

Syllabus ECO 5936-0001 Preliminary

May 8, 2022

Office: BEL 202

Class: M, 10:00 - 11:15 p.m., T, W 10:00 - 12:30 p.m.

Office Hours: T,W 12:30 p.m.-12:50 p.m.

Email: mdmitriev@fsu.edu

Overview

The course gives a graduate-level introduction to machine learning and covers both modern methods in machine learning and the underlying theory behind it. The course covers the foundations of Python, including the necessary libraries such as Numpy, Pandas, SKlearn, TensorFlow . In addition, we will cover latent variable models such as k-mean clustering, principal component analysis, as well decision trees, random forest, and deep learning. Depending on the availability of time, we will cover the foundations of NLP such as bag of words and TF-idf models, clean up the textual documents, extract the necessary features, and train the simplest models.

Prerequisites

None

Grades

The final grade consists of the following:

- attendance - 20 percent %
- home assignments - 30 %
- midterm- 20 %.
- final exam - 30 %

Classes

1. Installing Python, Anaconda, and Jupyter on local laptops (1 class)
2. Introduction to Pandas and NumPy (2 classes)

3. Exploratory analysis in Python (2 classes)
4. Dimensionality reduction: PCA and stochastic neighbor embedding (1 class),
5. Unsupervised learning: K-means clustering and Gaussian mixture model (2 classes)
6. Review of the linear models, Lasso and Ridge regressions, overfit k-fold cross-validation (2 classes)
7. Decision trees, pruning (2 classes)
8. Learning ensembles, Random Forest (2 classes)
9. Introduction to neural networks, activation functions, stochastic gradient descent (1 class)
10. Implementation of neural networks to structured data (2 classes)
11. Working with the convolutional neural networks (2 classes)
12. NLP (2 classes)

Readings

There is no single textbook for the course. We will use some material from the following textbooks:

Leo Breiman, Jerome Friedman, Charles J. Stone , R.A. Olshen, *Classification and Regression Trees* 1st ed.: Chapman and Hall/CRC, 1984.

Kevin P. Murphy , *Machine Learning: A Probabilistic Perspective (Adaptive Computation and Machine Learning series)*: MIT Press, 2012

Academic Honor Policy:

The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to ". . . be honest and truthful and . . . [to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at <http://dof.fsu.edu/honorpolicy.htm>.)

Americans With Disabilities Act:

Students with disabilities needing academic accommodation should: (1) register with and provide documentation to the Student Disability Resource Center; and (2) bring a letter to the instructor indicating the need for accommodation and what type. This should be done during the first week of class. This syllabus and other class materials are available in alternative format upon request. For more information about services available to FSU students with disabilities, contact the:

Student Disability Resource Center
874 Traditions Way
108 Student Services Building
Florida State University
Tallahassee, FL 32306-4167
(850) 644-9566 (voice)
(850) 644-8504 (TDD)
sdrc@admin.fsu.edu
<http://www.disabilitycenter.fsu.edu/>

Syllabus Change Policy

”Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice.”