Advance Python Programming

A Machine Learning-Focused Approach

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Course Description

Course Description I

This course provides an **advanced pythonic** approach to **Machine Learning** covering the following subjects:

- A typical Machine Learning project.
- Learning by fitting a model to data.
- Optimizing a cost function.
- Handling, Cleaning and preparing data.
- Selecting and engineering features.
- Selecting a model and tuning hyper-parameters using cross-validation.
- The challenges of Machine Learning, in particular under-fitting and over-fitting (the bias/variance trade-off).

Course Description II

- Supervised Learning Algorithms:
  - Linear and Polynomial Regression.
  - Logistic Regression.
  - k-Nearest Neighbours.
  - Support Vector Machines
  - Ensemble Methods.
- Unsupervised Learning Algorithms:
  - Clustering
  - Density Estimation.
  - Anomaly Detection

Python Frameworks

Python Frameworks

Rather than implementing our own versions of each algorithm, we will be using **production-ready** Python frameworks:

- **NumPy**
- **pandas**
- **Matplotlib**
- **Scikit-Learn**

Final Project & Grading

Computational Assignment

Grading:

- Grading will be exclusively performed through oral examination of your computational assignment.
- Students may work in groups of 2 or 3.