Reinforcement Learning (RL)

SPICED Academy

Graduation Day

Regularized Aniseeds

Philipp Bellmann - 31.01.2023

Reinforcement Learning (RL)

Part I: Snake as the ‘hello world’ of RL

- What is RL - Introduction
- Snake as practical example

Part II: Simulation of photovoltaic system with storage

- System overview and data sources
- Example day

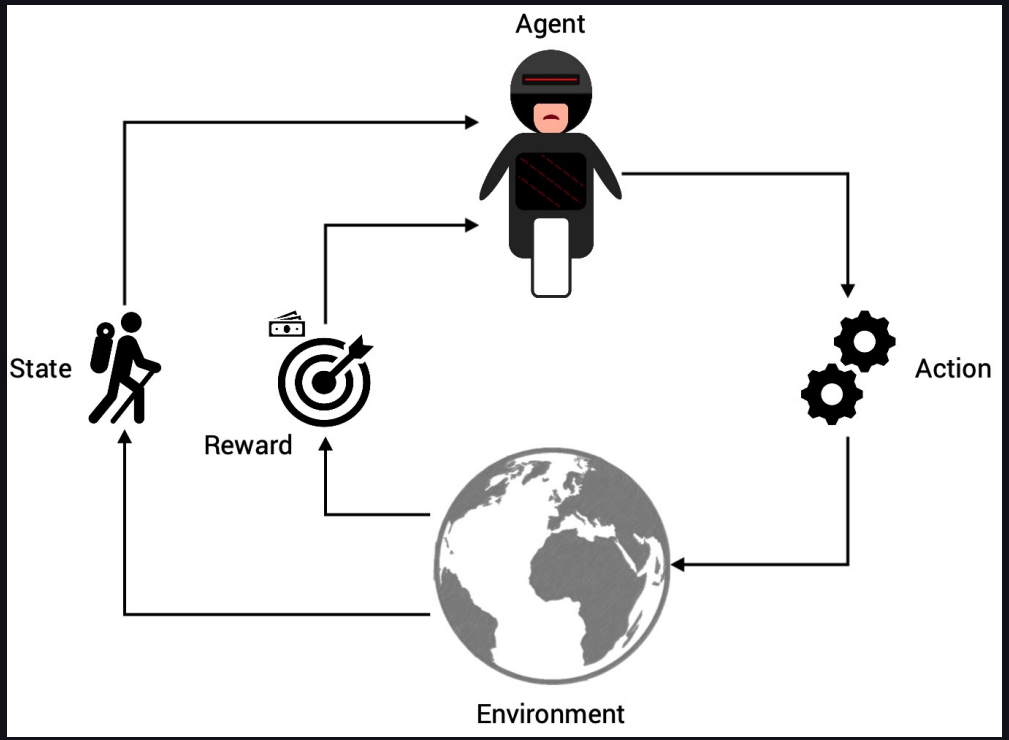
Part III: Solar storage control based on RL

- Concept of load shift and time-variable pricing
- Application of RL on storage control

