

Reinforcement Learning in a Smart Factory

SAKI SS19 Challenge 3 with **adesso**

Challenge

To develop an algorithm that optimizes the route that a robot takes for pick-up and storage of items in a warehouse

There are the following constraints

- Size of warehouse is $\{1..3\} \times \{1..2\}$
- There is separate start/stop position outside the 3x2 storage space
- The first position the robot can move into is always (1, 1)
- Robots can move to adjacent fields (but not diagonally)
- There are three types of items, identified by color (white, blue, red)

Approach

Implement a reinforcement-learning-based algorithm, where the robot is an agent deciding on its next move taking a Markov decision process (MDP)

There are several options for the MDP, choose the best performing one (and explain why your choice is the best one)

Data Source

None are needed, but for testing and training you can use the following data source in the homework folder

- Exercise 3 - Reinforcement Learning - Data Set.txt

In your homework submission, explain to us the performance of your solution based on the training data

Technology

- Programming technology
 - Python 3.6
 - Jupyter notebook
- ML / AI technology to use
 - Markov Decision Process (MDP) toolbox
 - <https://pymdptoolbox.readthedocs.io/en/latest/api/mdptoolbox.html>

Literature

- [SB11] Sutton, R. S., & Barto, A. G. (2011). Reinforcement learning: An introduction. Cambridge.
- [SB13] Sigaud, O., & Buffet, O. (Eds.). (2013). Markov decision processes in artificial intelligence. John Wiley & Sons.