CS1138

Machine Learning

(B.Tech. 4th Semester)

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Course Outline

- Prerequisites
- Lectures and Labs
- Evaluation
- Logistics
- Syllabus

Prerequisites

- Basic Probability / Statistics / Linear Algebra and Matrix Operations
- Good knowledge of computer programming.
- Data Structures
- Good knowledge of Python, Numpy, Pandas, etc. (CDA course)

Lectures and Labs

- 3 lectures / week --- Venue: EB1 – 009 (Amphi)
- 1 lab / week --- Venue: EB1 – 009 (Amphi)

Evaluation Scheme

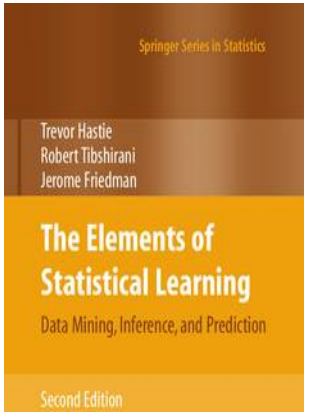
Component	Weightage
Class participation / Attendance	5 %
Mid Term 1	10 %
Mid Term 2	20 %
End Term	30 %
Lab Evaluation (Continuous)	15 %
Project	20 %

Logistics

- Canvas platform for updates and announcements.
- Please bring your laptops for the labs and get them ready with Scikit-Learn installation (Preferably with Anaconda environment).

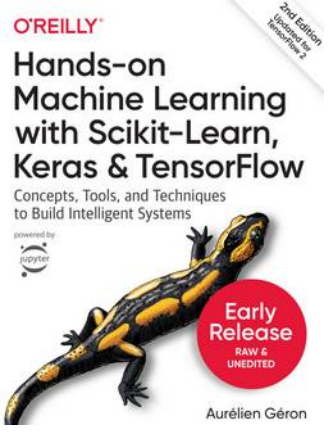
Textbooks / Reference Books

- The Elements of Statistical Learning (2nd Ed.)
  - Trevor Hastie, Robert Tibshirani, Jerome Friedman



- Machine Learning
  - Tom Mitchell

- Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow
  - Aurelien Geron



Some more reference books

- Python Machine Learning – Sebastian Raschka
- Machine Learning: A probabilistic perspective – Kevin P. Murphy
- Introduction to Machine Learning – Ethem Alpaydin
- Understanding Machine Learning – Shalev-Shwartz, Ben-David.
- Mathematics for machine learning – Deisenroth
- Deep Learning – Ian Goodfellow.
- ICML / TPAMI / ICLR / NeurIPS / CVPR / ICCV / ECCV / BMVC conference and journal papers.
- SKLearn/PyTorch tutorials.

Online Sources

- Stanford Machine Learning Course cs229 - Andrew Ng
  - https://www.youtube.com/playlist?list=PLoROMvodv4rMiGQp3WXShtMGgzqpfVfbU
- Machine Learning Specialization at Deeplearning.ai – Andrew Ng
  - https://www.deeplearning.ai/courses/machine-learning-specialization/
- NPTEL MOOC on Machine learning
  - https://www.youtube.com/playlist?list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77
- Introduction to Machine Learning – Dmitry Kobak
  - https://www.youtube.com/playlist?list=PL05umP7R6ij35ShKLDqccJSDntugY4FQT
- Some other sources: Like Kshitiz sirs' videos on youtube.
  - https://www.youtube.com/@DeepLearninginHindi
  - https://www.youtube.com/watch?v=yDLKJtOVx5c&list=PLD0F06AA0D2E8FFBA
- NYU Deep Learning 2021: Alfredo and Yann LeCun
  - https://www.youtube.com/playlist?list=PLLHTzKZzVU9e6xUfG10TkTWApKSZCzuBI

Points to note...

- Please follow the deadlines. There will be penalty for late submission.
- Be regular in classes and labs. Maintain your attendance. There will be **5%** marks for your attendance.
- Labs are important.
- Create the code yourself. **Copying code for the assignment will be penalized in the labs.**

Syllabus

- Revisiting some LA concepts
- Introduction, motivation, applications, Supervised, Unsupervised examples
- Regression Vs Classification, Feature extraction, Model training + validation.
- Linear Regression, Logistic Regression, Gradient Descent.
- Decision Trees, KNN, Evaluation Metrics,
- Neural Networks – Perceptron, MLPs, Activation Functions, Backpropagation. etc.
- SVMs
- Random Forests, Ensemble Models.
- Unsupervised – KMeans, Hierarchical, Dimensionality Reduction.

Thank you