Part I: Snake as the ‘hello world’ of RL

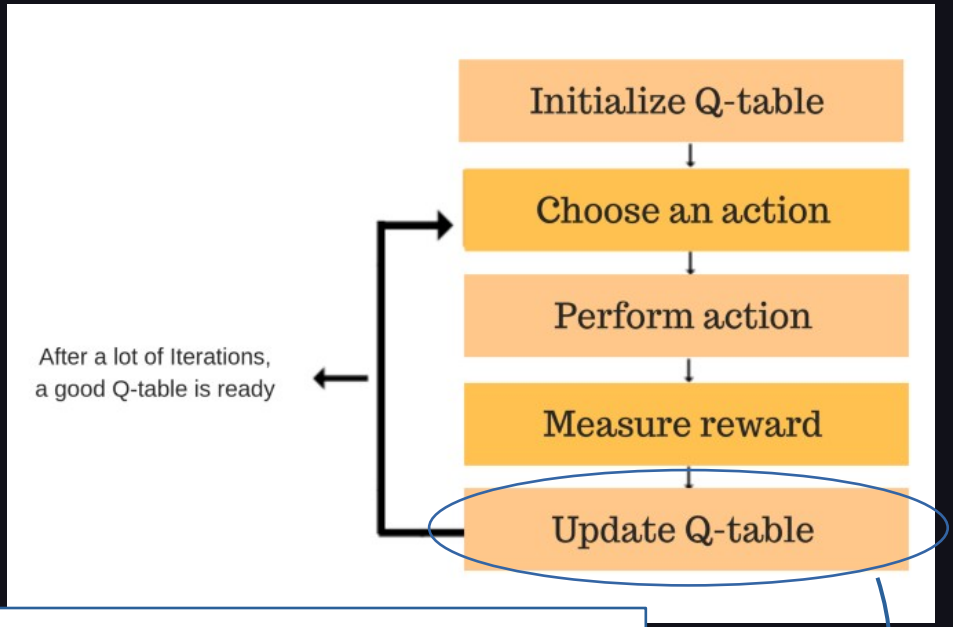
- What is Reinforcement Learning?

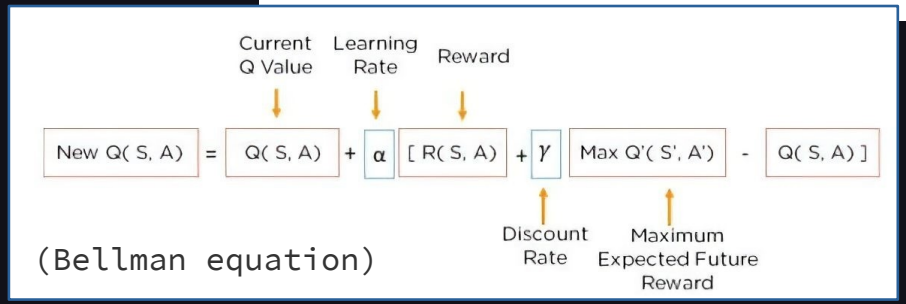
- Agent ⇔ Environment



Part I: Snake as the ‘hello world’ of RL

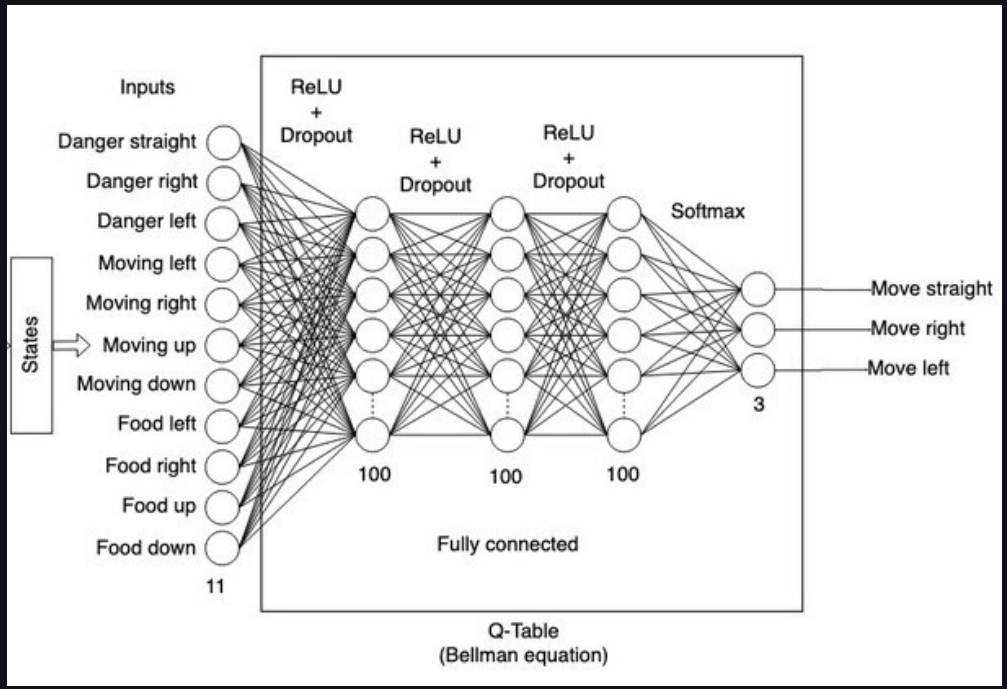
- What is Reinforcement Learning?
- Q-learning:
- Q-value = estimated reward for possible actions in this state
- Gamma = with which weight are rewards from future time steps taken into account?





