Course Overview

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NYU

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Contents

Logistics

Course Staff

- Instructor:
  - Mengye Ren
- Graders:
  - Shreya Agarwal
  - Jash Rathod

Logistics

- Class webpage: https://nyu-cs2565.github.io/2023-fall
  - Course materials (lecture slides, homeworks) will be made available on the website
- Announcements via Brightspace
- Discussion / questions on CampusWire

6608

https://campuswire.com/p/G74AFD6C8

- Office Hour: Tuesday 1:00-2:00 pm, Room 508, 60 Fifth Ave.

Assessment

- 4 assignments (40%)
- Midterm Exam (30%)
- Final Project (30%)
- Extra credits (2%) answer other students' questions in a substantial and helpful way on Campuswire

Homework

- Submit through Gradescope as a **PDF document**
- Late policy: You have 4 late days in total which can be used throughout the semester without penalty (see more details on website).
- You can discuss with other students on the homework assignments, but:
  - Write up the solutions and code on your own;
  - And list the names of the students you discussed each problem with.
- If your solution or code is substantially similar to other students then it will be treated as plagiarism.

Final Project

Prerequisites

- Multivariate Calculus: partial derivatives/gradient.
- Linear Algebra: vector/matrix manipulations, properties.
- Probability Theory: common distributions; Bayes Rule.
- Statistics: expectation, variance, covariance, median; maximum likelihood.
- Programming: Python, numpy

Course Overview and Goals

Syllabus (Tentative)

12 weeks of instruction + 1 week midterm exam + 1 week project presentation

- 2 weeks: introduction to **machine learning**, **optimization**
- 2 weeks: **Linear** methods for binary classification and regression (also **kernel methods)**
- 2 weeks: **Probabilistic models**, **Bayesian** methods
- 1 week: **Multiclass** classification and introduction to **structured prediction**
- 3 weeks: **Nonlinear** methods (**trees**, **ensemble** methods, and **neural networks**)
- 1 week: **Unsupervised** learning: **clustering** and **latent variable** models
- 1 week: **Reinforcement** learning
- More detailed schedule on the course website (still subject to change)

The high level goals of the class

- Our focus will be on the fundamental building blocks of machine learning
- Prepare the fundamental toolkit – fancy new methods are often combination of the techniques
- Understand what kind of problems can ML help solve
- Despite the large number of methods, understand the pros & cons of each method, understand the motivation why we choose one method over the other
- Apply ML in practical problems

The level of the class

- We will learn how to implement each ML algorithm **from scratch** using numpy alone, without any ML libraries.
- Once we have implemented an algorithm from scratch once, we will use the sklearn version.