UCLouvain

lingi2262
2019

Machine Learning :classification and evaluation

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

5 credits	30.0 h + 30.0 h	Q2

Teacher(s)	Dupont Pierre ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	• Learning as search, inductive bias • Combinations of decisions • Loss function minimization, gradient descent • Performance assessment • Instance-based learning • Probabilistic learning • Unsupervised classification
Aims	Given the learning outcomes of the "Master in Computer Science and Engineering" program, this course contributes to the development, acquisition and evaluation of the following learning outcomes: • INFO1.1-3 • INFO2.3-4 • INFO5.3-5 • INFO6.1, INFO6.4 Given the learning outcomes of the "Master [120] in Computer Science" program, this course contributes to the development, acquisition and evaluation of the following learning outcomes: • SINF1.M4 • SINF2.3-4 • SINF5.3-5 • SINF6.1, SINF6.4 Students completing successfully this course will be able to: • understand and apply standard techniques to build computer programs that automatically improve with experience, especially for classification problems • assess the quality of a learned model for a given task • assess the relative performance of several learning algorithms • justify the use of a particular learning algorithm given the nature of the data, the learning problem and a relevant performance measure • use, adapt and extend learning software Students will have developed skills and operational methodology. In particular, they have developed their ability to: • use the technical documentation to make efficient use of existing packages, • communicate test results in a short report using graphics. - - - - *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** The mini-projects are worth 20 % of the final grade, 80 % for the final exam (closed-book). The mini-projects can NOT be implemented again in second session. The 20 % for the mini-projects are fixed at the end of the semester and included as such in the global score for the second session. The final exam is, by default, a written exam (on paper or, when appropriate, on a UCLouvain computer).

Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** • Lectures • Several mini-projects (from 1 to 3 weeks) including some theoretical questions and mostly practical applications • The mini-projects are, by default, implemented in R and evaluated semi-automatically on a server (INGInious) • An R tutorial is included
Content	• Decision Tree Learning: ID3, C4.5, CART, Random Forests • Linear Discriminants: Perceptrons, Gradient-Descent and Least-Square Procedures • Maximal Margin Hyperplanes and Support Vector Machines • Probability and Statistics in Machine Learning • Performance Assessment: Hypothesis testing, Comparing Learning Algorithms, ROC analysis • Gaussian Classifiers, Fisher Linear Discriminants • Bayesian Learning: ML, MAP, Optimal Classifier, Naive Bayes • Instance-based learning: k-NN, LVQ • Clustering Techniques
Inline resources	http://moodleucl.uclouvain.be/course/view.php?id=8900
Bibliography	Des ouvrages complémentaires sont recommandés sur le site Moodle du cours. Additional textbooks are recommended on the Moodle site for this course.
Faculty or entity in charge	INFO

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Biomedical Engineering	GBIO2M	5		🔍
Master [120] in Data Science : Statistic	DATS2M	5		🔍
Master [120] in Mathematical Engineering	MAP2M	5		🔍
Master [120] in Computer Science and Engineering	INFO2M	5		🔍
Master [120] in Electrical Engineering	ELEC2M	5		🔍
Master [120] in Computer Science	SINF2M	5		🔍
Master [120] in Data Science Engineering	DATE2M	5		🔍
Master [120] in Statistic: Biostatistics	BSTA2M	5		🔍
Certificat d'université : Statistique et sciences des données (15/30 crédits)	STAT2FC	5		🔍
Master [120] in Data Science: Information Technology	DATI2M	5		🔍
Master [120] in Statistic: General	STAT2M	5		🔍