Part I: Snake as the ‘hello world’ of RL

- What is Reinforcement Learning?
- In Deep-Q-Learning the Q-table is represented by a neural network

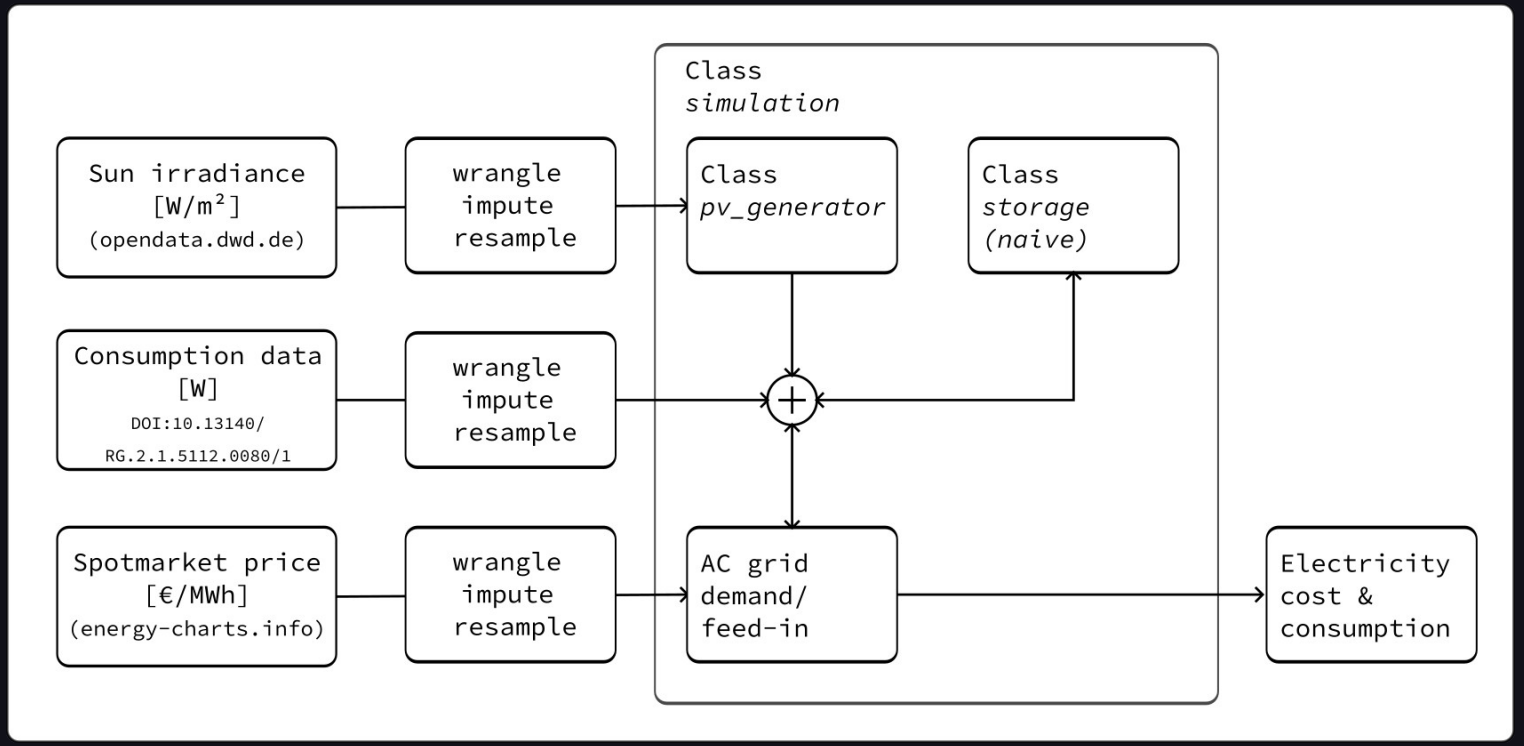


