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Courses

Exercises
Number of positions

CS-526 Learning theory

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Cursus	Sem. Ty	Language of English
Computer science	MA2, MA4 Op	
Cybersecurity	MA2, MA4 Op	t. Credits 4 Session Summe
Data Science	MA2, MA4 Op	
SC master EPFL	MA2, MA4 Op	
		Weeks 14 Hours 4 week

Summary

Machine learning and data analysis are becoming increasingly central in many sciences and applications. This course concentrates on the theoretical underpinnings of machine learning.

Content

- Basics: statistical learning framework, Probably Approximately Correct (PAC) learning, learning with a finite number of classes, Vapnik-Chervonenkis (VC) dimension, non-uniform learnability, complexity of learing.
- Neural Nets: representation power of neural nets, learning and stability, PAC Bayes bounds.
- · Graphical model learning.
- Non-negative matrix factorization, Tensor decompositions and factorization.
- · Learning mixture models.

Learning Prerequisites

Recommended courses

- Analysis I, II, III
- Linear Algebra
- Machine learning
- Probability
- Algorithms (CS-250)

Learning Outcomes

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

- Explain the framework of PAC learning
- Explain the importance basic concepts such as VC dimension and non-uniform learnability
- Describe basic facts about representation of functions by neural networks
- Describe recent results on specific topics e.g., graphical model learning, matrix and tensor factorization, learning mixture models

Teaching methods

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- Lectures
- Exercises

Expected student activities

- Attend lectures
- Attend exercises sessions and do the homework

Assessment methods

Final exam and graded homeworks

Supervision

Office hours Yes
Assistants Yes
Forum Yes

Others Course website

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