

Pattern Recognition

CS-688

Professor: Carlotta Domeniconi
carlotta@cs.gmu.edu

Fall 2013

General Information

- Instructor: Carlotta Domeniconi
 - Office: ENG, Rm 4424
 - Email: carlotta@cs.gmu.edu
 - Phone: (703) 993-1697
- Office hours: TR 4:30-5:30pm, or by appointment, or stop by
- <http://www.cs.gmu.edu/~carlotta/teaching//CS-688-f13/info.html>
- Visit the class webpage often!

Objective of the course

- In depth study and critical analysis of classic and current methodologies and most challenging problems in pattern recognition
- Technical tools from... linear algebra, probability, statistics, multivariate calculus, optimization

Topics (tentative)

- Issues with learning, model selection, over-fitting, decision theory, curse-of-dimensionality
- Linear Models for Classification
- Prototype Methods and Nearest Neighbors
- Dimensionality reduction: PCA, LDA, kernelized versions

More topics

- Kernel methods
- Support Vector Machines
- Clustering
- Mixture Models, EM, HMMs
- Additional topics: Subspace clustering; Ensemble methods for classification/clustering; Subspace clustering; Multi-view clustering; Semi-supervised learning; Learning with graphs

Course Format

- Lectures by the instructor
- Homeworks
- Project: proposal, presentation, paper
- Midterm
- Final

Important Dates

- **October 8**: Midterm
- **Oct 22**: Project proposal due
- **Nov 26**: Final
- **Dec 3/Dec 14**: Project presentations
- **Dec 14**: Paper on the project due

Visit the class webpage often for updates!!!

The final grade is based on...

- Homeworks (participation): **20%**
- Midterm1: **20%**
- Midterm2: **20%**
- Project (proposal, presentation, paper): **40%**
 - **10% Proposal**
 - **15% Presentation**
 - **15% Paper**

Some useful books

- **Textbook:**

- Christopher M Bishop,
“**Pattern Recognition and Machine Learning**”,
Springer, 2006.

Companion website:

<http://research.microsoft.com/~cmbishop/PRML/index.htm>

- **On Pattern Classification:**

- R. O. Duda, P. E. Hart, D. G. Stork,
“*Pattern Classification*”,
Second Edition, Wiley, 2001.

- **On Kernel Methods:**

- Bernhard Scholkopf and Alexander Smola,
*Learning with Kernels. Support Vector Machines,
Regularization, Optimization, and Beyond*,
The MIT Press, 2002.
- John Shawe-Taylor and Nello Cristianini,
Kernel Methods for Pattern Analysis,
Cambridge University Press, 2004.

- **On Statistical Learning:**

- T. Hastie, R. Tibshirani, and J. Friedman, “*The Elements of Statistical Learning. Data Mining, Inference and Prediction*”, Springer, 2001. (Last Print!)