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LEVERAGING MCTS FOR OPTIMAL DECK BUILDING STRATEGIES

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Rules for the Game

1

Goal: Collect The Most Money

1

2

Take Turns: Buy Cards Or Play Cards

2

3

Use Value Cards to Buy Shop Cards

3

4

Play Special Cards To Thwart Your Rival

4

Rules for the Game

MDP MODELING

- State Space:
  - Big!
  - N(Initial Shop States) = 420
  - N(initial Hand States) = 20
  - N(initial States)
  - = N(Initial Shop States) * 2(N(initial Hand States))
  - = 16800
  - Approx. Max N(states from a action) = 105

MCTS

- heuristic based approach.
- Progressive Widening Variation
  - Used to mitigate consequences of vast state space
  - Limit new sampled states

Steps

- Select:
  - Pick Best Leaf Node
  - UCB1 algorithm
- Rollout:
  - Simulate (‘bias’ random)
  - lose = -1 / win = 1
- back-propogate
- Repeat

Assumptions

- We assumed deferring turn is undesirable
- Smarter Rollout policies and value functions could improve performance

Progressive Widening

- By selecting appropriate parameters, we limited the number of sampled states per action to 40

Conclusion

- few seconds for 10,000 iterations
- MCTS is a key tool for vast state space challenges.