Introduction

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Course information

- Course:

    ECE C147/C247 - Neural Networks and Deep Learning
    Mong Learning Center

- Zoom link (for select lectures):

    https://ucla.zoom.us/j/93700609639

- Instructor:

    Jonathan Kao
    kao@seas.ucla.edu

- TAs:

    Yang Li (yangli95@g.ucla.edu)

    Pan Lu (lupantech@gmail.com)

    Tonmoy Monsoor (mtonmoy@g.ucla.edu)

    Tianyi Wang (tianyiw@g.ucla.edu)

- Grading: 40% homework, 30% midterm, 30% project, 2% bonus

Course information (cont.)

- Prof. Kao's office hours
  Link: https://ucla.zoom.us/j/94153057772
  Hours: Thursday 10a-12p

- Yang's office hours (MS Online Preference)
  Link: https://ucla.zoom.us/j/8085391892
  Hours: Wednesday 9-11p, Saturday 8-10p

- Pan's office hours (MS Online Preference)
  Link: https://ucla.zoom.us/j/91354250416
  Hours: Tuesday 7-9p, Friday 7-9p

- Tonmoy's office hours
  Link: https://ucla.zoom.us/j/8855338382
  Hours: Sunday 5-6p, Thursdays 5-6p (in person)

- Tianyi's office hours
  Link: https://ucla.zoom.us/j/6112016752
  Hours: Monday 7-9p, Saturday 9-11a

Course information, cont.

In past years teaching this class, we have consistently observed that discussions are sparsely attended, especially when an online discussion video is uploaded that can be viewed at any time. We also recognize that some students prefer to have an active discussion section with problem solving. Based on this, we propose a plan where we will hold some active discussion sections with problem solving, but the rest of the discussion sections will be used as additional office hours to get more questions answered. We will determine this in a student poll.

Discussions

- Textbook:

  Deep Learning
  Ian Goodfellow, Yoshua Bengio, and Aaron Courville

  Available here: `http://www.deeplearningbook.org/`

- We will use CCLE for course materials. Annotated lecture notes, as well as formal lecture notes, will be uploaded to CCLE. You may distribute formal lecture notes, but please do not distribute annotated lecture notes.

Syllabus

Date (2022)	Lecture	Content
03 Jan	1	Overview to deep learning (ZOOM)
05 Jan	2	Machine learning refresher I (ZOOM)
10 Jan	3	Supervised Classification & Gradient descent principles (ZOOM)
		HW #1 released
12 Jan	4	Fully connected neural networks (ZOOM)
17 Jan	-	No class (MLK holiday)
		HW #2 released
19 Jan	5	Backpropagation
24 Jan	6	Regularizations for training neural networks
		HW #3 released
26 Jan	7	Optimization for training neural networks
31 Jan	8	Convolutional Neural Networks I (ZOOM)
		HW #4 released
02 Feb	9	Convolutional Neural Networks II (ZOOM)
07 Feb	10	Convolutional Networks III
		HW #5 released
09 Feb	11	Recurrent Neural Networks
14 Feb	12	Recurrent neural networks II
16 Feb	M	Midterm, in class
		Project released
21 Feb	-	Veteran's day holiday
23 Feb	14	PyTorch and Tensorflow
28 Feb	15	Variational autoencoders
02 Mar	16	Generative adversarial networks
07 Mar	17	Survey of advanced topics in deep learning
09 Mar	18	Overview

Pre-requisites

This class requires a solid understanding in probability (131A) and linear algebra (133A or 205A), as well as prior exposure to machine learning (M146). This class will be very difficult (but not impossible) if you do not have prior machine learning background. We will spend two lectures doing machine learning review to ensure we are familiar with concepts we will expand upon in machine learning.

It also requires coding experience. The class will be taught entirely in Python. If you have only had exposure to MATLAB, there will be ramp up time to familiarize yourself with Python. You should factor this into your course load.

Pre-requisite topics I will **assume** you know.

- Probability: independence, conditional probability, Bayes rule, multivariate Gaussian distribution, marginalization, expectation, variance

- Linear algebra: basic matrix operations, span, rank, range and null space, eigenvalue decomposition, singular value decomposition, pseudoinverse

Zoom online lectures

A handful of lectures, discussions, and office hours, will be carried out on Zoom. These lectures will be recorded. Note that lectures held in Mong Learning Center will be recorded, too.

We encourage you to attend lectures live (MW 4-5:50pm Pacific Time), as there will be an opportunity for interaction and asking questions. If you do not wish to appear in a lecture video, because we are recording them for the benefit of all students, we ask that you opt out by not attending.

