Conclusion

Our Marquise de Cat AI achieved 60% win rate against Eyrie Dynasties AI's 40%. Sed ornare pulvinar est, ac rhoncus sapien lacinia sit amet. Sed facilisis eros lacus, elementum mollis lacus lacinia vel. Ut quis tristique enim, non feugiat tellus. Quisque massa lectus, ultrices id justo ornare, laoreet mollis risus. Nam facilisis dolor eu malesuada efficitur. Pellentesque vel justo libero. Nam ut libero rutrum, scelerisque erat et, luctus dolor.

