

Autonomous and Adaptive Systems

Introduction to the Course/Administrivia

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Introduction

- ▶ The goal of this module is to provide a solid introduction to the design of autonomous and adaptive computing systems from a theoretical and practical point of view.
- ▶ Topics will include principles of autonomous system design, reinforcement learning, game-theoretic approaches to cooperation and coordination, bio-inspired systems, complex adaptive systems, and computational social systems.
- ▶ The module will also cover several practical applications from a variety of fields including but not limited to distributed and networked systems, mobile and ubiquitous systems, robotic systems, and vehicular and transportation systems.

Contact

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Topics of the Module

- ▶ Introduction to the design of Autonomous Systems
- ▶ Reinforcement Learning
- ▶ Machine creativity: Generative Deep Learning
- ▶ Algorithmic Game Theory and Multi-agent Learning
- ▶ Bio-inspired adaptive systems
- ▶ Autonomous and mobile robots, driverless cars and intelligent transportation systems
- ▶ Ethical implications of AI
- ▶ Machine intelligence, super-intelligence, self-awareness and controllability

Suggested Textbooks

- ▶ Richard S. Sutton and Andrew G. Barto. Reinforcement Learning. MIT Press. 2018.
- ▶ Max Pumperla and Kevin Ferguson. Deep Learning and the Game of Go. Manning. 2019.

Afternoon Sessions

- ▶ In the afternoons, we will have a variety of activities, including practical sessions in labs, discussion of research papers with presentations made by students.
- ▶ The participation to these activities contributes to the final mark as discussed above.

Administrivia: Assessment

- ▶ The assessment will be based on an oral exam (90%) and class participation (10%).
- ▶ 6 oral exam sessions that will be announced on the course webpage and on the institutional website.

Administrivia: Assessment

- ▶ 6 oral exams per year.
- ▶ The exam will be structured as follows:
 - ▶ Discussion of a mini-project with presentation (max 3 slides + slide for the title);
 - ▶ You can use your laptop or send me the presentation in PDF format;
 - ▶ Questions about the topics covered during the module.

Administrivia: Assessment

- ▶ The title and type of mini-project does not need to be approved in advance.
- ▶ An up to 6-page short report (paper-style) about the project has to be submitted in advance (when you register for the exam).
- ▶ Information about the submission website will be posted on the module website in the coming weeks.
- ▶ You need to submit the code together with the report.

Administrivia: Format of the Report

- ▶ The report has to be written in English.
- ▶ The report must be submitted using the NeurIPS LaTeX style that can be found at this address:

<https://nips.cc/Conferences/2019/PaperInformation/StyleFiles>