Part I: Snake as the ‘hello world’ of RL

- Snake as a practical example

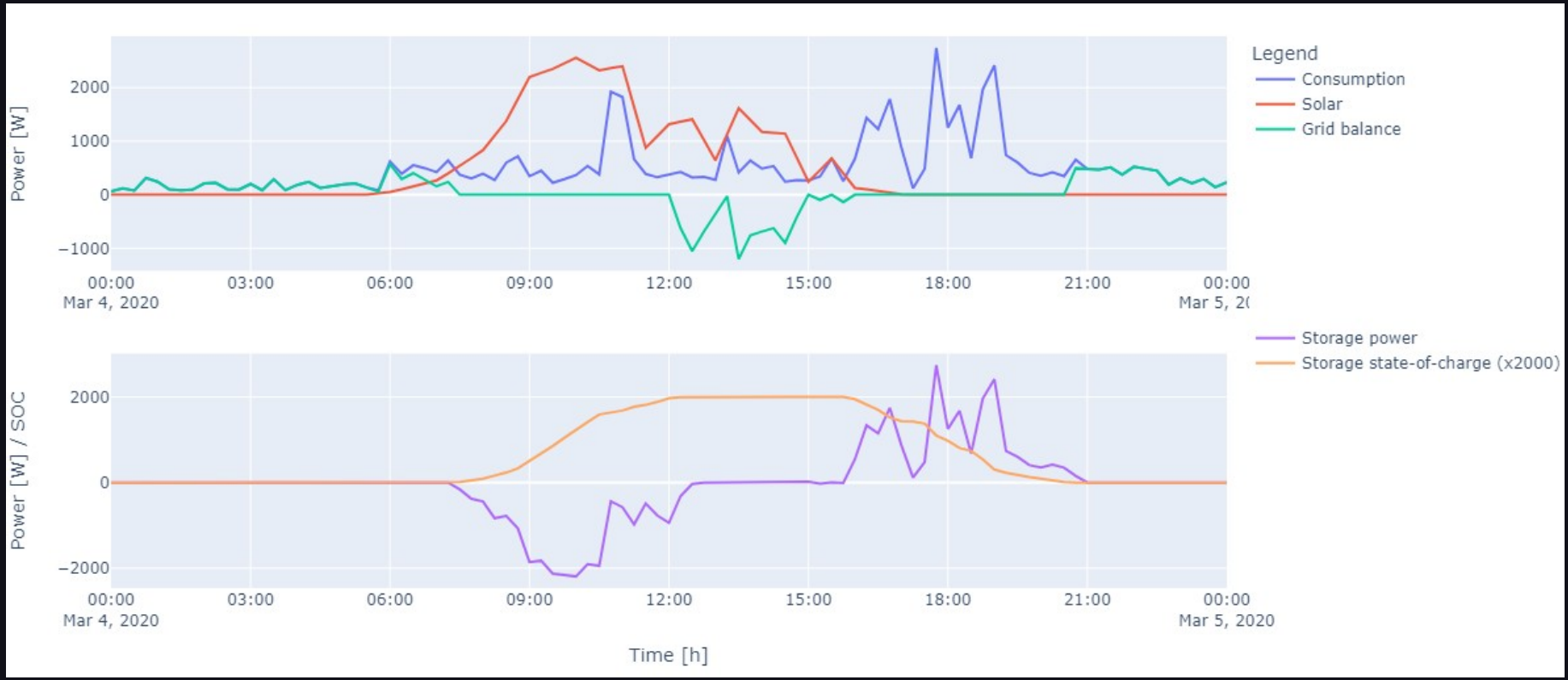
Part II: Simulation of photovoltaic system with storage

