Advanced Machine Learning

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Topics

- **Algorithms for "deep" learning**
  - recurrent systems, target propagation, non-gradient-based algorithms
- **Advanced topics in graphical models and factor graphs and energy-based models**
  - approximate inference, variational methods, intractable models (MRF....).
- **unsupervised learning and self-supervised learning:**
  - dimensionality reduction, ICA, deep auto-encoders....
- **sampling methods for inference and learning**
  - Hybrid Monte-Carlo, Contrastive Divergence, particle filtering
- **Discriminative methods for sequence labeling**
  - Conditional random fields, energy-based models, finite-state transducers
- **Reinforcement learning and Markov decision processes**
  - MDP/POMDP, Q-learning, adaptive critics.....

Application Topics

- **Generic Object Recognition**
- **Time-Series Prediction**
- **Robot Motor Control**
  - Legged locomotion
- **Sequence Segmentation**
  - audio/music/speech
  - Biological sequences
  - Parts of Speech tagging in NLP
- **Machine Translation**

Organization

- **We split up into 6 groups of 2 or 3 people.**
- **Each week, 4 groups prepare a review talk on 2 particular topics or papers**
  - i.e. 2 groups will have the same paper or topic
  - First hour: two ½ hour talks on the first topic/paper
    - Given by 2 randomly picked persons from the first 2 groups
  - Second hour: two ½ hour talks on the second topic/paper
  - These must be real talks with roughly 10-12 OpenOffice slides.
- **The other 2 "idle" groups will write a paper on the topics talked about by those 4 groups.**
- **The "product" of the class will be:**
  - introductory talks on the topics treated
  - introductory/survey papers on the topics treated.
  - These will be published on the CBLL web site with your name on them!

Brainstorming

- Split into groups
- Discuss which papers you want to review
- Send me a list for approval