Strategy Card Game AI Competition

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Legends of Code and Magic

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Draft Phase

Battle Phase

Competitions

One lane version (LOCM 1.0)
 Jul 2018 – CodinGame Sprint Contest (24h) – 742 participants
 Sep 2018 – CodinGame Marathon (30 days) – 2,174 participants

Two lanes version (LOCM 1.2)
 CEC 2019 – 6 entries (+2 baselines)
 COG 2019 – 9 entries (+2 baselines)
 CEC 2020 – 3 new entries (+10 previous agents)
 COG 2020 – 1 entry + 3 CEC entries (+2 baselines)
 CEC 2021 – no new entries
 COG 2021 – 5 new entries + COG2020 entries (+2 baselines)

New Entries

AdvancedAvocadoAgent, by Lukas Freudenberger and Tobias Spahn, Java
  Draft: Static card priority ordering.
  Play: Greedy choice over the available actions. Weights of evaluation function trained offline by an MCTS-based search over the space of parameters.
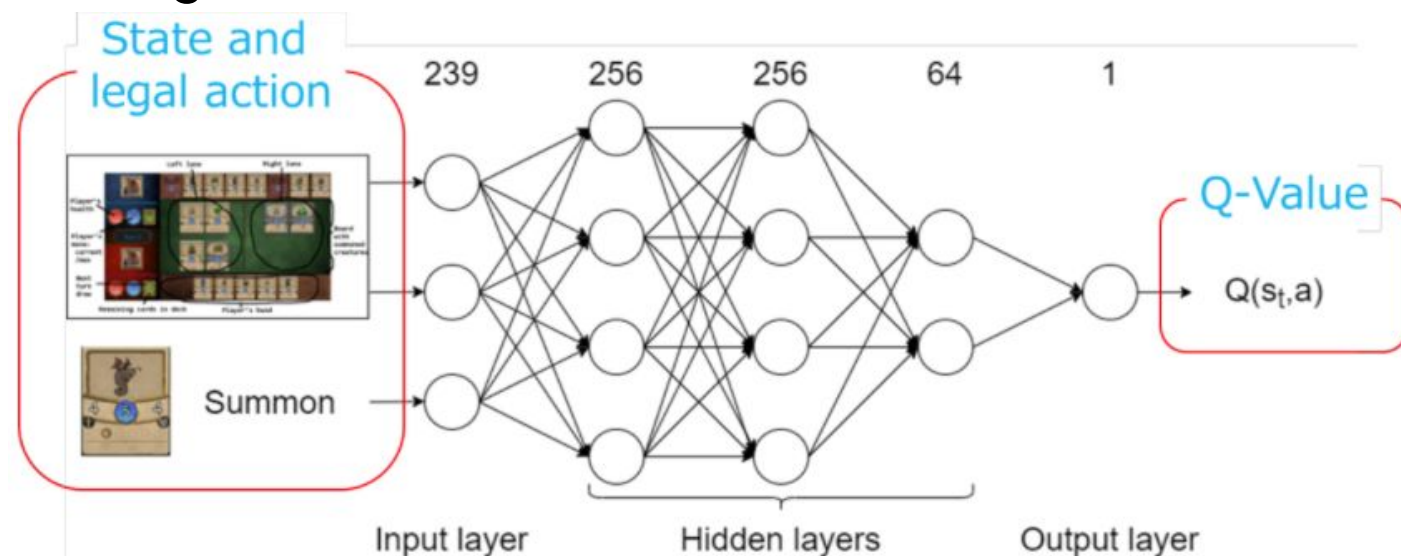
Ag2O, by Eiji Sakurai, Python
  Draft: Card scores calculated as difference of state value.
    Considers card combinations.
  Play: Trained by Reinforcement Learning (DQN).
    Action with the highest
    Q-Value is played.

State and legal action

Summon

239   256   256   64   1

Q-Value

$Q(s_t, a)$

Input layer   Hidden layers   Output layer

New Entries

Chad, by Marcin Witkowski, Wojciech Meller, Łukasz Klasiński, Rust
  Winner 2020
  Draft: Card weights computed using harmony search
  Play: MCTS with prediction of opponent's hand

DrainPower, by Mikołaj Dąbrowski, C#
 2 versions: normal and aggressive
  Draft: Static card priority orderings
  Play: Flat game simulations (1 turn depth + opponent responses),
    handcrafted scoring function, lethal detection (and preventing).

LANE_1_0, by Daniel Górski, Java
  Draft: Static card priority orderings
  Play: Constant number of of restricted game simulations (only own moves),
    complex handcrafted evaluation function
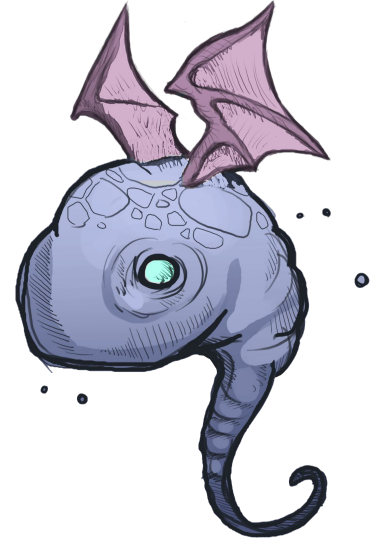
Evaluation

Every two agents were compared using 180 decks, ten games each. All games with the same deck had the same random seed, resulting in an identical card ordering.