- System overview and data sources



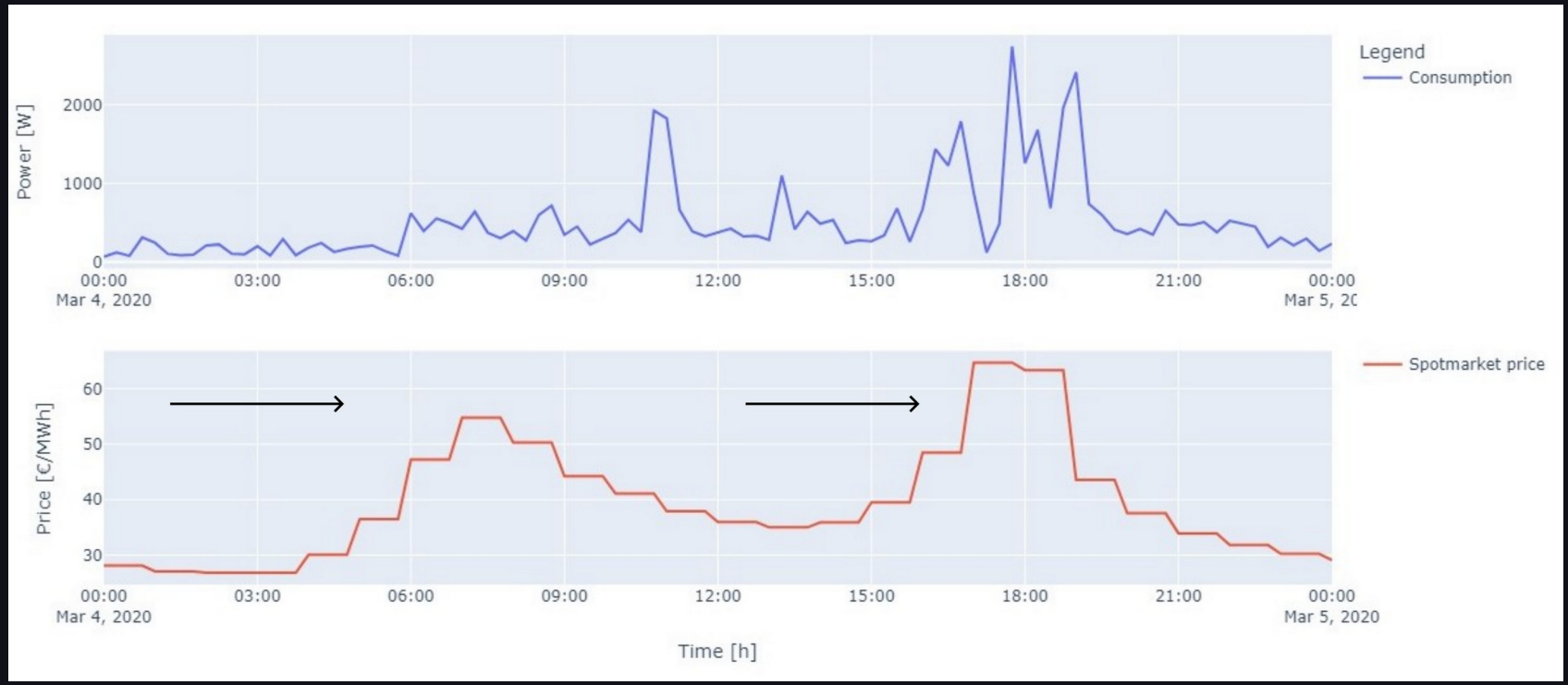
Part II: Simulation of photovoltaic system with storage

