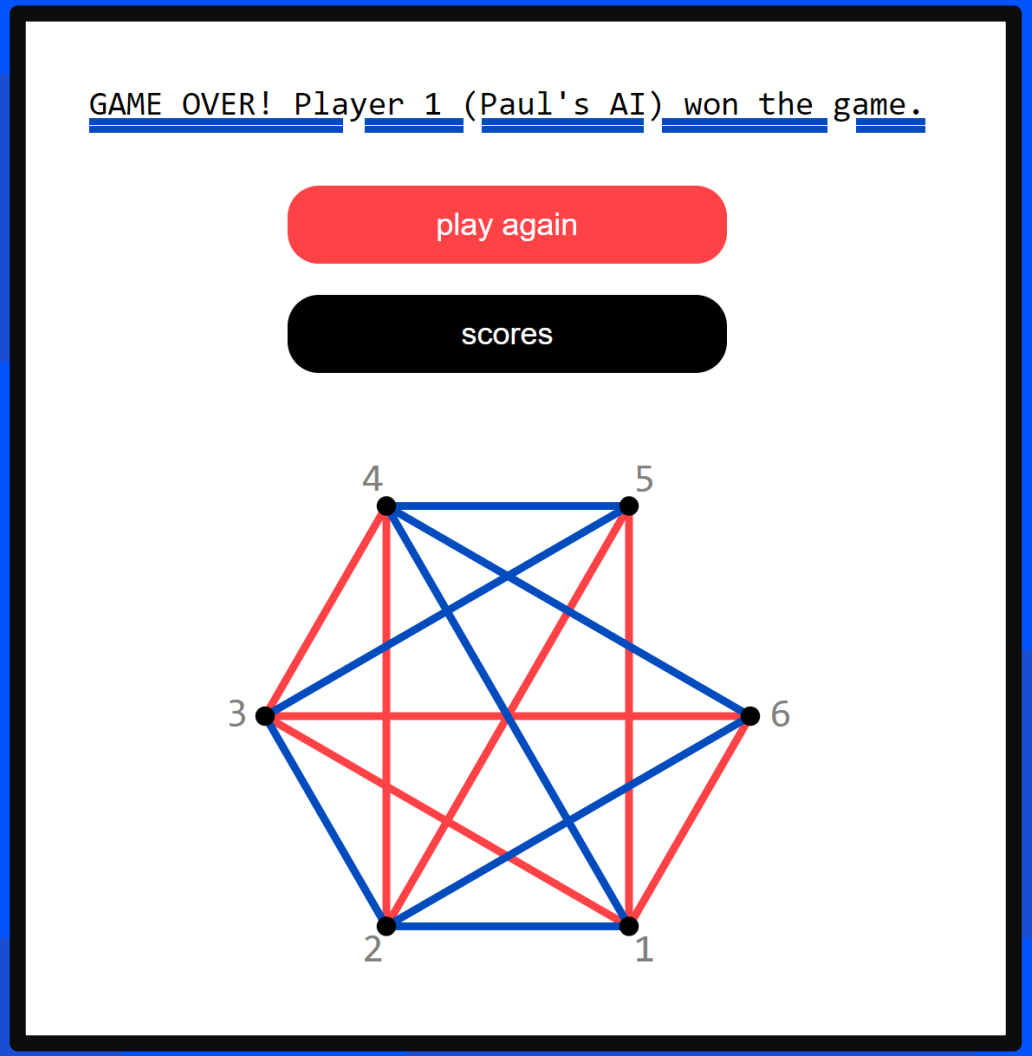
cloudflight

Artificial Intelligence for “SIM”

Paul Puntschart



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Paul

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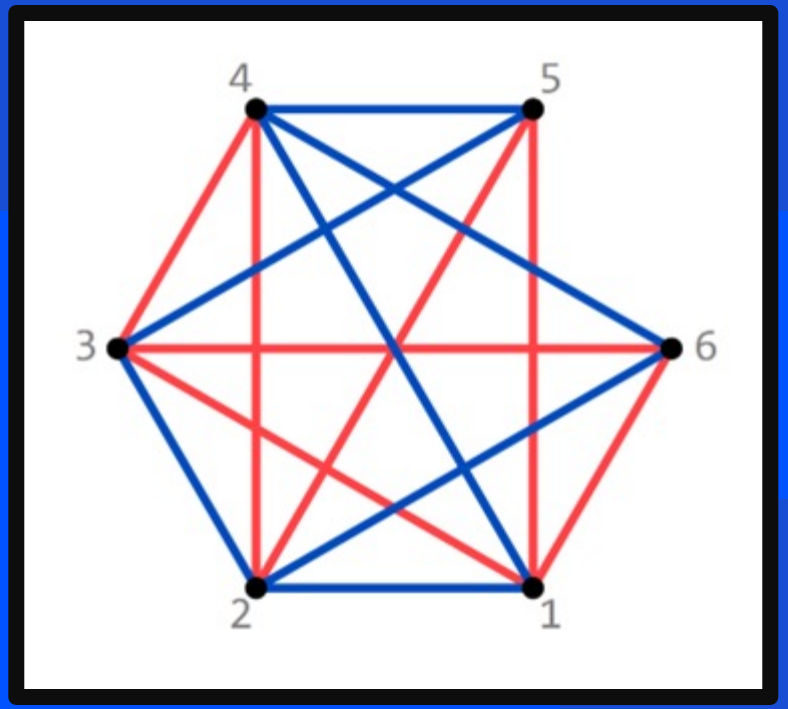
Chapter 1: **Play**
Chapter 2: **The Game**
Chapter 3: **Implement**
Chapter 4: **The AI**



