ECE-GY 9123 / CS-GY 9223 / Deep Learning

Spring 2021

Objectives

Upon successful completion of this course, you will be able to:

- grasp the mathematical basics of deep learning,
- formulate practical machine learning problems arising in a variety of practical applications,
- implement software prototypes of deep learning-based solutions to these problems,
- and test these prototypes on real-world datasets.

Pre-requisites

- CS-GY 6923 (Machine Learning), ECE-GY 6143, or equivalent grad-level course.
- Mathematical maturity (esp. linear algebra and optimization).
- Expertise in Python programming.

Outline of lectures (tentative)

Week	Lecture topic
1	ML basics
2	Deep neural networks
3	Autodiff
4	Convnets
5	Object detectors
6	Recurrent architectures
7	Attention mechanisms and Transformers
8	Deep learning in NLP
9	Flow-based models
10	Generative adversarial nets
11	Reinforcement learning
12	Deep RL
13	Meta learning
14	Current and future trends

Grading policy

- 60% - Homework assignments (expect one assignment every 2-3 weeks)
- 40% - Course project

Homework will consist of a mix of theory problems and programming assignments.

Projects will be in teams of at most 2 with several deliverables semester-long, will be student-defined, and will involve solving a real-world problem using tools from deep learning. More info to be provided within the first few weeks.

Resources

The primary text will be the course lecture notes (posted online before each week). We will be loosely following the material listed in the (excellent) online textbook "Dive Into Deep Learning" available at d2l.ai.

Programming can be done on Google Colab (free) or Amazon Sagemaker (contact me for credits). For project work, you can sign up for an NYU HPC account and list me as the faculty contact.

Class URLs

Piazza: Click on this link and if prompted, use access code 'ecegy9123'.

Gradescope: Click on this link and if prompted, use entry code 'D5PZRZ'.

Course times

Lectures: Mondays 11am-1:30pm (370 Jay, Rm 202)

Office hours: Thursdays 9:30am-10:30am (via Zoom)

Contact info

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Inclusivity

It is my intent that *all* students' learning experienced be enriched both in and out of class. If this standard is not being upheld, please speak to me. The Diversity and Inclusion at Tandon website is a terrific resource. If you are a student with a disability who is requesting accommodations, please reach out NYU's Moses Center for Students with Disabilities at 212-998-4980 or mosescsd@nyu.edu.