- Example day



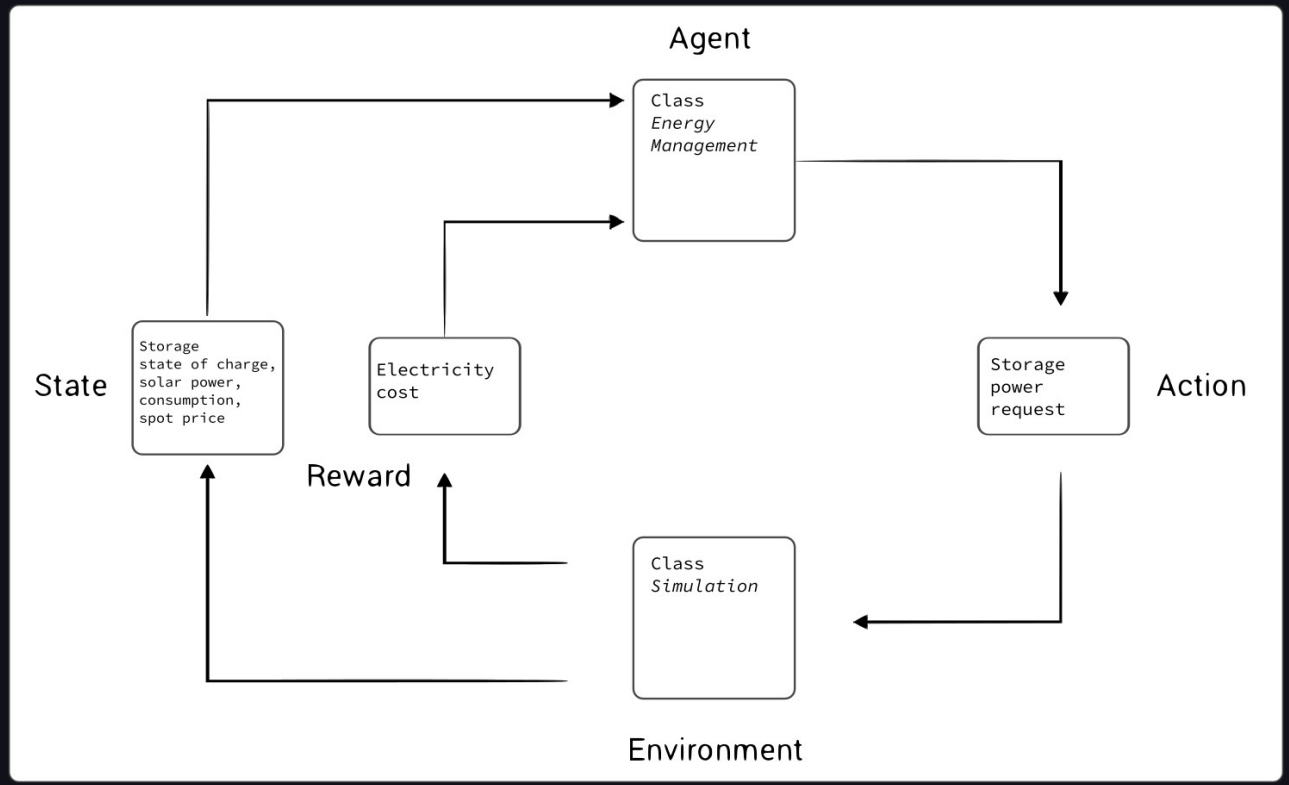
Part III: Solar storage control based on RL

- Concept of load shift and time-variable pricing



Part III: Solar storage control based on RL

- Application of RL on storage control



Thank You! 

- Questions?

- Some more Snake

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Image sources

Slide 3:

RL schema=(https://www.inovex.de/de/blog/reinforcement-learning-walkthrough-introduction/)

Slide 4:

Q-Table=(https://www.analyticsvidhya.com/blog/2021/02/introduction-to-reinforcement-learning-for-beginners/)

Bellman-eq=(https://www.simplilearn.com/tutorials/machine-learning-tutorial/what-is-q-learning)

Slide 5:

Deep-Q-schema=(https://www.researchgate.net/figure/Deep-Neural-Network-architecture_fig4_351884746)

Source code based on:

Environment=(https://www.geeksforgeeks.org/snake-game-in-python-using-pygame-module/)

Agent=(https://towardsdatascience.com/snake-played-by-a-deep-reinforcement-learning-agent-53f2c4331d36)