

First Course Handout

Title

Introduction to Machine Learning

Objective

This course introduces the students to machine learning (ML) methods used for various engineering applications. The lectures will focus on mathematical principles involved in ML, such as regression, classification, and supervised and unsupervised learning. There will be coding-based assignments for implementation, introducing students to tools such as sklearn and keras.

Contents

1. Preliminaries: Classification, Regression, Reinforcement Learning and basic probability theory
2. Model evaluation measures
3. Supervised learning: Linear Regression and Classification
4. Unsupervised learning: Clustering, Gaussian Mixture Models, Dimensionality reduction and visualization
5. Neural Network basics
6. Time series analysis and dynamic time warping
7. ML at scale: Parameter tuning, Model selection, Validation and testing

Mode

1. Recorded lectures released in the prior week (roughly 1.5-2 hours)
2. Live interaction session on weekends (roughly 1 hour)

Evaluation

1. Quizzes: 50%
2. End sem exam: 50%

Missed policy

1. We will utilise a “best N-1 out of N” policy for evaluating quizzes, where N is the total number of quizzes conducted.
2. The student missing the endsem exam will receive an I grade, which can be converted into a regular grade by appearing for the exam when the course is offered next, per the institute (SOPC) policy.

References

1. Slides or notes will be provided along with the videos every week.
2. Additionally, students may refer to any of the following books:
 - a. [“Pattern Recognition and Machine Learning”, C.M. Bishop, 2nd Edition, Springer, 2011.](#)
 - b. <http://gael-varoquaux.info/scipy-lecture-notes/packages/scikit-learn/index.html>