Technion - Israel Institute of Technology
The William M. Davidson Faculty of Industrial Engineering and Management

MBA- Focusing on the Management of Technology-Based Firms

Course Title:

Introduction to Machine Learning in Python (MBA)

Course Number: 099102

Number of credit points: 2

Course Instructor: Sapir Gershov

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Meeting time for students: right before class

Course Objectives: This course introduces students to advanced Machine Learning techniques in Python. Our focus will be on classification algorithms (SVM, Logistic Regression), regression algorithms (Linear Regression, Lasso, Ridge), and ensemble methods (Random Forest). Moreover, we will explore the software tools that constitute the Python data science ecosystem.

Course Content & Scope: As the course is highly applicative, potential candidates must be proficient in at least on programming language (preferably dynamic one). Advanced mathematical background (linear algebra, probability) is also assumed.

Learning Objectives: By the end of the course, the student will know how to: (1) Write basic code in Python; (2) Use standard data science

packages in Python, e.g., Pandas, Numpy and Scikit-learn; (3) Conduct exploratory data analysis; (4) Employ predictive algorithms for regression and classification; (5) Understand and analyze the challenges in model evaluation.

Teaching Methods: Presentations, hands-on sessions in the classroom, and homework exercises.

Teaching Materials: Slides, Jupyter notebooks (Python).

Readings (Recommended):

- https://stackoverflow.com
- Python data science handbook: essential tools for working with data (Jake VanderPlas).
- Python for Data Analysis (Wes McKinney)

Student Assessment:

Your grade will be composed of classwork grade (10%), proficiency exam (60%), and individual course project (30%).

- The exam will encompass questions on Python's syntax, implementation of simple algorithms (e.g., matrix multiplication), and foundations of Machine Learning techniques.

- In the Analytics project, you will apply algorithms learned in class to a dataset of your choice (preferably related to your domain of expertise). Your goal is to explore the data to gain insights and develop a predictive model for a problem or question that arises in the context of your data. More information will be given in the first week.

Course Plan

1. Introduction to Python programming (overview, basic syntax, variable types, containers, objects, data structures, Jupyter).
2. Exploratory Data Analysis (EDA) (input/output, Numpy, Pandas, Matplotlib).
3. Supervised learning (Learning Framework, Linear Regression, Logistic Regression, Model Selection with Cross-validation, Decision Trees, Bootstrapping, Random Forests, Gradient Boosting)
4. If time permits, one or more of the following subjects: Deep learning, Unsupervised learning, Natural Language Processing, Computer Vision, Ethics in Machine Learning.