# **Hearthstone AI Competition**

## **Conference on Computational Intelligence and Games 2018**

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# Task Description

- Program an agent, which is capable of playing the game Hearthstone

- We used the Sabberstone Framework (C#) modified for partial observation

- Evaluation in two separate tracks:

  - "Premade Deck Playing"-track
    - Play three known decks

  - "User Created Deck Playing"-track
    - Play your own deck

# "Premade Deck Playing" - track

- 33 submissions (+2 agents for training)
  - Everybody needs to play all three decks and one unknown deck to play against the others.

- Round Robin Tournament
  - 90 games per matchup of two agents,
  - 10 games per deck combination (25 starts per player)
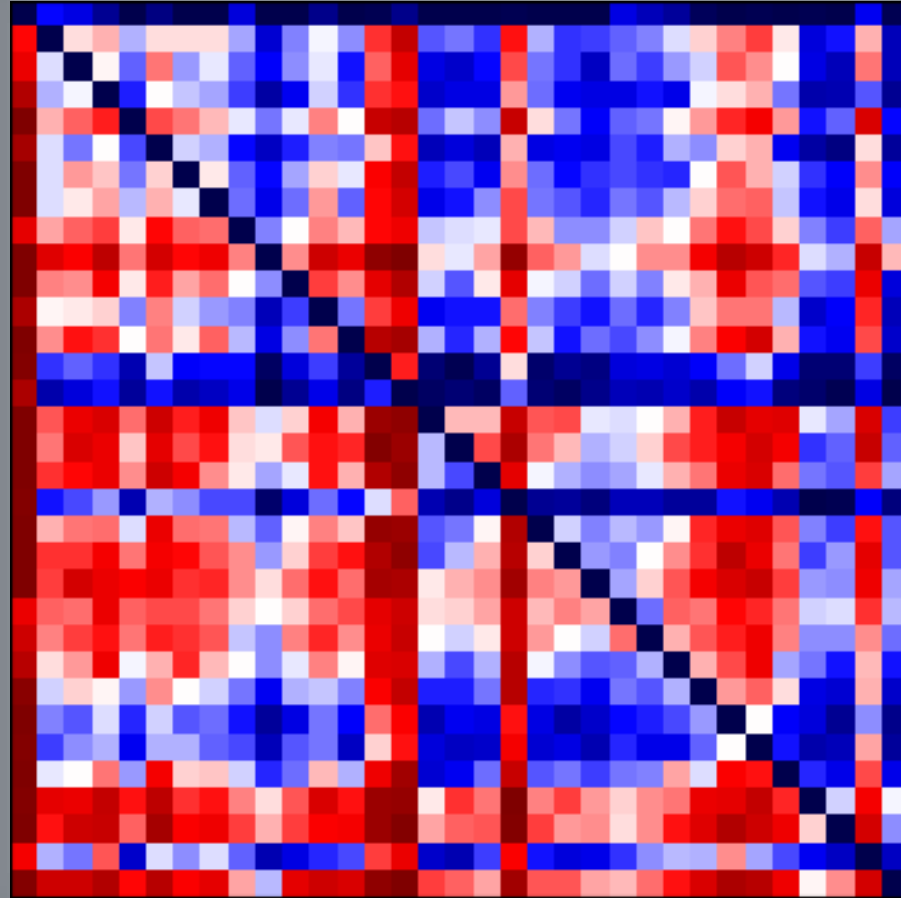
# 3 Decks – 3 Playstyles

(Aggro) Pirate Warrior

(Midrange) Jade Shaman

(Control) Reno Kazakus Mage

# "Premade Deck Playing" - Evaluation



33 submissions

# "Premade Deck Playing" - Ranking

**Rank 1**

**Rank 2**

**Rank 3**

**Rank 4**

**Rank 5**

# "Premade Deck Playing" - Ranking

| Rank 1 |
| --- |
| |

| Rank 2 |
| --- |
| |

| Rank 3 | Rank 4 | Rank 5 |
| --- | --- | --- |
| | | Ivan Prymak, Milena Malysheva<br>– 68% Winrate – |

# "Premade Deck Playing" - Ranking

**Rank 1**

**Rank 2**

**Rank 3**

**Rank 4**

Hans-Martin Wulfmeyer
– 68.3% Winrate –

**Rank 5**

Ivan Prymak, Milena Malysheva
– 68% Winrate –

# "Premade Deck Playing" - Ranking

| Rank 1 |
|---|
| |

| Rank 2 |
|---|
| |

| Rank 3 |
|---|
| Kai Bornemann<br>– 72.5% Winrate – |

| Rank 4 |
|---|
| Hans-Martin Wulfmeyer<br>– 68.3% Winrate – |

| Rank 5 |
|---|
| Ivan Prymak, Milena Malysheva<br>– 68% Winrate – |

# "Premade Deck Playing" - Ranking

## Rank 1

## Rank 2

**EVA - Pablo Garcia-Sanchez, Alberto Tonda
– 74.2% Winrate –**

## Rank 3
**Kai Bornemann
– 72.5% Winrate –**

## Rank 4
**Hans-Martin Wulfmeyer
– 68.3% Winrate –**

## Rank 5
**Ivan Prymak, Milena Malysheva
– 68% Winrate –**

# "Premade Deck Playing" - Ranking

### Rank 1
**Max Frick, Ünal Akkaya – 76.0% Winrate**

### Rank 2
**EVA - Pablo Garcia-Sanchez, Alberto Tonda
– 74.2% Winrate –**

### Rank 3
**Kai Bornemann
– 72.5% Winrate –**

### Rank 4
**Hans-Martin Wulfmeyer
– 68.3% Winrate –**

### Rank 5
**Ivan Prymak, Milena Malysheva
– 68% Winrate –**

# "Premade Deck Playing" – Specific Winrates

# "Premade Deck Playing" – Conclusion

- Top-performing agents either used
  - simulation-based search algorithms, such as MCTS
  - or trained an evaluation function using evolutionary algorithms

