CSE 575: Statistical Machine Learning

Jingrui He

CIDSE, ASU

Course Information

Basic Information

- Instructor: Dr. Jingrui He
  - Office: BY410
  - Office hours: F 1:30pm – 3:30pm
  - Email: jingrui.he@asu.edu
- Lecture
  - Time: F 9am – 11:45am
  - Location: PSH 152
- TA
  - Dawei Zhou (dawei.zhou@asu.edu)
  - Jun Wu (junwu6@asu.edu)
  - Office hours
    - Time: M/T 9am-10am (Jun Wu), W/Th 3:30pm-4:30pm (Dawei Zhou)
    - Location: BY221

Objective and Topics

- Objective
  - An in-depth understanding of machine learning and statistical pattern recognition techniques and their applications.
- Topics
  - Probability distributions, MLE, regression, classification, decision tree, boosting, kernel methods, clustering, mixture models, graphical models, dimensionality reduction, and advanced topics, such as deep learning.

Prerequisites

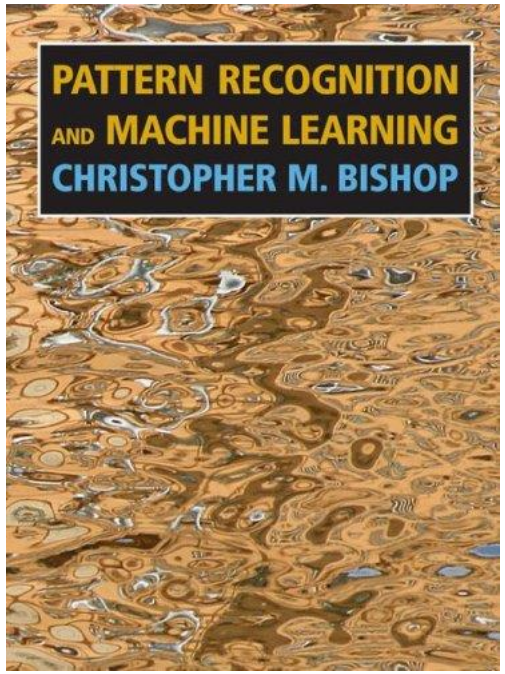
- VERY IMPORTANT!
- Basics of linear algebra, probability, algorithm design and analysis.
- Proficient in programming in one of the following languages (Matlab, Python, C++ or Java)
- Screen-quiz: later TODAY!

Tentative Class Schedule

Week	Topic	Homework	Exam
1	Introduction		Screen-Quiz
2	Probability Basics, MLE	HW1 out	
3	Linear Regression, Bias-Variance Tradeoff		
4	Naive Bayes, Logistic Regression		
5	Overfitting		
6	Decision Tree	HW1 due, HW2 out	Midterm 1
7	Boosting, Instance-based Learning		
8	Support Vector Machines		
9	Spring Break		
10	Bayes Networks, GMM, EM	HW2 due, HW3 out	
11	Dimensionality Reduction		Midterm 2
12	Graphical Models		
13	Bayes Networks		
14	Hidden Markov Models	HW3 due	
15	Advanced Topics		
16	Group Presentation		

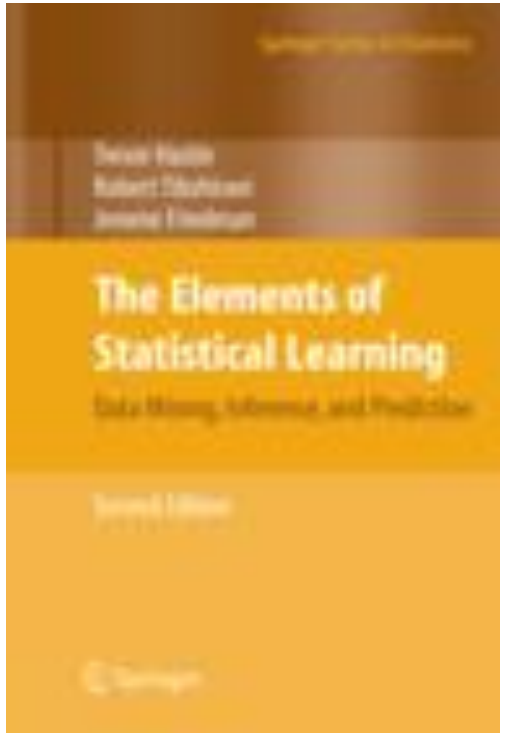
Textbook

- Pattern Recognition and Machine Learning, Christopher M. Bishop, 2006.



Reference Books

- The Elements of Statistical Learning: Data Mining, Inference, and Prediction (Second Edition) by Trevor Hastie, Robert Tibshirani and Jerome Friedman (2009)



http://www-stat.stanford.edu/~hastie/Papers/ESLII.pdf

Grading

- Project: 30%
  - Each group has 6~8 students
  - Project proposal (10%)
  - Group presentation (5%)
  - Final project report (15%)
- Homework (3): 15%
  - Equal weights
  - Each student should finish ***independently***
- Exam (3): 50%
  - Feb 15 (10%), Mar 22 (10%), Final (30%)
  - Closed book for all exams: NO cheat sheet allowed
- Class participation: 5%
  - Students are required to attend the lectures and participate in the class discussion
- A+; A: 90—100, A-: 85—89, B+: 80—84, B: 70—79, C: 60—70

Class Project

- Project proposal (1 page) due on **2/22/19** at 11:59pm
  1) Project title
  2) Team members: roles of each member
  3) Description of the problem you try to address
  4) Preliminary plan (milestones)
  5) Paper list
- Final project report (10-15 pages) due on **4/26/19** at 11:59pm
  1) Introduction: a summary of the problem, previous work, methods, and results
  2) Problem description: a detailed description of the problem you try to address
  3) Methodology: a detailed description of methods used
  4) Results: a detailed description of your observations from the experiments
  5) Conclusions and future work: a brief summary of the main contributions of the project and the lessons you learn from the project, as well as a list of some potential future work.

Academic Integrity

- Violations of the University Academic Integrity policy will ***NOT*** be tolerated. Penalties include reduced or 0 credit for submitted work, a failing grade in the class, a note on your official transcript that shows you were punished for cheating, suspension, expulsion and revocation of already awarded degrees. The university requires that should I implement any of these penalties, I must report the matter to the Dean's office. The university academic integrity policy can be found at http://provost.asu.edu/academicintegrity.

Title IX and ASU Policy

- Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at http://sexualviolenceprevention.asu.edu/faqs/students.

Disclaimer

- Some lecture notes are modified based on the slides made by Dr. Carlos Guestrin (with permission) while he was teaching Machine Learning at Carnegie Mellon University.

Professional deep learning model tuning
Caffe Installation ¥10
CNN ¥5 per layer
RNN ¥8 per layer