As per notice by UCLA's Office of Information Technology:

Where recording is permitted, it is permitted only by the host (typically instructor or meeting chair). Students in a class and/or meeting participants and any student-hosted meetings are prohibited from recording of any kind.

Lectures will be held at `https://ucla.zoom.us/j/93700609639`.

Zoom online lectures (cont.)

By default, all students will be muted during live lectures. There are two ways of having questions throughout lecture answered:

1. Raise your (virtual) hand.

   If you are on a mobile device, there is a "Raise Hand" button. If you are on a Desktop, click on "Participants" and then "Raise Hand." If you raise your hand, but you no longer need to ask your question, you can undo the "Raise Hand." When there is a natural breaking point in the lecture, Prof. Kao will unmute students with their hands raised, so that they can ask their question. Note, you will also have to unmute yourself.

2. Through the chat functionality.

   During lecture, you will be able to ask questions seen by everyone, or only by the TAs. We encourage you to ask questions seen by everyone, which may benefit others. Do not send chat messages to Prof. Kao, as he will not actively monitor these during the lecture. The TAs will answer questions over chat.

Academic integrity

UCLA embraces the core values of integrity, excellence, accountability, respect, and service through the True Bruin program

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`http://www.truebruin.ucla.edu`

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I take academic integrity very seriously; students caught cheating or violating these principles will face disciplinary action. Please refer to the UCLA student conduct code:

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`https://deanofstudents.ucla.edu/student-conduct-code`

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In this class, unacceptable behavior includes plagiarizing the work of others, plagiarizing code, and copying another person's exam. In accordance with UCLA policy, any instance of suspected academic dishonesty will be immediately reported to the Dean of Students Office and zero credit will be given for any work determined to be dishonest.

Grading

You will be graded on three components:

1. **Homework (40%)**. Homework will contain both written components as well as Python components.
    - ▶ Assignments are due (i.e., submitted to Gradescope) by 11:59pm on the day they are due.
    - ▶ To accomodate for unexpected or unforeseen circumstances, we will give *three late days* to every student. These late days should only be used in extenuating circumstances. We will not grant additional late days beyond these.
    - ▶ You may use **at most** 2 late days on any given assignment.
    - ▶ Any assignment more than two days late receives a grade of **zero**.
2. **Midterm exam (30%)**, in class.
3. **Final project (30%)**, details to be released.

Grading (cont.)

In addition to these grading scales, we will also award bonuses on top of your final grade as follows.

Bonuses (2 points)

- (Feedback) You earn a bonus of $+0.5\%$ for filling out the class evaluation at the end of class.
- (Piazza) You receive a bonus of at most $+1.5\%$ for participating on Piazza. While your answers to others will be anonymous, they will be known to the instructors, who will determine an appropriate number of points for instructor-approved student replies. Your bonus will be based on your participation on Piazza, which will be curved.
- (Piazza, cont.) Please do not conspire to post and answer questions for extra credit. We will be able to detect this. We do not want the Piazza forums to be spammed; this makes it more difficult for all students to find helpful questions.

Grading (cont.)

The class is graded on an absolute scale. The scale may be relaxed but it will not be made more stringent. These scales will be calculated and applied separately for undergraduate and graduate students.

Final score	Letter grade
93 – 100	A
90 – 93	A-
86 – 90	B+
83 – 86	B
80 – 83	B-
76 – 80	C+
73 – 76	C
70 – 73	C-
66 – 70	D+
63 – 66	D
60 – 63	D-
< 60	F

- We award A+ to the class's top students.

Grading (cont.)

- I will not change your final grade unless I made a calculation error, in accordance with UCLA Academic Senate Regulation A-313 and strict rules governing the integrity of the grading process.
- In HW # 3, at least one question will be optional for undergraduates.

Last notes

- Common student feedback is that, even if they were familiar with MATLAB, it was still time-consuming to transition to Python. Please consider this seriously as you plan your schedule for assignments. Python is the standard language for machine learning research today, and the best deep learning packages are specifically designed for Python.

- We know, and consistently receive feedback, that this class is a lot of work and is time-consuming. I want to state this up front so you can plan accordingly. We will aim to keep the stated HW schedule, following the assignments and schedule used last year.

- Piazza should be the primary means of asking and getting questions answered in the class. We would like Piazza to be student-driven. TAs will answer any questions that other students are unable to answer.

- If you have other course-related questions that are not appropriate to Piazza, please e-mail the entire teaching staff (rather than any one of us individually). If you have any personal matters to discuss, please e-mail Prof. Kao directly.

- Assignments are partially based on those from another class, for which we thank Serena Yeung and Justin Johnson for permission to use their assignments for this class.