Plan for today

• Course overview
• Introduction to computer vision research
• Logistics and requirements
Introductions

• Instructor
  – Yong Jae Lee
  – yongjaeelee@ucdavis.edu
  – Assistant Professor in CS, UC Davis since July 2014

– Research areas: Computer vision and machine learning
  • Visual Recognition
Introductions

• TAs:
  – Xueyan Zou
  – zxyzou@ucdavis.edu
  – PhD student in CS
  – Yangming Wen
  – ymnwen@ucdavis.edu
  – MS student in CS
This course

- ECS 174 (4-units)

- Lecture: Tues & Thurs 4:40-6:00 pm, Giedt Hall 1001

- Discussion section: Mon 12:10-1pm, Hunt 100

- Office hours: Academic Surge 1044/2075
  - Yangming: Wed 11 am - 1 pm (AS 1044)
  - Xueyan: Thurs 11 am- 1 pm (AS 1044)
  - Yong Jae: Fri 3-5 pm (AS 2075)
This course

• Course webpage
  https://sites.google.com/a/ucdavis.edu/ecs-174-computer-vision---spring-2019/

• Canvas (assignment submission, grades)
  https://canvas.ucdavis.edu/courses/349152

• Piazza
  piazza.com/uc_davis/spring2019/ecs174
Goals of this course

• Introduction to primary topics in Computer Vision
• Basics and fundamentals
• Practical experience through assignments
• Views of computer vision as a research area
Prerequisites

• Upper-division undergrad course
• Basic knowledge of probability and linear algebra
• Data structures, algorithms
• Programming experience
• Experience with image processing or Matlab will help but is not necessary
Topics overview

• Features and filters
• Grouping and fitting
• Recognition and learning

Focus is on algorithms, rather than specific systems
Features and filters

Transforming and describing images; textures, edges

Slide credit: Kristen Grauman
Grouping and fitting

Clustering, segmentation, fitting; what parts belong together?

Slide credit: Kristen Grauman
Recognizing objects and categories, learning techniques

Slide credit: Kristen Grauman
Recognition and learning

Deep learning
Not covered: Multiple views and motion

Multi-view geometry, stereo vision

Slide credit: Kristen Grauman
Not covered: Video processing

Tracking objects, video analysis, low level motion, optical flow

Slide credit: Kristen Grauman
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Textbooks

By Rick Szeliski
http://szeliski.org/Book/

By Kristen Grauman, Bastian Leibe
Visual Object Recognition
Requirements / Grading

• Problem sets (60%)

• Final exam (37%)
  – comprehensive (cover all topics learned in class)

• Class and Piazza participation (3%)
  – Piazza: participation points for posting (sensible) questions and answers
Problem sets

• Some short answer concept questions
• Matlab programming problems
  – Implementation
  – Explanation, results
• Follow instructions; points will be deducted if we can’t run your code out of the box
• Ask questions on Piazza first
• Submit to Canvas
• The assignments will take significant time to do
• Start early

• TA will go over problem set during discussion sections after release (others will be used as extra office hours)
Matlab

- Built-in toolboxes for low-level image processing, visualization
- Compact programs
- Intuitive interactive debugging
- Widely used in engineering
Matlab

- CSIF labs 67, 71, 75 (pc1-pc60)
- Academic Surge 1044 and 1116
- Lab schedule (reservations) and remote access info found on class website

- Matlab available for free from campus software site
Problem Set 0

- Matlab warmup
- Basic image manipulation
- Out tonight, due 4/12
Preview of some problem sets

- **resize:** castle squished
- **crop:** castle cropped
- **content aware resizing:**
  - seam carving
Preview of some problem sets

Grouping
Preview of some problem sets

Object search and recognition
Problem set deadlines

• Problem sets due 11:59 PM
  – Follow submission instructions given in assignment
  – Submit to Canvas; no hard copy submissions
  – Deadlines are firm. We’ll use Canvas timestamp. Even 1 minute late is late.

• Late submissions: 1 point deduction for every hour after the deadline up to 72 hours; after 72 hours, you will receive a 0

• If your program doesn’t work, clean up the code, comment it well, explain what you have, and still submit. Draw our attention to this in your answer sheet.
Collaboration policy

- All responses and code must be written individually or in pairs (a group of 2)

- Students submitting answers or code found to be identical or substantially similar (due to inappropriate collaboration) risk failing the course
  - We will be using MOSS to check for cheating!
  - Copying online solutions also counts as cheating!
  - Please don’t cheat... you are going to get caught!

- Read and follow UC Davis code of conduct
```
>>> file: LongJump.py

print("**** Long Jump Information System *****")
print("Please enter the names of competitors. (Press return when done.)")
print("Competitor no. 1: ")
competitor = input()
b,c,g,h,d,k = 1,0,0,0,[],0
maxi,competitors = [],[competitor]
while True:
    b = 0
    print("Competitor no. "+str(b)+":")
    competitor = input()
    if competitor == "":break
    else:
        competitors.append(competitor)
print("Please enter the distances for each competitor.")
for each in competitors:
    x = int(input("Distance: "))
    if x>0:
        d.append(x)
        maxi.append(max(d))
        if x>maxi[-1]:
            print("New record!")
        if x>maxi[-2]:
            print("Better than last!")
        if x>maxi[-3]:
            print("Best at all time!")
    else:
        print("Invalid distance.")
```

Miscellaneous

• Check class website regularly for assignment files, notes, announcements, etc.
• Come to lecture on time
• No laptops, phones, tablets, etc. in class please
• Please interrupt with questions at any time
Coming up

• Read the class webpage carefully
• Next class (Thurs): Matlab tutorial
• PS0 out tonight, due 4/12
• No office hours on Friday