Advanced Pattern Recognition

CS-775 (IT 803)

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General Info

➢ Instructor: Carlotta Domeniconi

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➢ Office hours: Mon. 2-4pm, or by appointment, or stop by

    ➢ http://www.cs.gmu.edu/~carlotta/teaching//CS775-s10/info.html

➢ Visit the class webpage often!

Objective of this course

➢ In depth study and critical analysis of current methodologies for pattern recognition and machine learning

➢ Technical tools from… linear algebra, probability, statistics, multivariate calculus, optimization

Pre-requisites

➢ CS 688, or permission by instructor

➢ Familiarity with fundamental issues with learning, model selection, generalization, over-fitting, decision theory, curse-of-dimensionality

➢ Dimensionality reduction techniques

➢ Classification and Clustering algorithms

Topics (Temptative)

- Subspace Clustering
- Ensemble Methods: Clustering Ensembles
- Semi-supervised learning: Clustering with Constraints
- Distance Metric Learning
- Active Learning
- Learning with External Knowledge (e.g., Wikipedia)
- Transfer Learning
- Probabilistic Topic Modeling
- More?

Course Format

- Lectures by the instructor
- Presentations and discussions of papers by students
- Midterm/Homeworks/Quizzes (?)
- Questions on papers presented in class
- Project: proposal, presentation, paper

Important Dates

➢ **March 1**: Project proposal due.

➢ **March 22**: Revised proposal due.

➢ **April 5**: Checkpoint: progress report for project.

➢ We may have a Midterm after Spring Break (March 8).

Some useful books

and

reading material

- **On Pattern Recognition and Machine Learning**:

  – 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 Ensemble Methods**:

  - Ludmila I. Kuncheva,
    Combining Pattern Classifiers – Methods and Algorithms,
    Wiley, 2004.

Conferences and Journals

- KDD (Knowledge Discovery and Data Mining)
- ICML (International Conference on Machine Learning)
- ECML (European Conference on Machine Learning)
- ICDM (International Conference on Data Mining)
- SDM (SIAM Conference on Data Mining)
- JMLR (Journal of Machine Learning Research)
- TKDD (Trans. On Knowledge Discovery from Data)
- DAMI (Data Mining and Knowledge Discovery Journal)
- …