



## ANALYSE DE DONNÉES ET RECONNAISSANCE DES FORMES

### DATA ANALYSIS AND PATTERN RECOGNITION

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| Lecturers : 14.0 | TC : 20.0 | PW : 0.0 | Autonomy : 14.0 | Study : 0.0 | Project : 0.0 | Language : MI

#### Objectives

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The purpose of data analysis and pattern recognition is to analyse and make explicit the concepts embedded in large amounts of data that can come from many sources. These methods have ever-increasing application benefits in fields as diverse and varied as computer vision, signal analysis, robotics, medicine, finance, electronic commerce, or military applications, etc. This course therefore aims to introduce the fundamental principles and techniques of data analysis and pattern recognition, and in particular descriptive approaches (automatic description of the concepts contained in the data), as well as predictive approaches.

**Keywords :** Data analysis, Pattern recognition, machine learning, classification, regression, neural networks

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#### Programme

- Factor Analysis (PCA, AFC, ACM)
- Discriminant Analysis (LDA)
- Linear models for regression
- Logistic regression for classification
- Problem of over-fitting and regularization
- Neural networks: representation and learning
- Tips and Practices for Applying Machine Learning
- Design of machine learning systems

#### Learning outcomes

- Understand the principle of the main methods of data analysis and pattern recognition.
- Knowing how to choose the method of data analysis or pattern recognition to be implemented according to the data and the objectives of the study at hand.
- Know how to implement the main methods of data analysis and pattern recognition, and exploit their results.
- Understand the principles of statistical learning for regression and classification.

#### Independent study

**Objectifs :** Understand and assimilate the concepts of courses implemented through lab works.

**Méthodes :** Question / answer sessions with teachers following the tutorials to help with homework assignments.

#### Core texts

Christopher M.Bishop, *PATTERN RECOGNITION AND MACHINE LEARNING*, Springer, 2006  
Richard O.Duda, Peter E.Hart, David G.Stork *PATTERN CLASSIFICATION*, John Wiley & Sons, 2001  
Trevor Hastie, Robert Tibshirani, Jerome Friedman *THE ELEMENTS OF STATISTICAL LEARNING*, Springer, 2011

#### Assessment

N1: knowledge mark (written exam)  
N2: skill score (average of the three assignments to be completed)  
Score AF =  $0.5 * N1 + 0.5 * N2$