

# 16831 Statistical Techniques, Fall 2014

## Course Project

To be completed in groups of 3

The course project is an opportunity for you to deeply explore one (or several) techniques covered in class and apply them to a robotic problem that is of interest to you. Since the projects require a substantial amount of work, you must form groups of three (some exceptions will be allowed). The research topic is up to you, as long as it makes use of the probabilistic techniques we cover during the course.

## Milestones

1. **Written proposal** October 2
2. **Initial presentation** October 9
3. **Midterm report** November 6
4. **3/4 report** November 20
5. **Final presentation** December 4
6. **Final report** December 10

## Project Proposal

Your proposal should be 1-3 pages, and it should introduce the problem you are trying to solve, the approach you will take, and also address the following questions:

- What are some impacts of this research?
- What is novel about the approach you are taking?
- How do learning and/or probabilistic inference techniques play a key role?
- What is your metric for success?
- What are key technical issues you will have to confront? Any other big challenges?
- What software or data sets will you use?
- What is your timeline? Include specific targets for the progress report.

**Note on current research** You *may* use your current research as a course project, as long as you explore a new area of the problem, and you cannot use previous results. Your proposal should clearly state what novel part you will be tackling in your course project.

## Initial presentation

The initial presentation will be a short (5 mins) presentation to the class about the problem you're solving and the approach you'll take.

## Midterm report

The midterm report should describe the progress you have made and your results so far. About 4 pages.

## 3/4 report

The 3/4 report should document updates from progress described in the midterm report. About 4 pages.

## Final presentation

You'll present your findings to the class at the end of the semester. This may be a poster session depending on class size. Otherwise it will be an in class presentation series.

## Final report

The final report will consist of two deliverables:

1. Project video: The goal is to create an ECCV or SIGgraph like video to describe your work. The video may consist of slides with voice-over, movies etc. The target duration is 5 minutes. The video will be shared with the entire class.
2. Written report: This is the detailed report of your approach and findings. You should re-state the problem you are solving and your approach, and summarize your results. The report should be no longer than a NIPS paper in size (8 pages including figures and tables), but a shorter and more concrete report is preferred.

## Sample projects

Here are a few sample projects:

- Filtering for pedestrian recognition: detect pedestrians from laser data for use by autonomous cars.
- Apply online learning algorithms to the TAC-SCM scenario (Trading Agents Competition)
- Online learning for robot motion models.

## Open Datasets

You are by no means required to use any of these data sets. If you find other datasets, feel free to share them on the class mailing list.

- MIT urban challenge <http://grandchallenge.mit.edu/wiki/index.php?title=PublicData>
- Caltech Pedestrian dataset  
[http://www.vision.caltech.edu/Image\\_Datasets/CaltechPedestrians/](http://www.vision.caltech.edu/Image_Datasets/CaltechPedestrians/)
- Amazon web services public data sets  
<http://developer.amazonwebservices.com/connect/kbcategory.jspa?categoryID=243>
- ChargeCar commute data <http://chargecar.org/data>
- Many more datasets:  
<http://flowingdata.com/2009/10/01/30-resources-to-find-the-data-you-need/>