

UE Advanced Machine Learning: Applications to Vision, Audio and Text



Level
Baccalaureate
+5



ECTS
6 credits



European Credit
Transfer and
Accumulation
System (ECTS)
Exchange
credits
6.0



Component
UFR IM2AG
(informatique,
mathématiques
et
mathématiques
appliquées)



Semester
Automne

- > **Teaching language(s):** English
- > **Open to exchange students:** Yes
- > **European Credit Transfer and Accumulation System (ECTS) Exchange credits:** 6.0
- > **Code d'export Apogée:** GBX9MO74

Presentation

Description

The course is split into two parts. During the first part, a wide range of machine learning algorithms will be discussed. The second part will focus on deep learning, and presentations more applied to the three data modalities and their combinations. The following is a non-exhaustive list of topics discussed:

- Computing dot products in high dimension & Page Rank
- Matrix completion/factorization (Stochastic Gradient Descent, SVD)
- Monte-carlo, MCMC methods: Metropolis-Hastings and Gibbs Sampling
- Unsupervised classification: Partitionning, Hierarchical, Kernel and Spectral clustering
- Alignment and matching algorithms (local/global, pairwise/multiple), dynamic programming, Hungarian algorithm,...
- Introduction to Deep Learning concepts, including CNN, RNN, Metric learning
- Attention models: Self-attention, Transformers
- Auditory data: Representation, sound source localisation and separation.
- Natural language data: Representation, Seq2Seq, Word2Vec, Machine Translation, Pre-training strategies, Benchmarks and evaluation

- Visual data: image and video representation, recap of traditional features, state-of-the-art neural architectures for feature extraction
- Object detection and recognition, action recognition.
- Multimodal learning: audio-visual data representation, multimedia retrieval.
- Generative Adversarial Networks: Image-image translation, conditional generation

Course parts

Lectures

Lectures (CM)

36h

Useful info

Contacts

Program director

Eric Gaussier

✉ Eric.Gaussier@imag.fr

Program director

Xavier Alameda-Pineda

✉ xavier.alameda-pineda@inria.fr

Campus

> [Grenoble - University campus](#)