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
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