EE-558

A Network Tour of Data Science

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Cursus	Sem.	Type
Data Science	MA1, MA3	Obl.
Data science minor	H	Opt.
Electrical Engineering		Obl.
Electrical and Electronical Engineering	MA1, MA3	Obl.
Managmt, tech et entr.	MA1, MA3	Opt.
Microtechnics	MA1, MA3	Obl.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	During the semester
Workload	120h
Weeks	14
Hours	**4 weekly**
Lecture	2 weekly
Exercises	2 weekly
Number of positions	

Content

Context
In the last decade, our information society has mutated into a data society, where the volume of worldwide data doubles every 1.5 years. How to make sense of such tremendous volume of data? Developing effective techniques to extract meaningful information from large-scale and high-dimensional dataset has become essential for the success of business, government and science.
Objective
The goal of this course is to provide a broad introduction to effective algorithms in data science and network analysis. A major effort will be given to show that existing data analysis techniques can be defined and enhanced on graphs. Graphs encode complex structures like cerebral connection, stock exchange, and social network. Strong mathematical tools have been developed based on linear and non-linear graph spectral harmonic analysis to advance the standard data analysis algorithms. Main topics of the course are networks, unsupervised and supervised learning, recommendation, visualization, sparse representation, multi-resolution analysis, neuron network, and large-scale computing.
Structure
The course is organized into two parts: lectures (2 hours) and coding exercises (1 hour). The essential objective of the exercises is to apply the theory on real-world cases.
Evaluation
Evaluation will be conducted on a continuous basis: homeworks and coding assignments.

Keywords

data science, data mining, network science, machine learning