

CS 3750 Machine Learning

Lecture 1

Advanced Machine Learning

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CS 3750 Advanced Machine Learning

Administration

A seminar course

- **Classes:**
 - Lectures
 - Student (topic-centered) presentations
- No homework assignments and no exams
- Short abstracts for assigned readings due before the class
- Course projects

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Administration

Course Projects:

- **2 projects**
 - Midterm project (assigned)
 - Final project (student writes a proposal)
- **Grading:**
 - Projects
 - Paper presentations/ discussions

Study material

Study material:

- **Books**
- **Handouts (electronic or hardcopy form)**
- **Books:**
 - Chris Bishop. *Pattern recognition and Machine Learning* Springer, 2006.
 - Michael Jordan. Introduction to Graphical Models. in preparation
 - Daphne Koller and Nir Friedman. Bayesian Networks and Beyond. in preparation.

Study material

Study material

Other books:

- C. Bishop. *Neural networks for pattern recognition*. Oxford U. Press, 1996.
- Duda, Hart, Stork. *Pattern classification*. 2nd edition. J Wiley and Sons, 2000.
- Friedman, Hastie, Tibshirani. *Elements of statistical learning*. Springer, 2001.
- B. Scholkopf and A. Smola. *Learning with kernels*. MIT Press, 2002.

Tentative topics

- **Basics of** density estimation and classification methods.
- **Graphical models** of multivariate distributions.
 - Directed and undirected models.
 - Inferences
 - Learning of parameters and structure
- **Variational approximations** for inference and learning.
 - Mean-field approximations. Variational Bayes
- **Component analysis and their applications**
 - PCA, LSA, PLSA, etc
- **Kernel methods**
 - Kernel methods, Kernel-PCA, string kernels, etc.
- **Spectral clustering**