MACHINE LEARNING IN FIN ENG, Section A ❯ ↱ 📖Syllabus

Syllabus

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Week - 1: Introduction
(Wed Jan 29, 2020 10:00 AM - 12:30 PM)

Introduction

1. Overview of Topic and Couse
2. Introduction to the Tools
3. Key Concepts

Textbooks

(VP) Python Data Science Handbook

(AG) Hands-On Machine Learning with Scikit-Learn and Tensorflow

(DL) Deep Learning Book [link]

Readings

VP Chapters 1-4

AG Chapter 1

DL Chapter 5

Week - 2: Supervised Learning: Regression
(Wed Feb 05, 2020 10:00 AM - 12:30 PM)

Supervised Learning: Regression

1. Recipe for ML
2. Linear Regression
3. Training; Validations/Cross Validation

Readings

AG Chapter 2

Week - 3: Supervised Learning: Classification
(Wed Feb 12, 2020 10:00 AM - 12:30 PM)

Supervised Learning: Classification

1. Logistic Regression
2. Categorical variables
3. Alt data: image, text

Readings

AG Chapter 3

Week - 4: Becoming a successful Data Scientist
(Wed Feb 19, 2020 10:00 AM - 12:30 PM)

Feature Engineering, Transformations

1. Transformations

Readings

AG Chapter 4

Week - 5: Other Classical Models
(Wed Feb 26, 2020 10:00 AM - 12:30 PM)

Other Classical Models

1. Decision Trees
2. Ensembling, Random Forests
3. Bagging and Boosting
4. Naive Bayes
5. Support Vector Machines

Readings

AG Chapters 5,6,7

Week - 6: Interpretation and Optimization
(Wed Mar 04, 2020 10:00 AM - 12:30 PM)

Interpretation, Optimization, MIssing data

1. Interpreting the coefficients
2. Data imputation
3. Gradient Descent and its variants

Readings

AG Chapter 4

Week - 7: Unsupervised Learning
(Wed Mar 11, 2020 10:00 AM - 12:30 PM)

Unsupervised Learning

1. Matrix factorization
2. Principal Components Analysis and dimensionality reduction
3. Clustering
4. Recommender Systems; Collaborative Filtering

Readings

AG Chapter 8

Week - 8: Classical ML Wrap-up and Intro to Deep Learning
(Wed Mar 18, 2020 10:00 AM - 12:30 PM)

1. Wrap up Classical Machine Learning
2. Optimization of Loss functions: Gradient Descent
3. Introduction to Deep Learning

Spring Break, no class
(Wed Mar 25, 2020 10:00 AM - 12:30 PM)

Week - 9: Introduction to Deep Learning
(Wed Apr 01, 2020 10:00 AM - 12:30 PM)

Introduction to Neural Networks

1. Motivation, History
2. Fully connected networks
3. Activation functions

4. Computation Graphs
5. TensorFlow, keras

Readings

AG Chapters 9, 10

Week - 10: Autoencoders and Generative ML
(Wed Apr 08, 2020 10:00 AM - 12:30 PM)

Autoencoders and Generative ML

1. Vanilla Autoencoders
2. Variational Autoencoders
3. Latent space representation

Readings

AG Chapter 15

Week - 11: Training Neural Networks
(Wed Apr 15, 2020 10:00 AM - 12:30 PM)

Training Neural Networks

1. Vanishing and Exploding gradients
2. Initialization
3. Regularizers, Dropout
4. Normalization

Readings

AG Chapter 11

DL Chapters 6,8

Week - 12: Convolutional Neural Networks
(Wed Apr 22, 2020 10:00 AM - 12:30 PM)

Convolutional Neural Networks

1. One and two dimensional convolutions
2. Interpretation

3. **Readings**

AG Chapter 13

DL Chapter 9

Week - 13: Recurrent Neural Networks
(Wed Apr 29, 2020 10:00 AM - 12:30 PM)

Recurrent Neural Networks

1. Vanilla RNN
2. LSTM
3. Generative RNN

Readings

AG Chapter 14

DL Chapter 10

Week - 14: Other topics
(Wed May 06, 2020 10:00 AM - 12:30 PM)

Other Topics

1.
  Natural Language Processing

2.
  Adversarial examples

3.
  Auto differentiation

Readings

AG Chapters 14, Appendix D

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