Machine Learning II

Introduction

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Teaching staff

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S-INFO-075: Machine Learning II

- This course will be taught in English (lectures, labs, communications, emails, etc)
- Prerequisites
  - Machine learning I (S-INFO-256)
  - Probability and Statistics
  - Multivariate calculus
  - Linear algebra
  - Optimization
- **Course Webpage**
  - `https://github.com/bsouhaib/ML2-2024`
  - Lecture notes, project details, etc.
- **Moodle**
  - `https://moodle.umons.ac.be/course/view.php?id=2786`
  - Forum for asking questions, project submission, etc.

About the course

- **Objectives**
  - Learn advanced topics in machine learning
  - Learn how to do research/development in machine learning
- **Content**
  - Standard lectures and labs
  - Reading of research papers or book chapters
  - Online recorded lectures and seminars
- **Project**
  - Read a selected machine learning paper
  - Write a report (including experiments, and necessary proofs)
  - Prepare a lecture, covering the necessary background and discussing the paper
  - **More details to be announced later**

Assessment

- Oral exam ($\mathbf{O}$) (closed book) (/20)
- Project ($\mathbf{P}$) (/20)
- Final mark $= \begin{cases} \mathbf{O} \times 0.6 + \mathbf{P} \times 0.4 & \text{if } \mathbf{O} \geq 50\% \text{ and } \mathbf{P} \geq 50\%; \\ \min(\mathbf{O}, \mathbf{P}) & \text{otherwise.} \end{cases}$

Topics covered in Machine Learning I

- Introduction to machine learning (supervised, unsupervised, semi-supervised, ...)
- Supervised learning framework (components of learning, KNN, training and testing errors, model selection, cross-validation, optimal predictions, bias and variance tradeoff, ...)
- Linear regression (least squares, MLE, nonlinear effects, variable selection, regularization...)
- Linear classification (logistic regression, discriminant analysis)
- The bootstrap
- Tree-based methods (regression and classification trees, bagging, random forests, boosting)
- Dimension reduction and principal component analysis
- Introduction to the perceptron and neural network model
- (Python programming: Pandas and Scikit-learn)