



Aalto University
School of Electrical
Engineering

ELEC-E8125 Reinforcement learning

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Contents

- Overview of mathematical models and algorithms behind decision making in time-series systems
- Optimal decisions in known worlds
- Optimal decision in unknown worlds
- Optimal decisions in partially observable worlds

Learning goals – What's the course about?

After completing the course, you can

- explain main concepts and approaches related to decision making and learning in stochastic time series systems;
- read scientific literature to follow the developing field;
- choose approaches for a particular problem;
- implement algorithms such as value iteration and policy gradient.

Examples

Prerequisites

- Essential
 - Programming (**Python**, NumPy)
 - Math (probability, matrix algebra, calculus)
- Useful
 - Machine learning (supervised learning)
 - Control engineering (feedback, LQR)
- Motivation to work hard

Teaching

- Independent study
 - Readings, videos
 - Lectures
 - Discuss concepts, summarize, give new viewpoints
 - Tue 14:15-16:00 - 2 hours of lecture / week
 - Quizzes
 - Based on lectures and readings, completed electronically (on MyCourses)
 - Assignments/problem sets
 - 6 problem sets, to be completed individually
 - We strongly advise to use Linux
 - OpenAI Gym has no official Windows support; Mac should be fine
 - **Individual work** – we will use TurnItIn.
 - Project
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Course project

- Application of learned knowledge (late 2nd period)
- 2 person groups
- Project topic: Pong
- Optionally your own topic
 - contact the course staff

Slack channel

rlaalto2019.slack.com

Please join the exercise channels (#exercise-1, #exercise-2, etc.)

Also #techsupport, #feedback

Grading and evaluation

- To pass
 - Complete assignments
 - Complete project
- Grading
 - Quizzes 20%
 - Assignments 50%
 - Project 30%
- Extra points
 - Activity on the Slack channel
 - Project tournament

Workload estimate

- Lectures 28 h
- Assignments and exercise sessions 20 h
- Independent study 40 h
- Project work 40 h
- Total 128 h

Material

- MyCourses
 - Lecture slides
 - Links to readings and videos
- Sutton & Barto, “Reinforcement learning”, second edition
 - Available on MyCourses
- Any other material you can find

Teachers

- Lecturer
 - Prof. Ville Kyrki (ville.kyrki@aalto.fi)
- TAs (assignments and project)
 - Karol Arndt
 - Oliver Struckmeier
 - David Blanco Mulero

Questions?