6.869.csail.mit.edu/fa19

https://piazza.com/class/k05qxom4lo03kk

MIT COMPUTER VISION

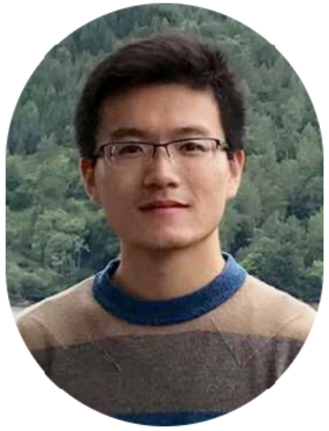
6.819 / 6.869: Advances in Computer Vision

Instructors Antonio Torralba, Bill Freeman, Phillip Isola

Lecture TR 9:30am - 11am (Room 34-101)

Xavier Puig

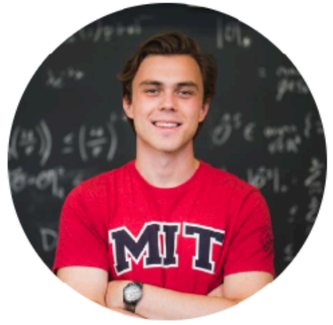
Julie Ganeshan



Siyuan Dong

Nadiia Chepurko

Shawn Wang



Tom Dudzik

Tools we will use

- Math: Linear algebra, geometry, multivariate calculus, optimization, probabilistic inference, machine learning, deep nets
- Coding: Python, numpy, scipy, Pytorch
  - Tutorials will be announced

Assignments

- Problem sets (60%)
- Final project (40%)
- No exams or quizzes

Problem sets

http://6.869.csail.mit.edu/fa19/policy.html

- Weekly psets
- Out on Thursday each week
- Usually due one week after
- Grades returned two weeks after due date [we will do our best to handle regrade requests if we made a mistake]
- The submission deadline will be 23:59 on Thursday. Late submissions will be accepted up to 7 days late, but grade decays linearly to half credit over this period. You will also have a total of 3 free late days that will not be penalized. Details at: http://6.869.csail.mit.edu/fa19/policy.html

- Collaboration policy
  - Psets should be done individually, unless otherwise stated (a few will be group projects)
  - You can talk each other, get advice, ask questions on Piazza — but writing and coding should be done individually, and never shared (except when specified in group projecs)

- No hard copies. Submissions will be made electronically.
- Some problem sets will have extra problems only for those taking the graduate version of the course.

Final project

http://6.869.csail.mit.edu/fa19/project.html

We will provide a list of ~10 projects to pick from. List will be made public around Oct 15.

- Individually or pairs (recommended)
- Due on Dec 11
- Presentations week of Dec 9 (3-5 minutes each)
- Everybody presents

Materials

http://6.869.csail.mit.edu/fa19/materials.html

- Office hours (place and times to be announced on web site and Piazza)
- Use TA office hours for psets, Prof office hours for questions about lectures, projects; both can be used for general confusion
- Piazza: to ask questions to other students and TAs, send your questions using Piazza (avoid emails). Everybody is welcome to participate.
- Readings: We will be posting class notes for many of the lectures; the course materials link (above) lists other good resources, many of which are free online (Szeliski book, Deep learning text)

Course content

Lecture	Date	Topic
		Week 1
1	Thu 9/5/2019	Introduction. Simple vision systems.
		Week 2
2	Tue 9/10/2019	Describing the Signal: pinhole, computational, and corner cameras.
3	Thu 9/12/2019	Color
		Week 3
4	Tue 9/17/2019	Geometry, Stereo, Intrinsic-Extrinsic Camera Parameters
5	Thu 9/19/2019	Signal Processing
		Week 4
6	Tue 9/24/2019	Spatial Linear Filters
7	Thu 9/26/2019	Temporal Linear Filters
		Week 5
8	Tue 10/1/2019	Multi-Scale Pyramids

cameras, optics

signals

9	Thu 10/3/2019	Introduction to Bayesian Inference. Color Constancy and Demosaicing.
		Week 6
10	Tue 10/8/2019	Statistical Models for Images
11	Thu 10/10/2019	Probabilistic Graphical Models
		Week 7
12	Thu 10/17/2019	Introduction to Machine Learning
		Week 8
13	Tue 10/22/2019	Neural Networks
14	Thu 10/24/2019	Stochastic Gradient Descent, Back Propogation
		Week 9
13	Tue 10/29/2019	Mechanisms of training and running networks
14	Thu 10/31/2019	Mechanisms of training and running networks
		Week 10
15	Tue 11/5/2019	Spatial NNs, CNNs, visualization of weights
16	Thu 11/7/2019	Temporal NNs, RNNs, LSTMs, Attention

probabilistic models, inference

learning (mostly deep)

		Week 11
17	Tue 11/12/2019	Representation Learning
18	Thu 11/14/2019	Scene Understanding
		Week 12
19	Tue 11/19/2019	Vision and Language, Image Captioning, VQA
20	Thu 11/21/2019	Image Synthesis: structured prediction, generative models, GANs, autoregressive models
		Week 13
23	Thu 11/26/2019	How to do research; How to write papers; How to give talks
		Week 14
24	Thu 12/3/2019	Datasets, curation, biases and domain adaptation
25	Thu 12/5/2019	Vision for embodied agents

advanced topics and applications