Chapter 1:

P l a y

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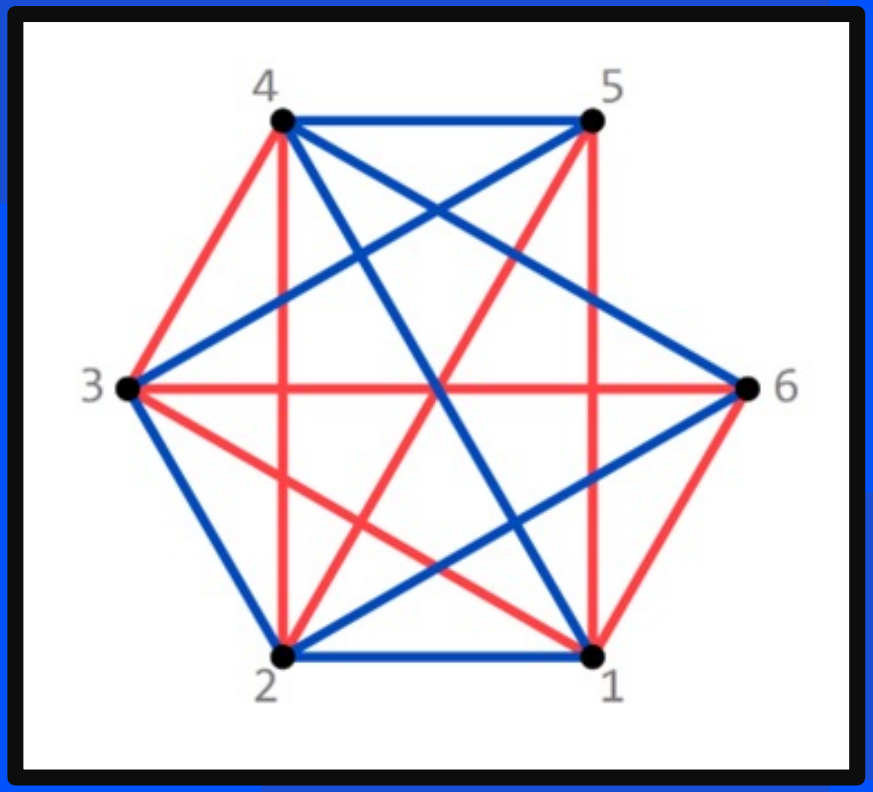
Rules

- draw 6 dots
- one after another:
  - connect the dots
- if you drew a triangle:
  - you lost the game



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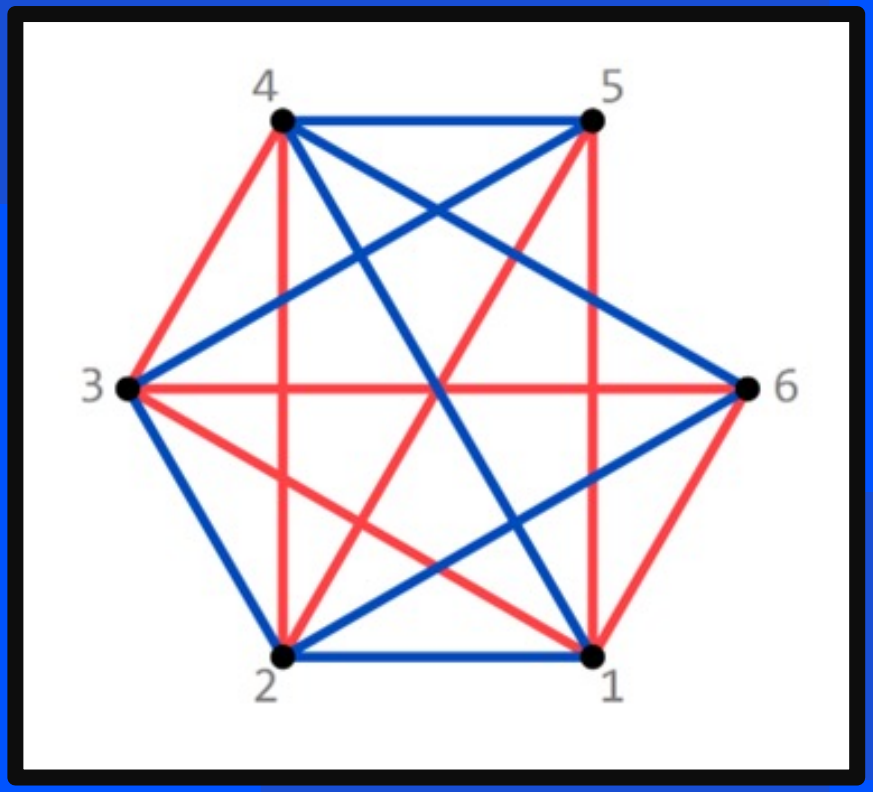
https://joshbraun.umasscreate.net/sim/

Rules

- draw 6 dots
- one after another:
  - connect the dots
- if you drew a triangle:
  - you lost the game



Chapter 2:

The Game

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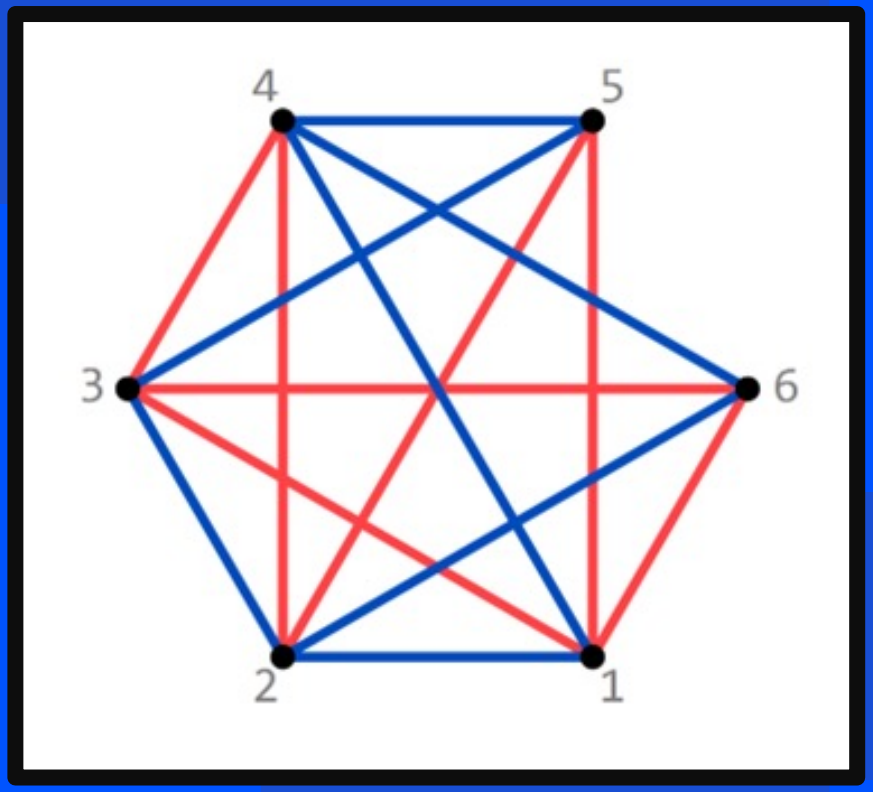
The Game “SIM”

- 1969 by Gustavus J. Simmons
- Ramsey theory:
  a draw is not possible
- Player ? can always win



Chapter 3:

I m p l e m e n t

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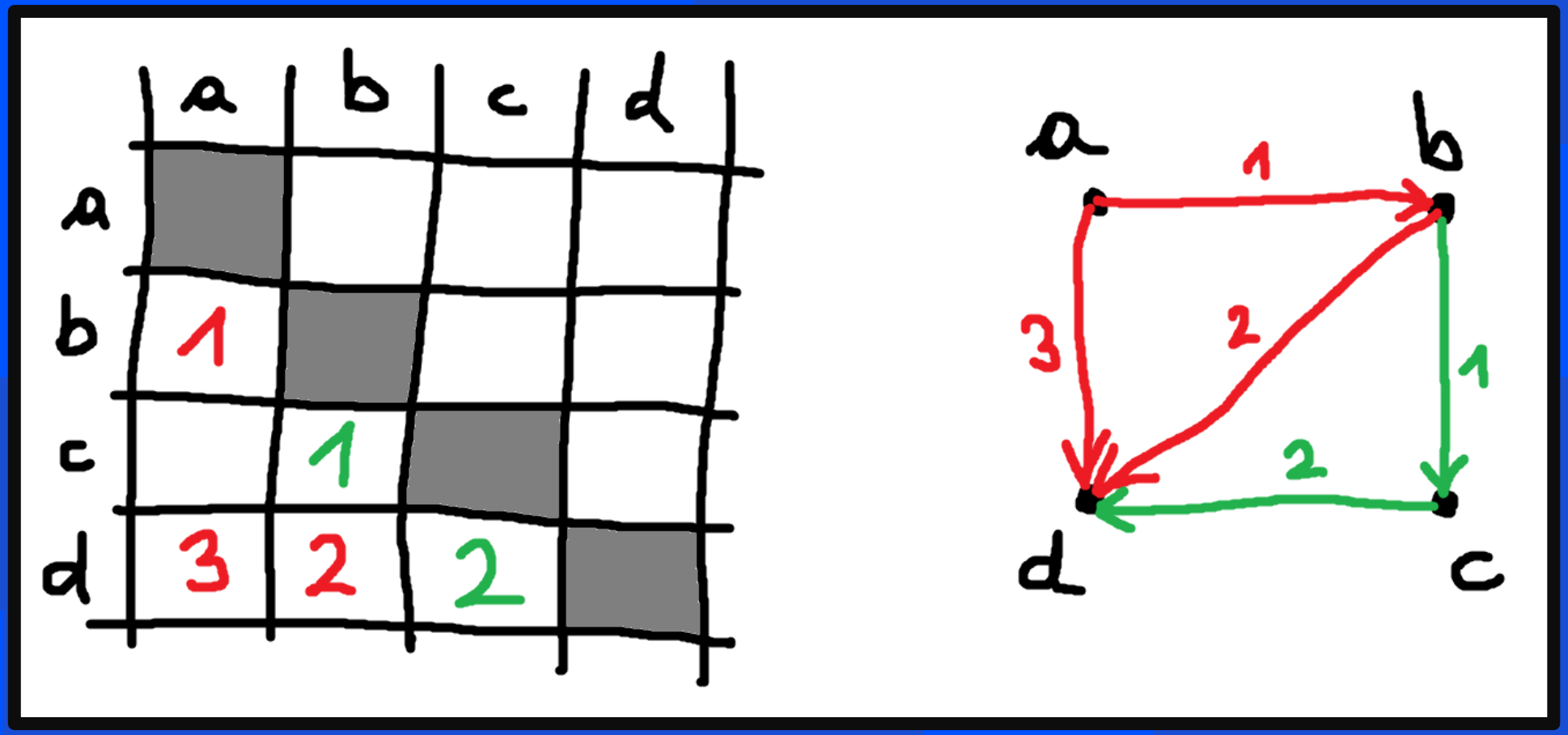
The Board



