ENG-704

EECS Seminar: Advanced Topics in Machine Learning

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Cursus	Sem.	Type
Computational and Quantitative Biology		Opt.
Computer and Communication Sciences		Opt.
Electrical Engineering		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Autre (reprise)
Workload	60h
Hours	**28**
Courses	28
Number of positions	

Frequency

Every year

Remark

Next time: Spring 2027

Summary

Students learn about advanced topics in machine learning, artificial intelligence, optimization, and data science. Students also learn to interact with scientific work, analyze and understand strengths and weaknesses of scientific arguments of both theoretical and experimental results.

Content

List of general technical topics:

- Recent trends in deep learning and representation learning
- Scalable convex and non-convex optimization for machine learning
- Distributed and parallel methods and systems for machine learning
- Multi-Agent Learning, Machine Teaching, and Adversarial Learning
- Adaptive, single shot and zero-shot learning
- Analysis and predictions in social networks, the web, Wikipedia
- Network algorithms
- Computational Social Science
- Natural Language Processing

This course is held as an advanced seminar, and will familiarize students with recent developments in machine learning and AI in particular, and with the analysis and presentation of scientific work in general. Original research articles have to be presented and critically reviewed. The students will learn how to structure a scientific presentation in English. An important goal of the seminar presentation is to summarize the essential ideas of a research paper in sufficient depth while omitting details which are not essential for the understanding of the work, as well as to identify strengths and weaknesses of the paper at hand, that is to demonstrate critical interaction with the presented material of both their own paper but also their peers. The learned presentation and communication skills are beneficial for future presentations both in the industrial as well as scientific environment.

Keywords

Machine Learning, Optimization, Deep Learning, Artificial Intelligence.

Learning Prerequisites

Required courses

EE-556 Mathematics of Data, CS-433: Machine Learning, CS330: Artificial Intelligence.

Learning Outcomes

By the end of the course, the student must be able to:

- Explore recent developments in machine learning methods and applications
- Analyze scientific work
- Critique scientific work
- Synthesize arguments into convincing scientific presentations

Assessment methods

Oral examination.