

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
- 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:

- Textbook from CS 2750
- Handouts (electronic or hardcopy form)
- **Books:**
 - Chris Bishop. *Pattern recognition and Machine Learning* Springer, 2006.

Study material

Study material

Other books:

- Koller, Friedman. Probabilistic graphical models.
- 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

- **Review:** supervised learning, density estimation
- **Extending standard learning framework:**
 - sparsity, learning to rank, multiple task
- **Low dimensional representation of data**
 - **Component analysis and their applications**
 - PCA, LSA, PLSA, pPCA, ICA, etc
 - **Latent variable models**
 - Variational approximations
- **Kernels**
 - Kernel methods, Kernel-PCA, string kernels, etc.
- **Non-parametric models and methods:**
 - Graph-based kernels for classification and clustering
 - Metric learning
- **Gaussian processes**