

COS 598B: Advanced Topics in Computer Science: Visual Recognition (spring 2018)

Homepage: <https://piiazza.com/princeton/spring2018/cos598b/home>

Prerequisite: COS 429 or equivalent

Class time: MW 3-4:20

Location: Friend 008

Instructor: [Prof. Olga Russakovsky](#)

Office hours: W 4:30-5:30

Description:

We will select a few computer vision topics to explore. The focus will be on visual recognition, with sample topics including large-scale image classification, object detection, semantic segmentation, human pose estimation, activity recognition in video and visual question answering. We will cover each topic in depth, including benchmarking and evaluation, data acquisition and annotation, successes and failures of classical algorithms, the latest state-of-the-art insights and models, and promising future directions. Students will be expected to routinely read and present research papers, with special attention on developing excellent oral and written scientific communication skills.

Three goals:

1. Learn more about visual recognition
2. Improve oral and written scientific presentation skills
3. Practice giving constructive feedback on scientific written and oral presentation

Course structure: There will be 3 modules (pixel-level understanding, language and vision, and activity recognition in video), with each module corresponding to about 6-8 lectures. Each lecture will cover ~2-4 papers. In addition, there will be a course project. The format throughout the seminar will be guided peer learning.

Workload: two main components

Component #1. Class lectures and discussions, consisting of:

- A. Class participation: Since it's a discussion-based class, you're expected to attend the vast majority of the lectures. You should read (or at least skim) the papers before coming. Also, you will not learn much if you sit quietly and zone out. This is very much an interactive class so do ask questions, request clarifications, pull up the papers (not gmail) on your laptop, and get as much out of the meetings as you can.
- B. Lecture (about once during the semester, but may be more depending on enrollment and whether you do it with a partner): You will lecture on an assigned topic, covering ~2-4 papers, during one of the class meeting times. We will do scheduling and signups

likely at the beginning of each module. The goal is to educate the others in the class about the topic, so do think about how to best cover the material, do a good job with slides, and be prepared for lots of questions. *It is strongly recommended that you attend office hours before your lecture.* You'll get feedback on your presentation from 3 classmates.

- C. Lecture feedback (on about 2-3 lectures): You'll provide written feedback to the presenter(s) on their lecture, 1+ pages in length, commenting on the content, delivery, clarity, completeness, etc. No need for complete sentences, bullet points are fine, but should be thorough and constructive. Should be emailed to the presenter(s) and the instructor within a day of the lecture. We'll sign up for these as we do the lecture scheduling.

Component #2. Course project, consisting of:

- A. Project report: You will iterate on and ultimately produce a paper, in [CVPR format](#), resembling a conference submission. We'll have several deadlines: April 11th for title, April 13th for milestone draft, April 30th for short in-class spotlight presentation, May 11th for final report. The final paper will be exactly 8 pages not including references (just like a CVPR submission); the milestone should be at least 4 pages. You can work alone or with a partner. You can choose to do the paper in one of three ways:
- a. (Option 1) Do a course project on any recognition topic. The project does not have to be novel research but should consist of a particular method you want to try out. The project can be related to your research/IW/etc but should not be duplicated (similar to [COS 429](#) requirement last semester). You will be evaluated on the clarity and quality of the analysis&writeup more so than on the accuracy of your method. The writeup should include an introduction positioning your problem and proposed approach, an overview of related work, a description of the method, and both quantitative and qualitative results along with analysis and a conclusion.
 - b. (Option 2) Pick a visual recognition topic and perform an analysis of existing techniques, similar to [\[Torralba and Efros ICCV 2011\]](#), [\[Russakovsky et al. ICCV 2013\]](#), [\[Sigurdsson et al. ICCV 2017\]](#), [\[Huh et al. 2016\]](#). This would include deciding on a particular angle of analysis (across datasets, across methods, etc), downloading the related code/data/annotations, coding/scripting to generate the results, and multiple iterations of analysis. The writeup should include an introduction positioning the investigation, related work, and lots of analyses and conclusions.
 - c. (Option 3) Pick an area of visual recognition and write a detailed literature review on the subject, as if writing a book chapter. The review can be about a topic we cover in class but should go in much more depth (think 20+ citations). The review should cover both classical literature as well as the latest techniques. The length requirement is still 8 pages which you can allocate however you see fit to best explain this topic to a fellow student who has taken COS 429 but couldn't take COS 598b this quarter.

- B. Written feedback on 1-2 projects: You will be receiving feedback on your project from 2-3 classmates, so you will in return provide feedback to ~2 others (depending on the number of pair projects). You'll help your assigned team(s) with every stage of the process. Feedback on the milestone is due April 20th (but sooner will be appreciated), and should be in the form of a very thorough conference review (1+ pages in length; we'll have templates). Feedback on the spotlight presentation is due within a day of the in-class presentations, and can be on the order of a paragraph. Feedback for the final paper is due on Dean's day, and should be similar to the milestone feedback in length and format.

Important dates at a glance:

- Wed, April 11th in class: title, selection of option 1-3, (optional) partner name
- Fri, April 13th: milestone due
- Fri, April 20th: milestone feedback due
- Mon, April 30th and Wed, May 2nd: project spotlights in class
- Fri, May 11th: project report due
- Dean's date May 15th: report feedback due