



THE UNIVERSITY OF
CHICAGO

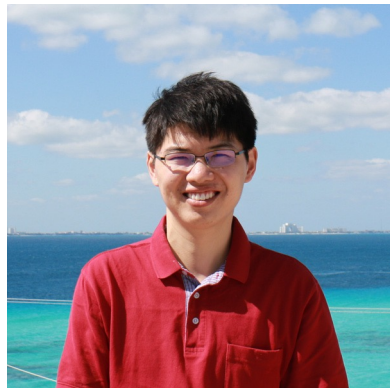
STAT 37710 / CAAM 37710 / CMSC 35400
Machine Learning

Logistics

Cong Ma

Teaching stuff

- Instructor: Cong Ma
- Teaching assistants: Yuepeng Yang, Huy Tran



Cong Ma
congma@uchicago.edu



Yuepeng Yang
yuepengyang@uchicago.edu



Huy Tran
huydtran@uchicago.edu

Overview

This course

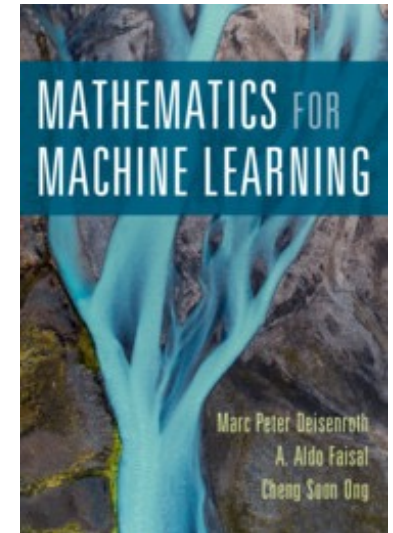
1. is a graduate level intro course to machine learning (ML)
2. provides you with fundamentals of ML: regression, classification, bias/variance trade-off, model selection, mixture models, neural networks, etc.
3. prepares you for advanced courses in ML: statistical learning theory, online learning, deep learning theory, etc.

This course is NOT

1. a survey course on various ML algorithms; we delve into math!
2. an easy course; we delve into math!

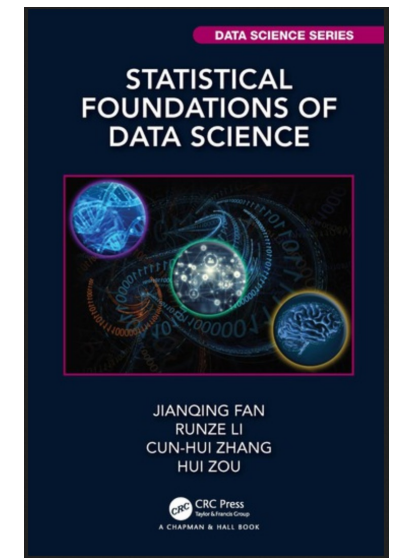
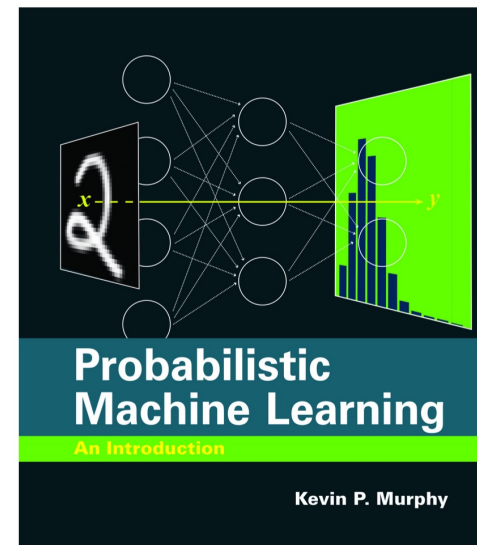
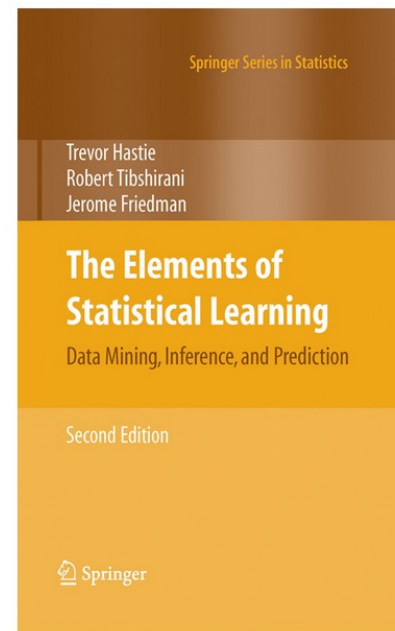
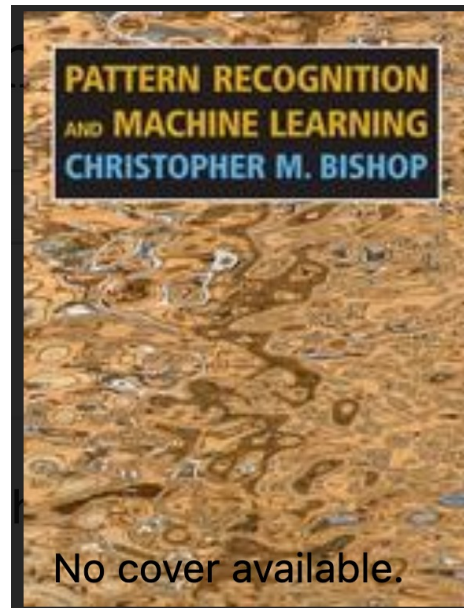
Prerequisites

