Machine Learning

Course level: Master

Course instructors: Marc Sebban (Professor - UJM, Saint- Etienne) and Amaury Habrard (Professor - UJM, Saint- Etienne)

Education period: 2nd semester

Language of instruction: English

Expected prior-knowledge: basic mathematics and statistics – convex optimization

Aim and learning outcomes:
This course gives a general introduction to Machine Learning, from algorithms to theoretical aspects in Statistical Learning Theory.

Topics to be taught (may be modified) ~20h of lectures + 20h of lab sessions.

• General introduction to Machine Learning: learning settings, curse of dimensionality, overfitting/underfitting, etc.

• Overview of Supervised Learning Theory: True risk versus empirical risk, loss functions, regularization, bias/variance trade-off, complexity measures, generalization bounds.

• Linear/Logistic/Polynomial Regression: batch/stochastic gradient descent, closed-form solution.

• Sparsity in Convex Optimization

• Support Vector Machines: large margin, primal problem, dual problem, kernelization, etc.

• Neural Networks, Deep Learning

• Theory of boosting: Ensemble methods, Adaboost, theoretical guarantees

• Non-parametric Methods (K-Nearest-Neighbors)

• Domain Adaptation

• Metric Learning

Teaching methods: Lectures and Lab sessions.

Form(s) of Assessment: written exam (50%) and project (50%)

Literature and study materials:


• Machine Learning, Tom Mitchell, MacGraw Hill, 1997

• Pattern Recognition and Machine Learning, M. Bishop, 2013


• On-line Machine Learning courses: https://www.coursera.org/

Additional information:
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