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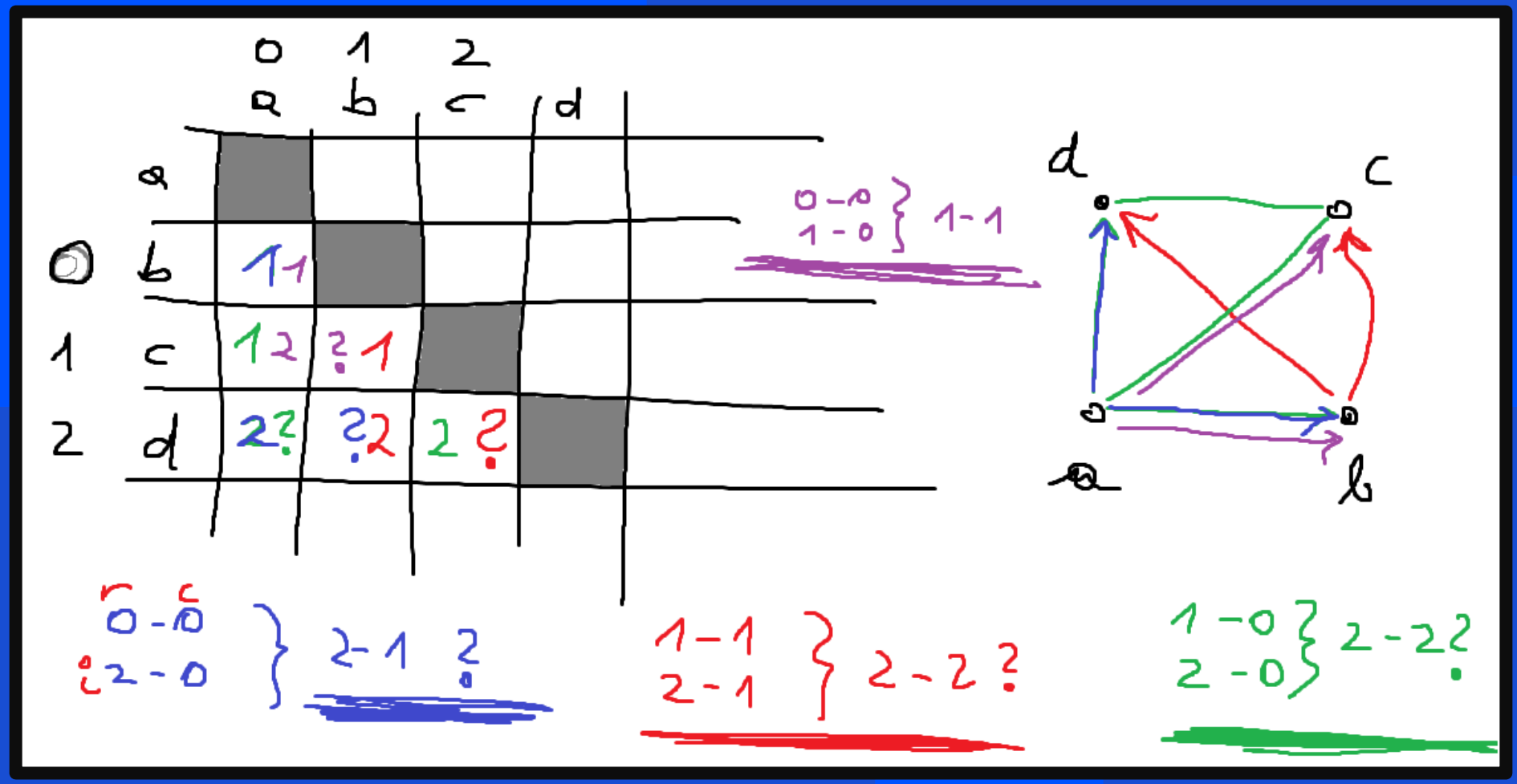
The End



