Summer 2020

CS 675-850: Introduction to Machine Learning

Usman Roshan

Follow this and additional works at: https://digitalcommons.njit.edu/cs-syllabi

Recommended Citation
https://digitalcommons.njit.edu/cs-syllabi/101

This Syllabus is brought to you for free and open access by the NJIT Syllabi at Digital Commons @ NJIT. It has been accepted for inclusion in Computer Science Syllabi by an authorized administrator of Digital Commons @ NJIT. For more information, please contact digitalcommons@njit.edu.
## CS 675: Introduction to Machine learning
### Summer 2020

**Instructor:** Usman Roshan  
**Office:** GITC 4214B  
**Ph:** 973-596-2872  
**Email:** usman@njit.edu

**Grader:** Yijie Zhang  
**Email:** yz829@njit.edu

### Textbooks:
- Introduction to Machine Learning by Ethem Alpaydin (Not required but strongly recommended)
- Learning with kernels by Scholkopf and Smola (Recommended)
- Foundations of Machine Learning by Rostamizadeh, Talwalkar, and Mohri (Recommended)

### Grading:
- 20% mid-term, 30% final exam, 20% course projects, 30% programming assignments

**Grading instructions**

**Course Overview:** This course is a hands-on introduction to machine learning and contains both theory and application. We will cover classification and regression algorithms in supervised learning such as naive Bayes, nearest neighbor, decision trees, random forests, linear regression, logistic regression, neural networks, and support vector machines. We will also cover dimensionality reduction, unsupervised learning (clustering), feature selection, kernel methods, hidden Markov models, gradient descent, big data methods, and representation learning. We will apply algorithms to solve problems on real data such as digit recognition, text document classification, and prediction of cancer and molecular activity.

### Course plan:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Date</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Introduction, Bayesian learning, and Python | 01/22/20| **Introduction**  
  Background  
  - Basic statistics  
  - More basic probability and statistics  
  - Applied statistics  
  - Linear algebra background  
  - More linear algebra  
  Unix and login to NJIT machines  
  - Basic Unix command sheet  
  - Instructions for AFS login  
  Textbook reading: All of chapter 1, 2.1, 2.4, 2.5, 2.6, 2.7 |
| Bayesian learning                           |         | **Bayesian learning**  
  **Bayesian decision theory example problem**  
  Textbook reading: 4.1 to 4.5, 5.1, 5.2, 5.4, 5.5 |
| Python                                      |         | **Python**  
  **More on Python**  
  Python cheat sheet  
  Python practice problems |
| Nearest means and naive-bayes | Nearest mean algorithm | Naive Bayes algorithm | Assignment 1 | Predicted labels for naive bayes on breast cancer trainlabels.0 mean initialized to 0.01 | Python example 1 | Python example 2 | Python example 3 |