- Used decks are not balanced well. The evaluation tries to compensate for this, by testing all match-ups.
  - Different strategy profiles emerged (aggro, midrange)
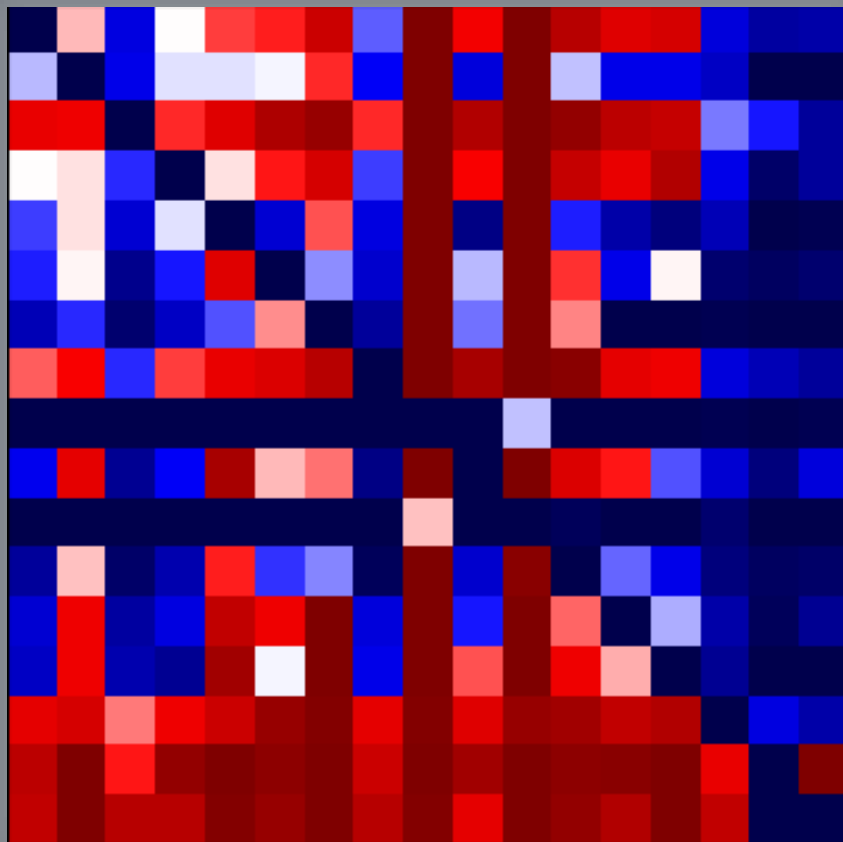  - Best bots can play all matchups well

# "User Created Deck Playing"-track

- 17 submissions (+2 agents for training)
  - Everybody chose his own deck to play against the others.

  - Round Robin Tournament
    - 100 games per matchup (50 starts per player)

# "User Created Deck Playing" - Evaluation



17 submissions

# "User Created Deck Playing" - Ranking

**Rank 1**

**Rank 2**

**Rank 3**

**Rank 4**

**Rank 5**

# "User Created Deck Playing" - Ranking

**Rank 1**

**Rank 2**

**Rank 3**

**Rank 4**

**Rank 5**

Simon Schröer (Jade Shaman)
– 68% Winrate –

# "User Created Deck Playing" - Ranking

| Rank 1 |
|---|
| |

| Rank 2 |
|---|
| |

| Rank 3 | Rank 4 | Rank 5 |
|---|---|---|
| | **Christian Wustrau (Jade Shaman)** – 75% Winrate – | **Simon Schröer (Jade Shaman)** – 68% Winrate – |

# "User Created Deck Playing" - Ranking

**Rank 1**

**Rank 2**

**Rank 3**
Kai Bornemann (Jade Shaman)
– 78% Winrate –

**Rank 4**
Christian Wustrau (Jade Shaman)
– 75% Winrate –

**Rank 5**
Simon Schröer (Jade Shaman)
– 68% Winrate –

# "User Created Deck Playing" - Ranking

## Rank 1

## Rank 2

**Max Frick, Ünal Akkaya (Warlock)**
**– 88% Winrate –**

## Rank 3

Kai Bornemann (Jade Shaman)
**– 78% Winrate –**

## Rank 4

Christian Wustrau (Jade Shaman)
**– 75% Winrate –**

## Rank 5

Simon Schröer (Jade Shaman)
**– 68% Winrate –**

# "User Created Deck Playing" - Ranking

## Rank 1
Lars Wagner (Jade Druid) – 95% Winrate

## Rank 2
Max Frick, Ünal Akkaya (Warlock)
– 88% Winrate –

## Rank 3
Kai Bornemann (Jade Shaman)
– 78% Winrate –

## Rank 4
Christian Wustrau (Jade Shaman)
– 75% Winrate –

## Rank 5
Simon Schröer (Jade Shaman)
– 68% Winrate –

# "User Created Deck Playing" - Conclusion

- Winning agents use top-performing meta-decks
  - JadeDruid, Warlock, JadeShaman
  - 2nd and 3rd place also performed well using other decks
  - Winning strategies include: MCTS, RHEA, EA Greedy

# Future Work

- Interesting Research Questions:
  - Can we measure the strength/balance of a deck using the different bots and their playstyles
  - How to evaluate the meta-game and choose your deck
  - How to test drafting and deck-building in a competitive environment.

- Tracks will be updated for next year!

# Thank you for all your submissions!

# We are looking forward to continue this competition!



http://www.is.ovgu.de/Research/HearthstoneAI.html