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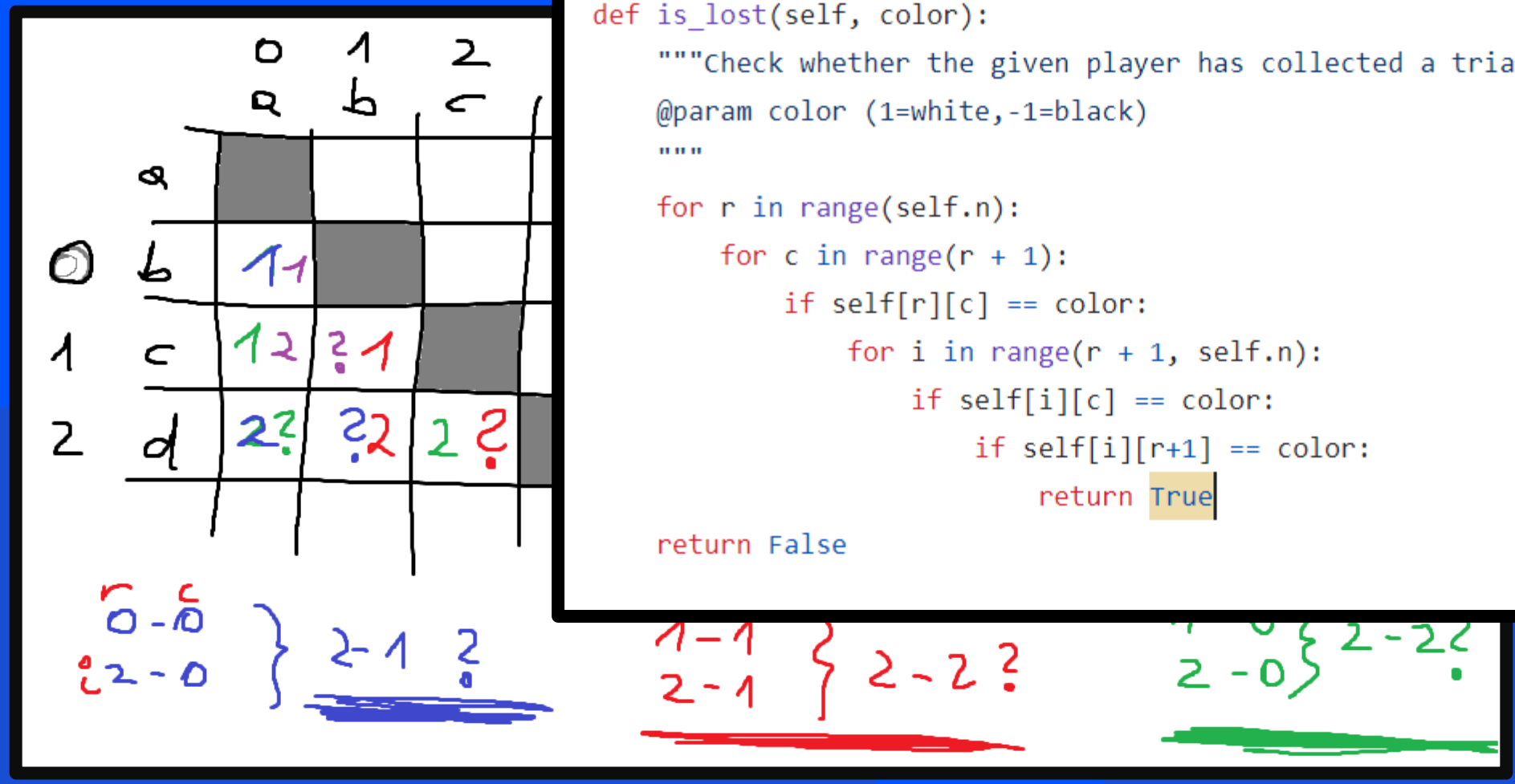
The End




```python
def is_lost(self, color):
    """Check whether the given player has collected a triangle;
    @param color (1=white,-1=black)
    """
    for r in range(self.n):
        for c in range(r + 1):
            if self[r][c] == color:
                for i in range(r + 1, self.n):
                    if self[i][c] == color:
                        if self[i][r+1] == color:
                            return True
    return False
```

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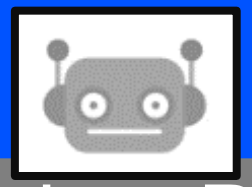
Players



Random Player

Algo Player

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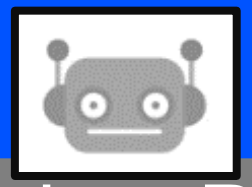
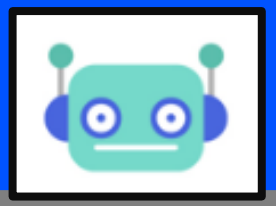
Players



Random Player

Algo Player



Human Player

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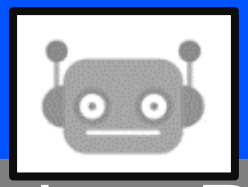
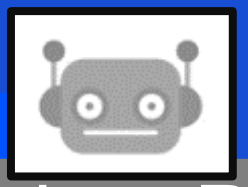
Tournament



Random Player

vs



Random Player

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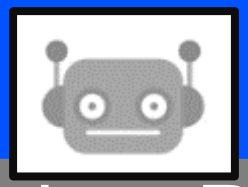
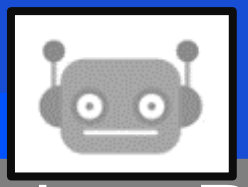
Tournament



Random Player

vs



Random Player

Arena.playGames (1): 100%| 500000/500000 [07:07<00:00, 1168.89it/s]
Arena.playGames (2): 100%| 500000/500000 [07:16<00:00, 1144.61it/s]

