Advanced Machine Learning

Intro + SVD review

Today’s Outline

- Admin stuff
  - Content, Grading, Textbook
- Project Description
- Linear Algebra review
- Singular Value Decomposition

Admin stuff

Course Content

- Dimension Reduction: SVD + PCA (Weeks 1 + 2)
- Recommender Systems + PyTorch (Weeks 2 + 3)
- PyTorch + Neural Networks (Week 3 + 4)
- Boosting - AdaBoost + Gradient Boosting (Weeks 5 + 6)

Course Content

- Schedule on Github

Grade Breakdown

Homework 20% (~ 5 HWs)

Quizzes/Final 60% (20% each)

Data Competition 15%

Attendance and Professionalism 5%

Expectations:

> 60% on quizzes and > 60% overall for a passing grade

Homework

- 5 HW assignments: mix of coding and theory
- Due on Fridays + 48 hr ext. = Sundays at 11:59p
- Start HW early! They can take some time.
- HW1 is out already.

Quizzes + Final

- Tentative dates:
  - Feb 13th
  - Feb 27th

- Final Exam: Mar 13th

- Conditional on room bookings, to be confirmed ASAP

Office Hours

- Monday 3:15pm-4:00pm in person
- Thursdays 3-4pm over zoom

- I would love to see you in my office hours!

Attitude

- This class is hard!
- Come to my office hours! Even when we don’t have exams.
- Learning happens in and outside of class.

Attitude

This class has both applications and math!!

Attitude

“Why do we have to do this math? We aren’t going to use this in our real jobs.”

Attitude

Attitude

- Every one of you will end up in different work; most of you WILL actually use this foundation in your career at some point

- Strengthens your fundamental muscles regardless of which “sport” you end up doing

- If you don’t see and practice this now – you might never do it on your own → leads to “injury”/misapplication

NO FLABBY ASSES!

(mathematically speaking)

Attitude

- I am your coach – I’m here to strengthen and help you; not make it hard unnecessarily!
- Tell me what you need!

Attitude

- Stop and ask questions in lecture when things are confusing
- REALLY! This benefits everyone, including your classmates and me.

Attitude

tfw there is math in math grad school

Technology policy

- During class: No slack/phones out.

- Outside of class: Announcements and assignments will come from Slack, Canvas, and Github. You should slack the course channel for questions regarding course content, assignments, etc.

- Don’t wait until the last minute to ask– you might not get a response at 11:40p on Sunday night!

Final Project

- Kaggle competition among our class (out after all NDAs submitted)
- Groups of 3: random assignment
- Top 5 teams will have the option of presenting their winning models for extra credit on the last day of class
- Both sections will merge for the final presentation day!
  - 3/13 from 10a-12p

Final Project

- Details in Project folder on Canvas
- Everyone must sign an NDA before data can be released
- Teams are found in project_teams.csv

Questions?

Linear Algebra Review

Discuss with your neighbors:

How would you explain the following concepts intuitively?

- Orthogonality
- Projection
- Basis
- Matrix rank

How about geometrically?

Ancient Linear Algebra Website

Singular Value Decomposition