Explore Big Data Applications. 25%

# EE4-66 COURSEWORK: PAPER STUDY AND 6-MINUTE PRESENTATION

The coursework is designed to encourage students to go beyond the taught materials and cultivate a good taste about important techniques and applications. The coursework will help students to have better answers to the following questions:

- What are the important concepts/techniques that have not been fully covered in the lectures?
- What are the recent developments of the area/topic?
- How can the concepts/techniques be used to solve real life problems?

The final presentations will help students largely broaden their views of the topic, witness how their peers use their judgment to choose a sub-topic to study, and get exposed to critical thinking of others.

**Coursework weight.** 25% of the overall marks

**How it work.** The coursework can be divided into three steps.

**Step 1**: Choose a paper by *noon 12:00, 17 November 2017, Friday.*

Put your selected paper to the Google document at Google Drive:

(1) Check your college email. If you registered for this course, you should have received an invitation email to access the coursework document at Google Drive. If you have not registered for this course, please register for this course and at the same time contact the GTAs using your college email. GTA should be able to add your access to the document.
(2) Save the invitation for future reference! Make sure your Google account is linked to your college email.
(3) Follow the link, you can see the Google document for this coursework. You can directly edit the document and add your information. Please hold yourself accountable and only edit the part that you are supposed to change.
(4) The GTAs of this course will try to give their feedback in two weeks time.

The material that you choose can be a paper, report, or book chapter (henceforth referred to as paper) that goes beyond or partially overlaps with the taught materials in lectures.

Independent self-study is highly recommended and at the same time multiple students can group together to study various aspects of a topic/paper. Note that in this case the final presentations are still individual presentations but can be allocated in adjacent time slots.

Once the paper has been chosen, please put the paper that you chose, and a link to the pdf of your paper to the google form.

Please note that GTAs and I will check the appropriateness of the paper. You expect to hear back from us on our comments on your choice of paper by *1st December 2017*, Friday. If we find the paper that you chose is not appropriate, you will need to quickly choose an appropriate paper and obtain our approval by *8th December 2017 Friday*. To avoid hassles associated with the paper change, you are highly recommended to choose a high-quality paper in the first place.

**Step 2**: Read the paper and prepare your presentation

The purpose of developing techniques is always to solve some problem or satisfy human's curiosity. The key for reading your paper is to understand the motivation behind the paper and how the proposed concept or developed technique addressed the motivation.

**Step 3**: Presentation (Time and venue will be announced by *17 November 2017*)

The presentation has to be at most 6 minutes. After each presentation, there is a question and answer session lasting 3-4 minutes. We have to be very rigid about time control to make sure that each individual student finishes the business in 10 minutes including the time for transition and equipment setup. Given the presentation time is only 6 minutes, you are advised to be very careful about the choice of the presentation materials and the delivery. My advice is to focus on only one point and get to that point fast.

**Presentation marking scheme.** (25% of the overall marks for the module)
Being punctuate: 8/25
Showing that you have read the paper: 7/25
Showing that you have properly understood the paper: 5/25
The width and depth of your understanding, and the delivery: 5/25

## Suggested topics

Students please feel free to go beyond the topics listed below.

- Sparse Recovery
  - Group sparsity
    Huang, Junzhou, and Tong Zhang. "The benefit of group sparsity." The Annals of Statistics 38.4 (2010): 1978-2004.
    Zhang, Shaoting, et al. "Automatic image annotation using group sparsity." Computer Vision and Pattern Recognition (CVPR), 2010 IEEE Conference on. IEEE, 2010.
  - Relevance vector machine
    Tipping, Michael E. "Sparse Bayesian learning and the relevance vector machine." Journal of machine learning research 1.Jun (2001): 211-244.
  - Distributed compressed sensing
    Baron, Dror, et al. "Distributed compressive sensing." arXiv preprint arXiv:0901.3403 (2009).
  - Distributed basis pursuit
    Mota, João FC, et al. "Distributed basis pursuit." IEEE Transactions on Signal Processing 60.4 (2012): 1942-1956.
- Low-rank Matrix Related
  - Blind deconvolution
  - Blind source separation
  - Separate background and foreground for videos
  - Subspace clustering
- Deep neural networks
  - Back propagation
    Cilimkovic, Mirza. "Neural networks and back propagation algorithm." Institute of Technology Blanchardstown, Blanchardstown Road North Dublin 15 (2015).
    Online examples: http://cs231n.github.io/optimization-2/ and
    https://mattmazur.com/2015/03/17/a-step-by-step-backpropagation-example/
  - Convolutional neural network
    LeCun, Yann, et al. "Gradient-based learning applied to document recognition." Proceedings of the IEEE 86.11 (1998): 2278-2324.
    Online materials: http://cs231n.github.io/convolutional-networks/
  - Convolutional neural network and convolutional sparse coding
    Papyan, Vardan, Yaniv Romano, and Michael Elad. "Convolutional Neural Networks Analyzed via Convolutional Sparse Coding." arXiv preprint arXiv:1607.08194 (2016).