



UNIVERSITY OF TECHNOLOGY
IN THE EUROPEAN CAPITAL OF CULTURE
CHEMNITZ

Deep Reinforcement Learning

Foreword

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Background

- 2002: Master in Electrical Engineering (Supélec).
- 2006: Ph.D. in Computer Science (Inria).
 - Emergence of sensorimotor function on a distributed numerical substrate.
- Postdoc in Psychology (Münster).
- 2011: lecturer at TU Chemnitz:
 - Habilitation in 2017:
 - On the role of dopamine in motivated behavior: a neuro-computational approach.
 - Courses: machine learning, computer vision, deep RL.
- Erasmus coordinator: <https://www.tu-chemnitz.de/informatik/international/erasmus.php.en>

Research

- Computational neuroscience
 - Dopamine, biological reinforcement learning
 - Basal Ganglia, decision-making
 - Cerebellum, motor control
 - Hippocampus, memory
- Machine learning
 - Reservoir computing
 - Successor representations
 - Graph neural networks
 - Deep reinforcement learning

Course description

- Registration and forum on OPAL:

<https://bildungsportal.sachsen.de/opal/auth/RepositoryEntry/21637267457>.

- One lecture (Wednesday 09:15) and one exercise (Tuesday 13:45).
- Move lecture to Thursday 17:15?
- All materials are at:

<https://www.tu-chemnitz.de/informatik/KI/edu/deeprl/notes>

- The videos are slightly outdated.
- Written exam, 90 minutes, 5 credit points, based on a research paper.

Course description

- **Neurocomputing** (573180) is an **informal** prerequisite of deep reinforcement learning, but it is possible to study it parallel.
- The content is available for everybody, but the exam is only for:
 - Master Neurorobotik.
 - Master Data Science.
 - Master Informatik (→ Multi-Agent systems).
 - Master angewandte Informatik (→ Themenschwerpunkte Informatik I/II).
 - Master SEKO.
- The course is quite math-heavy: calculus, statistics, information theory.

Exercises

- Exercises : programming in Python the algorithms seen in the course (using tensorflow, keras, gym).
- The first exercises are a tutorial on Python and Numpy (common with Neurocomputing and CV).
- Exercises are there to better understand the algorithms and learn to use the modern tools.
- There will be no programming question at the exam, but some may be related to the exercises.