Player1 vs Player2 (total of 1000000 games): (499148, 500852, 50%)

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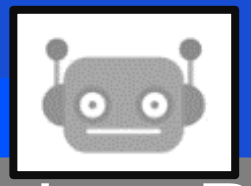
Tournament

Algo Player

vs



Random Player

Player1 vs Player2 (total of 100000 games): (88150, 11850, 88%)

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Tournament

Algo Player

vs

Algo Player

Player1 begins (50000 games): (25279, 24721, 51%)
Player2 begins (50000 games): (24640, 25360, 49%)
Player1 vs Player2 (total of 100000 games): (49919, 50081, 50%)

Chapter 4:

The AI

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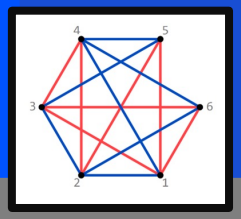
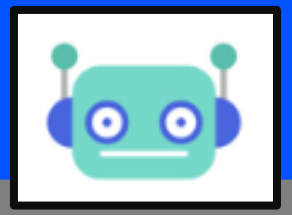
Reinforcement Learning Szenario



Environment



Agent

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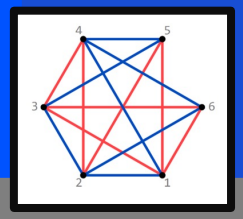
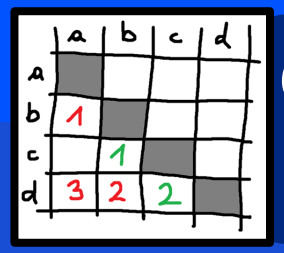
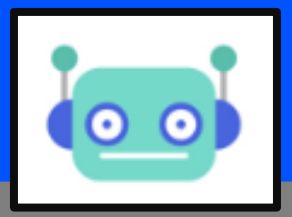
Reinforcement Learning Szenario



Environment



Observation
Reward



Agent

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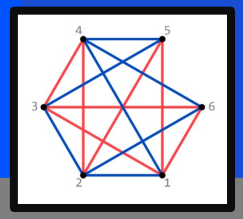
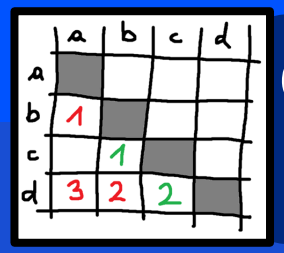
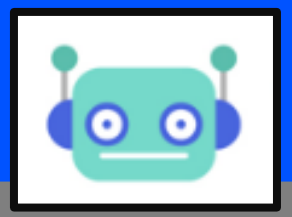
Reinforcement Learning Szenario



Environment



Observation
Reward



Agent

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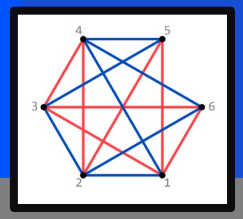
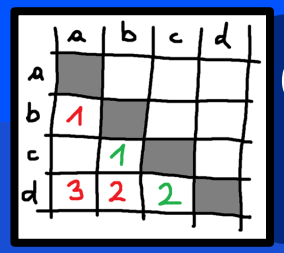
Reinforcement Learning Szenario



Environment



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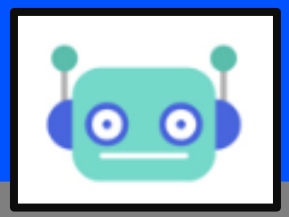

Agent

Action

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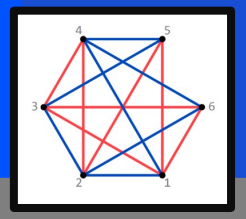
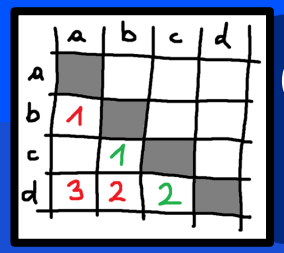
Reinforcement Learning Szenario



Environment



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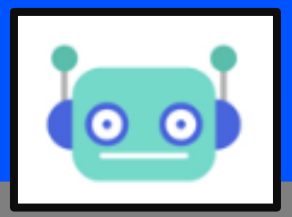
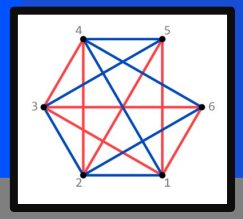


Agent

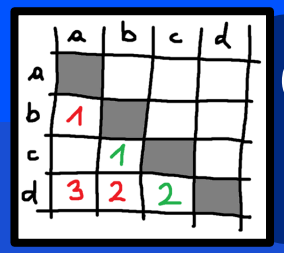
Action

cloudflight

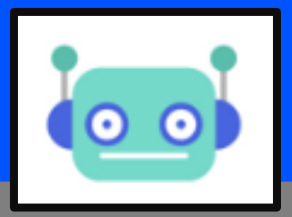
Reinforcement Learning Szenario



Environment



Observation
Reward



Agent

Action

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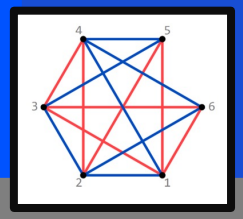
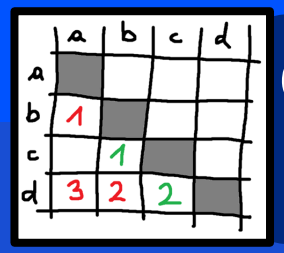
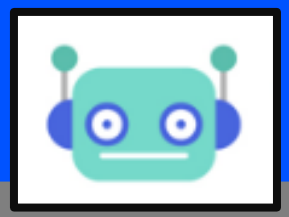
Reinforcement Learning Szenario



