Machine Learning: Introduction

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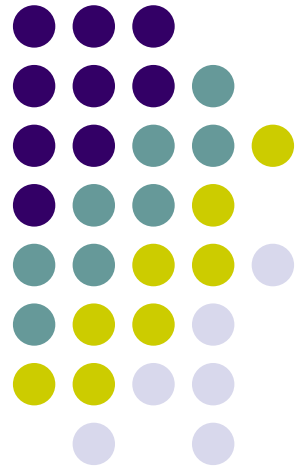
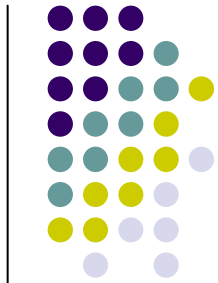


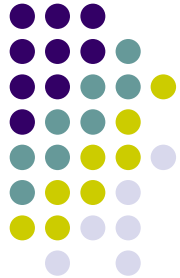
Syllabus



- Covers a set of Machine learning techniques –from basic and state-of-the-art.
- You will learn:
  - PCA, MDS,K-mean, spectrum based clustering, Naïve-Bayes classification, boosting, logistic regression, decision tree, EM, HMM, Kalman filtering…
- Tell the stories behind the algorithms, theory and applications.

- It is going to be fun and hard work.

Rough schedule



- 03.01: Introduction
- 03.08: Classification
- 03.15: Clustering
- 03.22: HMM & Kalman Filtering

Principle

- Simple is beauty!

- Make a balance between theories and real applications

Final report

- Paper reading report.
  - Reading a typical learning paper. Report the main idea and your own opinions.
    - Paper source:
      - SIGGRAPH / EUGROGRAPHICS / SCA / Pacific Graphics,
      - ICCV / ECCV / ACCV, CVPR,
      - NIPS / ICML / IJCAI / UAI / AAAI
      - ...
    - Report can be in English or Chinese. And please hand out in PDF format.

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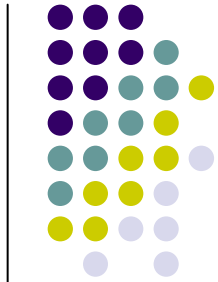
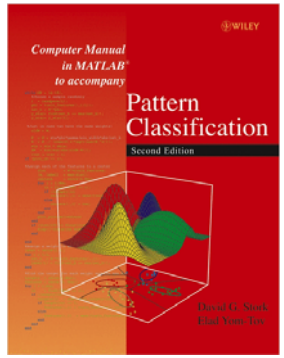
Prerequisites



- Probabilities
  - Distributions, densities, marginalization…
- Basic statistics
  - Moments, typical distributions, regression…
- Algorithms
  - Dynamic programming, basic data structures, complexity…
- Programming
  - Mostly your choice of language: C/C++, MATLAB, JAVA
- We provide some background, but the class will be fast paced

- Ability to deal with “abstract mathematical concepts”

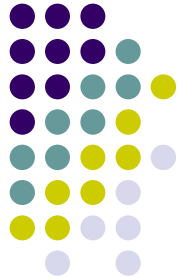
Text books



- Machine Learning
  - by Tom Mitchell
- Pattern Classification (2nd Edition)
  - by Duda, Hart and Stork
- Information Theory, Inference, and Learning Algorithms
  - by David MacKay
- Statistical Inference,
  - by George Casella and Roger L. Berger.
- And more …

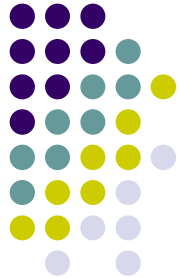
- **All above books are optional. Everyone have their own learning algorithms, ☺**

Internet resources



- http://www.cad.zju.edu.cn/home/zhx/ML/

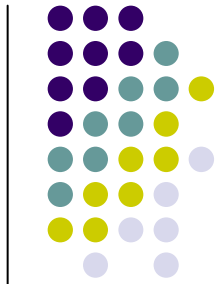
Enjoy!



- Machine Learning is becoming ubiquitous in science, engineering and beyond.
- This class should give you the basic foundation for applying ML and developing new methods.

- The fun begins…

Reference



- http://www-2.cs.cmu.edu/~guestrin/Class/10701/slides/CarlosIntro.pdf