- Basic linear algebra
 - e.g., MATH 19620 or STAT 24300 or higher
- Basic probability and statistics
 - e.g., STAT 22000 or STAT 23400 or STAT 24500
- Mathematical Foundations of Machine Learning
 - [CMSC 35300](#) or equivalent
 - e.g., Part 1 covered by [Mathematics for Machine Learning](#)
- Experience with Python
- Use HW0 to judge skills (will post tonight)



References

We recommend the following books. But we won't follow them closely.



Relation to other graduate ML courses

- **Mathematical foundations**
 - STAT 27700 / CMSC 35300: Mathematical Foundations of Machine Learning (**prerequisite**, Fall 2020; Spring 2021)
- **Introduction to machine learning**
 - STAT 37710 / CMSC 35400: Machine learning (**this course**)
 - TTIC 31020: Introduction to Machine Learning
- **Theoretical foundations**
 - TTIC 31250: Introduction to the Theory of Machine Learning
 - TTIC 31120 - Computational and Statistical Learning Theory (advanced topics)
- **Probabilistic reasoning**
 - TTIC 31180: Probabilistic Graphical Models
- **Contemporary ML models and their applications**
 - TTIC 31230: Fundamentals of Deep Learning
 - TTIC 31040: Introduction to Computer Vision
 - TTIC 31190: Natural Language Processing
 - TTIC 31110: Speech Technologies

Course websites

- We will have two course websites:
 - <https://congma1028.github.io/Teaching/STAT37710/index.html>
 - Canvas
- Lecture notes and HWs will be posted on both
- Important announcement will be posted on Canvas

Course structure

- **Lecture format:**
 - in-person, class participation is strongly encouraged
 - Mixture of slides and board writing
- **Lecture hours: Tu/Th 11:00am-12:20pm**
- **Check course webpage for TA office hours**

Grading

- **6-7 homework (including HW0) 50%**
 - involve both theory and coding
 - roughly released 1 day prior to the relevant lecture block, due 3 days after the lecture block
 - Allow collaboration, but you need to write your solutions independently, you also need to write explicitly who you have discussed with
- **Midterm exam 20% (date TBD)**
- **Final exam 30% (date TBD)**
- **Lose 5% for every day late on homework**
 - Up to 5 days & prior to release of solutions
 - HW solutions will be released ~1 week after due date unless otherwise specified (w/ exceptions at exam weeks)

Tentative schedule

Week 1	09/27	logistics + intro
	09/29	statistical machine learning
Week 2	10/04	MLE, method of moments
	10/06	Bayesian methods
Week 3	10/11	Regularization, model selection
	10/13	Logistic regression
Week 4	10/18	Generative model
	10/20	Support vector machine
Week 5	10/25	Kernel methods
	10/27	Midterm

Week 6	11/01	Multi-layer perceptrons
	11/03	Deep neural networks
Week 7	11/08	Decision trees
	11/10	Bagging
Week 8	11/15	Boosting
	11/17	Graphical models?
Week 9	11/29	Gaussian processes?
	12/01	Online learning? PAC?
Week 10		NO CLASS
		NO CLASS