LINGI2262

2013-2014

Machine Learning :classification and evaluation

5.0 credits	30.0 h + 30.0 h	1q

Teacher(s) :	Dupont Pierre ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Inline resources:	> http://www.icampus.ucl.ac.be/claroline/course/index.php?cid=INGI2262
Prerequisites :	Basic knowledge in Probability, Statistics and Algorithmics (as provided by the courses BIR1203, BIR1304 and SINF1121)
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 :	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 :	The 4 mini-projects worth 25% of the final grade, 75% for the exam. A copy of the slides of course is the only document approved at the final exam. The mini-projects can NOT be remade in second session 25% are already set at the end of Q1 and included as such in the final score in the second session.
Teaching methods :	-- Lectures -- Written assignment and/or Miniproject (2 students/group, from 1 to 3 weeks) -- Assignment feedback
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

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	Gaussian Classifiers, Fisher Linear Discriminants
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	Bayesian Learning: ML, MAP, Optimal Classifier, Naive Bayes
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	Instance-based learning: k-NN, LVQ
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	Clustering Techniques
Bibliography :	Required Slides available on: http://www.icampus.ucl.ac.be/claroline/course/index.php?cid=INGI2262 and more generally all documents (set of mini-projects) available on the same site.
Cycle and year of study :	> Master [120] in Computer Science and Engineering > Master [120] in Computer Science > Master [120] in Biomedical Engineering > Master [120] in Statistics: General > Master [120] in Mathematical Engineering > Master [120] in Electro-mechanical Engineering > Master [120] in Electrical Engineering
Faculty or entity in charge:	INFO