INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

Liste d'éléments pédagogiques

Practical info

Location(s)

Toulouse

Signal Processing/ Hilbert spaces and Wavelets

ECTS
3 crédits

Hourly volume
69h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

-Hilbert Spaces: definition, Hilbertian basis, projection on a convex set, Fourier analysis
-Wavelets: Haar wavelets, connection coefficients/regularity
-Approximation of functions in Hilbert Spaces

At the end of this module, the student should be able to:

-Provide examples of Hilbert spaces
-Give examples of Hilbertian basis
-Fourier analysis of a 1d and 2d signal
-Use and analyze the results of Fast Fourier Transform
-Use and analyse the results of Wavelet transform
-Understand the decomposition of a function in a basis of wavelets.

Necessary prerequisites

Python: numpy, scipy, matplotlib
Fourier Analysis: Fourier Series, Fourier Transform, L^2 space.

Practical info

Location(s)

Toulouse

Infrastructure for cloud and big data

ECTS
3 crédits

Hourly volume
38h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

-General concepts of cloud and big data computing infrastructures
-Principles of virtualized infrastructures
-Cloud services
-ools associated with cloud infrastructures
-Principles of big data computing platforms (map-reduce, stream processing)
-Big data treatment environments (Hadoop, Spark, Storm)

At the end of this module, the student should be able to:

-Use virtualization platforms
-Use cloud platforms
-Program big data applications
-Execute big data applications in a computing infrastructure

Necessary prerequisites

Algorithmic, Java programming, Linux environment handling (shell commands)

Practical info

Location(s)

Toulouse

Functional Programming and Graph Theory

ECTS
4 crédits

Hourly volume
81h

Introducing

Objectives

This unit builds on two courses related to the development of complex software:

-Functional programming : Data collecting and network computing applications cannot be programmed efficiently with the common shared memory paradigm (centralized state that can accessed by all components from the application). Functional programming rely on the stateless paradigm derived from the notion of mathematical functions to avoid bottlenecks.

-Graph theory : Graphs are mathematical objects that are used to model many problems relying on complex data. Many dedicated data structures and algorithms have been design to represent and use them efficiently.

Necessary prerequisites

Computer system use
Imperative Programming

Location(s)

Toulouse

Practical info

Machine learning

ECTS
4 crédits

Hourly volume
82h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

-Main concepts and risks of machine learning.
-Advanced methods of machine learning on vector data, requiring tuning effort and/or expert knowledge.
-Ethics of artificial intelligence.

At the end of this module, the student should be able to:

-Solve simple exercises about the underlying mathematical theory.
-Put in action the data science methodology on case studies with R and Python.
-Explain to non-experts the tuning choices in the algorithms.
-Criticize the assumptions and results, summarize the main conclusions.
-Detect legal defects (bias, discrimination) in the algorithms.

Necessary prerequisites

Course « Data science »
Course « Generalized linear model »

Practical info

Location(s)

Toulouse

[FRANCAIS] Développer ses compétences managériales

ECTS
4 crédits

Hourly volume
43h

Practical info

Location(s)

Toulouse

[FRANCAIS] Formation en entreprise 2

ECTS
12 crédits

Hourly volume
12h

Practical info

Location(s)

Toulouse

[FRANCAIS] FLE Semestre 8

ECTS

Hourly volume
12h

Practical info

Location(s)

Toulouse