

# Mathematics in computer science

Hongxin Zhang  
zhx@cad.zju.edu.cn

State Key Lab of CAD&CG, ZJU  
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# Syllabus



- This 2 months short course:
  - covers a set of data driven techniques
  - optimization methods
  - from basic and state-of-the-art.
- You will learn fundamental algorithms of multivariate analysis
- And see the stories behind these algorithms, theory and applications.
- It is going to be fun and hard work.



# Rough schedule

- 02.27: Introduction & Point estimation
- 03.06: Component Analysis
- 03.13: Distance and similarity
- 03.20: Graphical models
  
- 03.27: Linear programming
- 04.03: Linear programming
- 04.10: Quadratic programming
- 04.17: Non-linear programming

# 反思



- It is not a pure machine learning course
  - Although we will discuss a lot on machine learning things
- We will focus on mathematical methods and their underlying motivation
  - Representation and presentation
  - Thinking in mathematical way
  - Happy working with mathematics

# Principle

- Simple is beauty!
- Make a balance between theories and real applications
- 哲學（*philosophy*）是從希臘字「Φιλοσοφία」（*philosophia*）轉變而來，意思為「熱愛智慧」，或是比較少用的「智慧的朋友」。



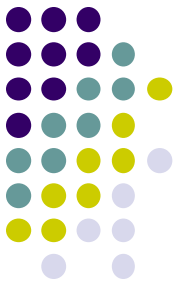
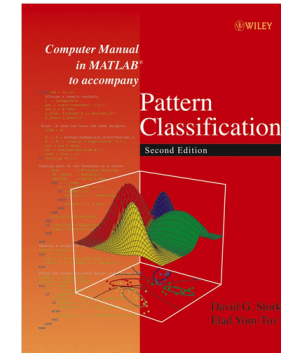


# Prerequisites

- Probabilities
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- Basic statistics
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- Algorithms
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- Programming
  - Mostly your choice of language: C/C++, MATLAB, JAVA
- We provide some background, but the class will be fast paced
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# Text books

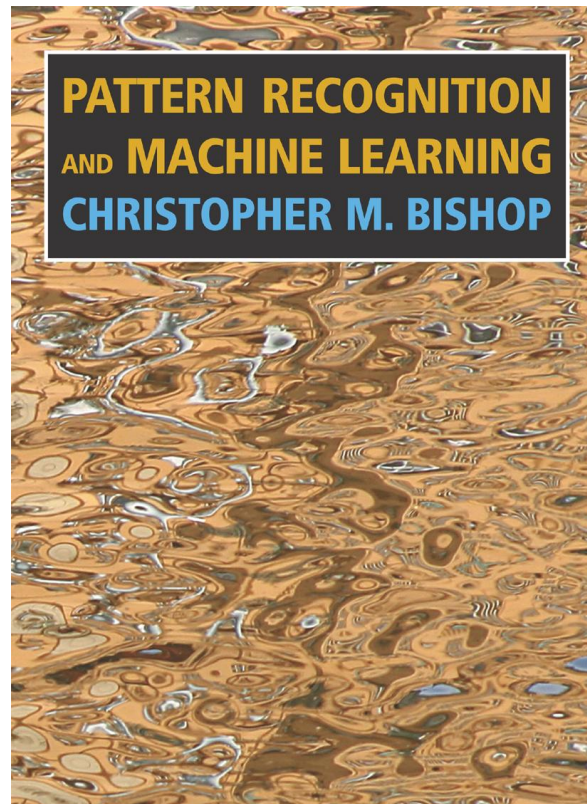
- [Pattern Classification \(2nd Edition\)](#)
  - by Duda, Hart and Stork
- [Information Theory, Inference, and Learning Algorithms](#)
  - by David MacKay



# Text books

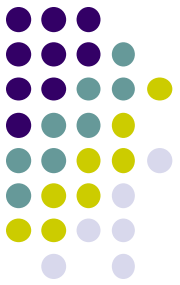


- <http://research.microsoft.com/en-us/um/people/cmbishop/prml/>





# Text books



- From data mining area
  - Mining of Massive Datasets
  - <http://infolab.stanford.edu/~ullman/mmds.html>



# Internet resources

- <http://www.cad.zju.edu.cn/home/zhx/csmath>



# Evaluation

- Homework: 40%
  - Python programming
  - Course notes
  -
- Course paper: 40%
  - Read top-level (10 selected) papers, and report main idea
- In class performance: 20%

# Enjoy!



- Data driven is becoming ubiquitous in science, engineering and beyond
- This class should give you the basic foundation for applying DD and developing new methods
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# 源自88上某位网友的签名档



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2.

3.

4.

