

Probabilistic Graphical Models

Course level: Master MLDM

Course code: MLDM PGM

ECTS Credits: 4.00

Course instructor: Rémi EMONET (UJM, Saint-Étienne)



Education period (Dates): 3rd semester

Language of instruction: English

Expected prior-knowledge: Data Analysis, Machine Learning: Fundamentals and Algorithms

Aim and learning outcomes:

This course introduces the principles of Probabilistic Graphical Models (PGM) and probabilistic modeling in general. This course covers the main concepts of probabilistic modeling, the inference methods and how probabilistic models relate to other approaches (e.g. deep learning). After this course, the learner is able to describe a probabilistic generative process for some observed data, and to derive the equations that are necessary for the inference, and to start using the latest probabilistic modeling frameworks. This course also gives the necessary background to read research papers and talks that heavily rely on graphical models and their inference methods.

Topics to be taught (may be modified) ~20h:

- Introduction, Probabilities, Sources of uncertainty
- Bayesian Networks, Independence, Factorization, Sampling
- Principle of inference in probabilistic models
- Markov Chain Monte Carlo (Gibbs, Metropolis-Hastings, importance, ...)
- Expectation Maximization for GMM
- Variational Inference in depth
- Deep learning meets probabilistic models
- Probabilistic programming languages and frameworks
- (Re)Visiting simple and Advanced models

Teaching methods: Lectures.

Form(s) of Assessment: exam + student project

Literature and study materials:

Part of “*Probabilistic Graphical Models – Principles and Techniques*”, Daphne Koller ; part of “*Pattern Recognition And Machine Learning*”, Christopher M. Bishop ; and online resources

Additional information:

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