Environment



Observation
Reward



Agent

Action

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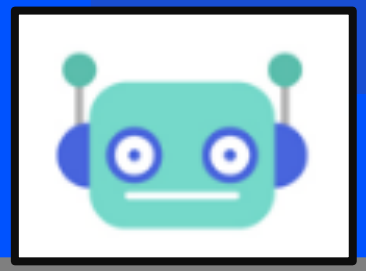
Tournament Play



Agent 0

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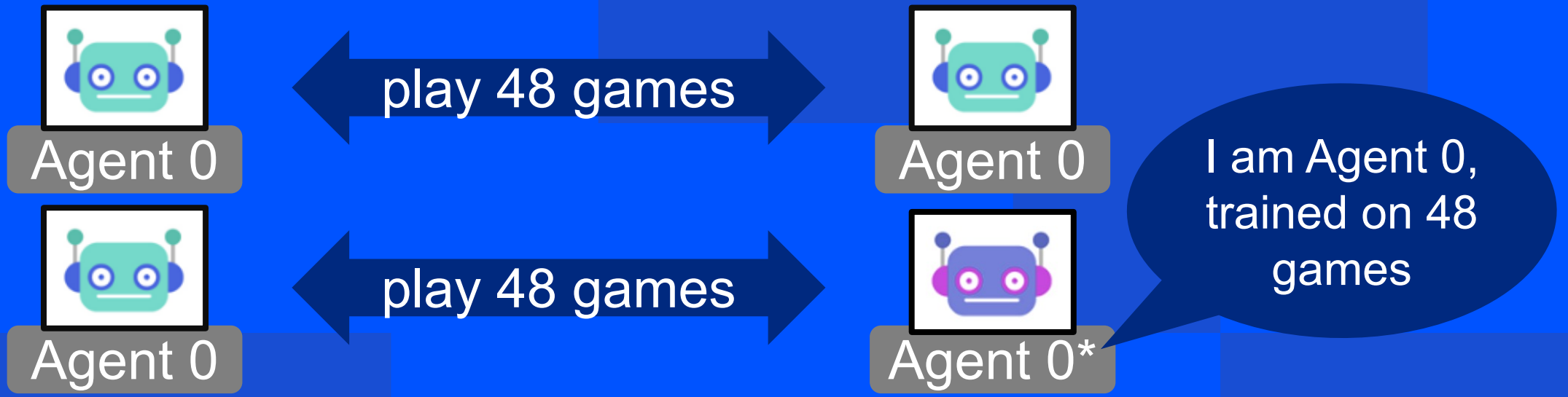
Tournament Play

cloudflight

Tournament Play



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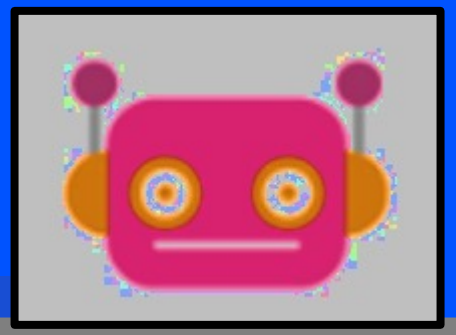
Tournament Play

cloudflight

Game History

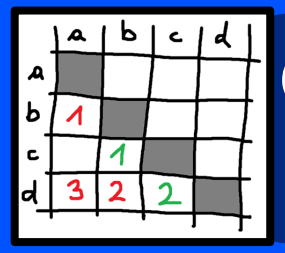


I am Agent 24, trained on 64 tournament games

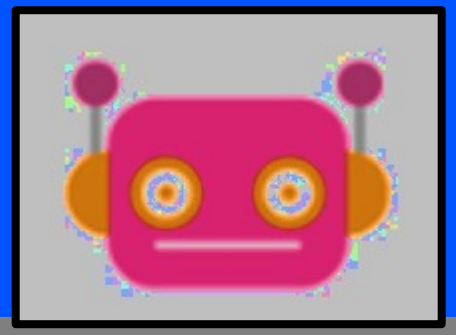
Agent 24*

cloudflight

Action Variaty



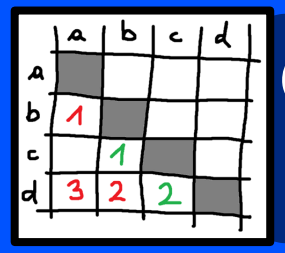
Observation
Reward



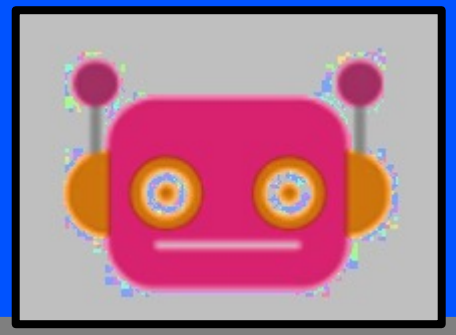
Agent 24*

cloudflight

Action Variaty



Observation
Reward



Agent 24*

I'll play

the best action?

