Data Analysis

Course level: Master (M1)  Track(s): MLDM

ECTS Credits: 6

Course instructors: Marc Sebban & Ievgen Redko (UJM)

Education period (Dates): 1st semester  Language of instruction: English

Expected prior-knowledge: basic mathematics and statistics

Aim and learning outcomes: This course gives the necessary mathematical background to perform data analysis using statistics, linear algebra and convex optimization. Practical sessions make use of the Python programming language.

Keywords: probability, statistics, linear algebra, optimization, linear regression, PCA, clustering.

Syllabus:

- Basics in probabilities (chance experiments, random variables, moments, law of large number, …)
- Statistics (discrete and continuous distributions, estimates, Maximum Likelihood Estimation,…)
- Basics in linear algebra and in convex optimization.
- Linear/polynomial/logistic Regression (closed-form solution, batch and stochastic gradient descent)
- Principal Component Analysis and t-SNE
- Clustering (k-means)

Organisation and timetable: Lectures (24h), lab sessions (20h).

Form(s) of Assessment: written exam, practical work/project

Literature and study materials:

- Pattern Recognition, S theodoridis, K. Koutroumbas, 4th edition
- On-line Machine Learning courses: https://www.coursera.org/

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