Seminar:
Advanced topics in Machine Learning

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Goal of this seminar course

Practice giving scientific presentations

Learn about advanced topics in machine learning
Goal of today

- Seminar topics overview
  - ~40 papers in several topic areas
- Assignment of students to these topics
  - Detailed assignment of papers done later
- Discuss course organization, grading

- (Reinforcement) Learning and controlling dynamical systems
- Adversarial Examples and Robustness
- Adversarial learning
- Bayesian Nonparametrics
- Deep learning, architecture, RNN
- Deep learning, memory augmented models
- Deep learning, regularization
- Deep learning, theory
- Deep representation learning
- Deep representation learning, discrete latent representations
- Deep structure learning, Bayesian networks
- Disentangled Representations
- Fairness and Interpretability
- GANs
- GPs and neural networks
- Generative model
- Implicit Models

- Matrix Factorization/Causality
- Model interpretability
- Neural Networks
- Perturbations, Optimization and Statistics
- Sequential model
- Submodularity and Discrete Optimization
- Unsupervised Learning
- Unsupervised Learning/Causality
- Variational Inference
Course organization

- Two time slots:
  - Tuesday 16-18 in CAB G56
  - Thursday 16-18 in CAB G57

- You are expected to present in and regularly attend one of these slots
  - n sessions per slot (probably, ~10) with 2 talks each
  - You must attend n-1 sessions in the slot you’re presenting.
  - You may switch between slots in one week.

- First talks will start on 9. and 11. October, respectively.
Grading

Your grade will be determined based on your talk, as well as participation in the discussion

Criteria:

- **Structure** (how well is your talk organized?)
- **Understandability** (how understandable is your oral presentation and slide design?)
- **Completeness** (how well do you provide right background, and manage to focus on what is important and relevant?)
- **Activity** (how engaged are you in class and in the talk preparation?)
- **Independence** (how independent are you in preparing the presentation, and in reflecting on the paper?)
Presentation details

- Use electronic slides (ppt, pdf, ...)
- Talk length: 30 min + 15 min discussion
- The talk should provide sufficient background to be understandable to someone who has taken an ML class
- You should present the papers contributions and results, as well as reflect on them
Typical talk outline

- **Introduction** (Motivation and background)
- **Formal problem statement** (Notation, ...)
- **Technical contribution** (algorithm, theoretical result, ...)
- **Experimental results** (if any)
- **Discussion** (what are perceived strengths and weaknesses of the paper; what could be done more; ...)
- **Conclusion**
Advice on presentation design

Giving compelling presentations is hard!

- „Minimize words and maximize illustrations“
- Focus on giving intuition, identifying key insights etc.

Some pieces of advice:

- [http://www.cs.berkeley.edu/~jrs/speaking.html](http://www.cs.berkeley.edu/~jrs/speaking.html)
- [http://greatresearch.org/2013/10/04/presenting-a-technical-talk/](http://greatresearch.org/2013/10/04/presenting-a-technical-talk/)
Topic assignment

- Each student gives ordered preferences for 3 topics
- We match students to topics according to preference
  https://goo.gl/forms/bL45KhiM3X9gsD2B3
- Each topic will have a representative, who will assign papers from the topic to students
- For each paper, there will be an advisor whom you can ask for clarification and advice
- Set up at least one meeting with your advisor to discuss the paper / presentation (weeks before talk)
- Send (near-complete) draft of slides to advisor at least 7 days prior to presentation date