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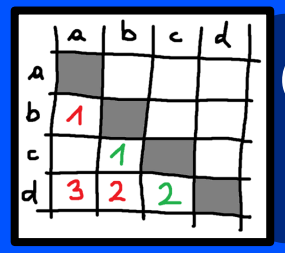
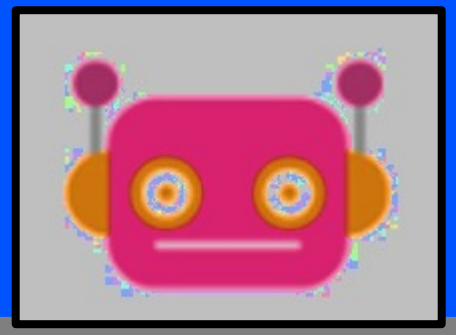
Action Variaty

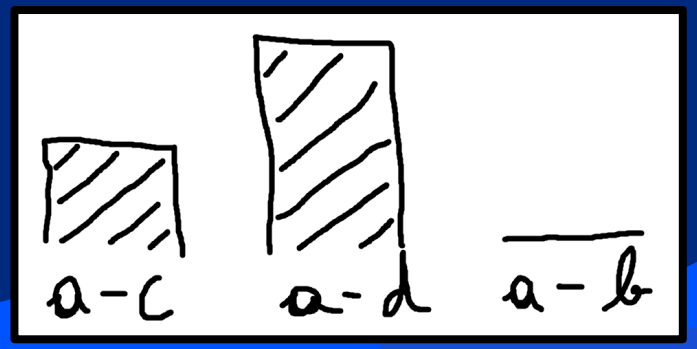


Observation
Reward



Agent 24*

I'll play



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Tournament

Agent 1

vs

Algo Player

Player1 begins: (34, 16, 68%)
Player2 begins (50 games): (41, 9, 82%)
Player1 vs Player2 (total of 100 games): (75, 25, 75%)

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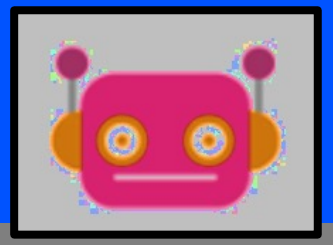
Tournament



Agent 24

vs

Algo Player

Player1 begins: (39, 11, 78%)
Player2 begins (50 games): (37, 13, 74%)
Player1 vs Player2 (total of 100 games): (76, 24, 76%)

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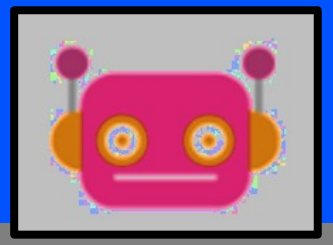
Tournament



Agent 40

vs

Algo Player

Player1 begins: (86, 14, 86%)
Player2 begins (100 games): (86, 14, 86%)
Player1 vs Player2 (total of 200 games): (172, 28, 86%)

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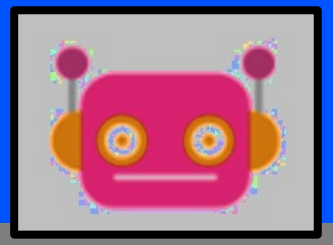
Tournament



Agent 148

vs

Algo Player

Playing as Player1 (700 games): (633, 67, 90%)
Playing as Player2 (700 games): (692, 8, 99%)
Player1 vs Player2 (total of 1400 games): (1325, 75, 95%)

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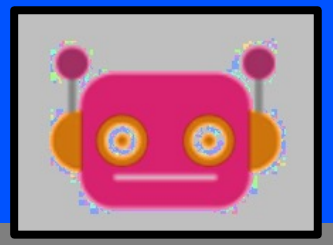
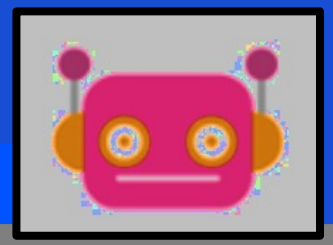
Tournament



Agent 148

vs



Agent 148

Player1 begins (50 games): (4, 46, 8%)
Player2 begins (50 games): (47, 3, 94%)
Player1 vs Player2 (total of 100 games): (51, 49, 51%)

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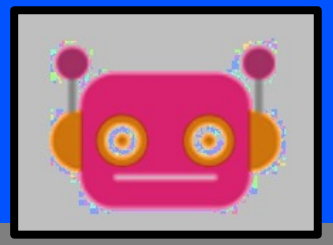
Tournament



Agent 226

vs

Algo Player

Player1 begins (500 games): (449, 51, 90%)
Player2 begins (500 games): (500, 0, 100%)
Player1 vs Player2 (total of 1000 games): (949, 51, 95%)

cloudflight

Source Code

https://github.com/a1026360/JazzWorm/tree/pauls-sim-ai/sim

CLOUDFLIGHT CODING CONTEST

39th CCC: 19.04.2024

Vienna City Hall

Win cash prizes and gaming gadgets + enjoy food and drinks while networking

starting time: 10:00	#School track:	school students, all languages allowed	1-5 ppl team or single
starting time: 15:00	#Classic track:	All skill levels, from beginners to pros	1-3 ppl team or single

register.codingcontest.org