All participants source code available at
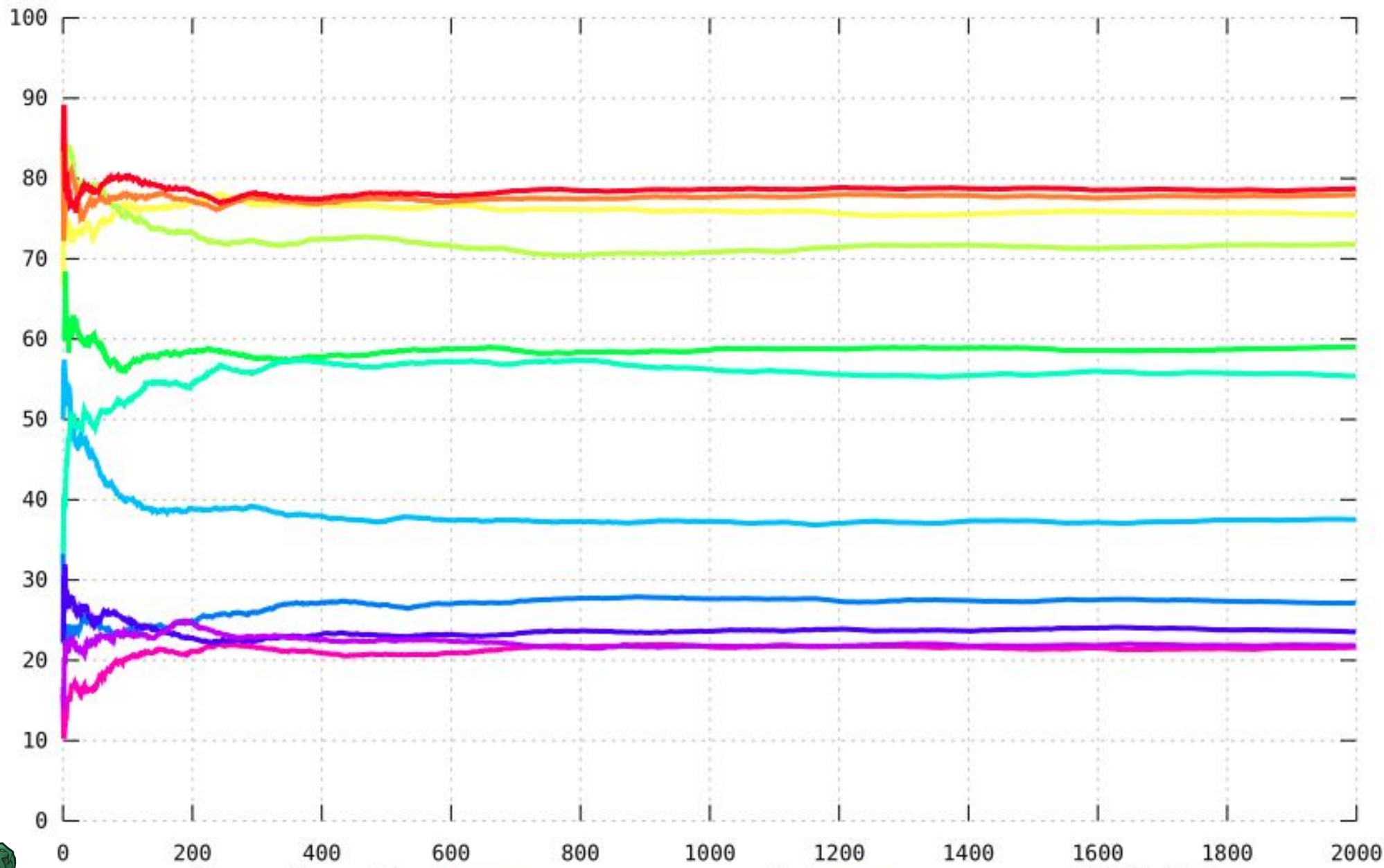github.com/acatai/Strategy-Card-Game-AI-Competition

Results

Results

Place	Player	Wins
1	**DrainPowerAggressive**	**78.72%**
2	**DrainPower**	**77.96%**
3	**Chad**	**75.51%**
4	Coac	71.77%
5	OneLaneIsEnough	59.01%
6	ReinforcedGreediness	55.38%
7	**LANE_1_0**	**37.53%**
8	**Ag2O**	**27.17%**
9	Baseline1	23.56%
10	Baseline2	21.83%
11	**AdvancedAvocadoAgent**	**21.62%**

Winners

DrainPowerAggressive
Mikołaj Dąbrowski

Chad
Marcin Witkowski,
Wojciech Meller,
Łukasz Klasiński

LANE_1_0
Daniel Górski

Some conclusions

➔ Arena mode prevents "smart" deck constructing
        seeking for pure power works best
➔ No much gain in searching beyond player's turn + onboard response
        high randomness and game tree size
➔ Good evaluation function is a key
        more important than exhaustive/deep search
➔ There is progress in top players' strength:
    ○ 2019-2020 Coac,
    ○ 2020 Chad,
    ○ 2021 DrainPowerAggressive

More charts and player data:

LegendsOfCodeAndMagic.com/COG21

Future

This is the last edition under the current rules and deck.

Next editions:
➔ (Semi-)Constructed mode:
     Deckbuilding from the given set of cards
➔ Introducing new game mechanic:
     Area of Effect
➔ Procedurally generated sets of cards
     (probably / optional)