Machine Learning & Pattern Recognition

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About Me

Dr. SONG Xuemeng (宋雪萌)
Assistant Professor
Dept of Computer Science & Technology
Office: N3-422
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Consultation: by appointment

- **Ph.D., National University of Singapore (2012-2016)**
- **B.Eng., University of Science and Technology of China (2008-2012)**
- **Research Interests:**
  - **Information retrieval**
  - **Multimedia analysis**

Objectives

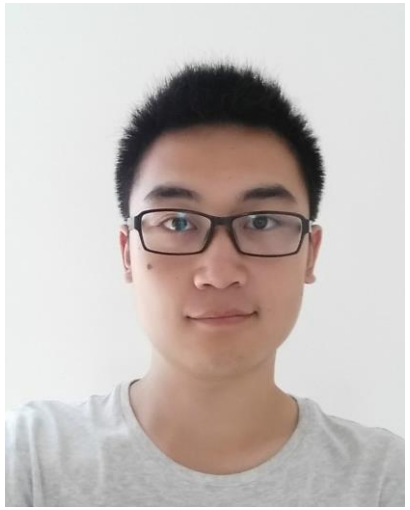
- To equip students with knowledge of common *statistical machine learning* and *pattern recognition algorithms* and techniques.

Teaching Partner

Dr. Liqiang Nie (聂礼强).
Professor, Qilu Scholar, PhD supervisor.
Project of Thousand Youth Talents 2016.
Dept of Computer Science & Technology
Office: N3-422
E-mail: nieliqiang@gmail.com

- **Ph.D., National University of Singapore (2009-2013)**
- **B.Eng., Xi'an Jiaotong University (2005-2009)**
- **Research Interests:**
  - **Information retrieval**
  - **Multimedia analysis**

Teaching Assistant



Mr. LIN Junyu (林俊宇)
Master Student
Dept of Computer Science & Technology
Office: N3-409
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- **B.Eng., Shandong University (2014-2018)**
- **Research Interests:**
  - **Information retrieval**
  - **Multimedia analysis**

Prerequisites

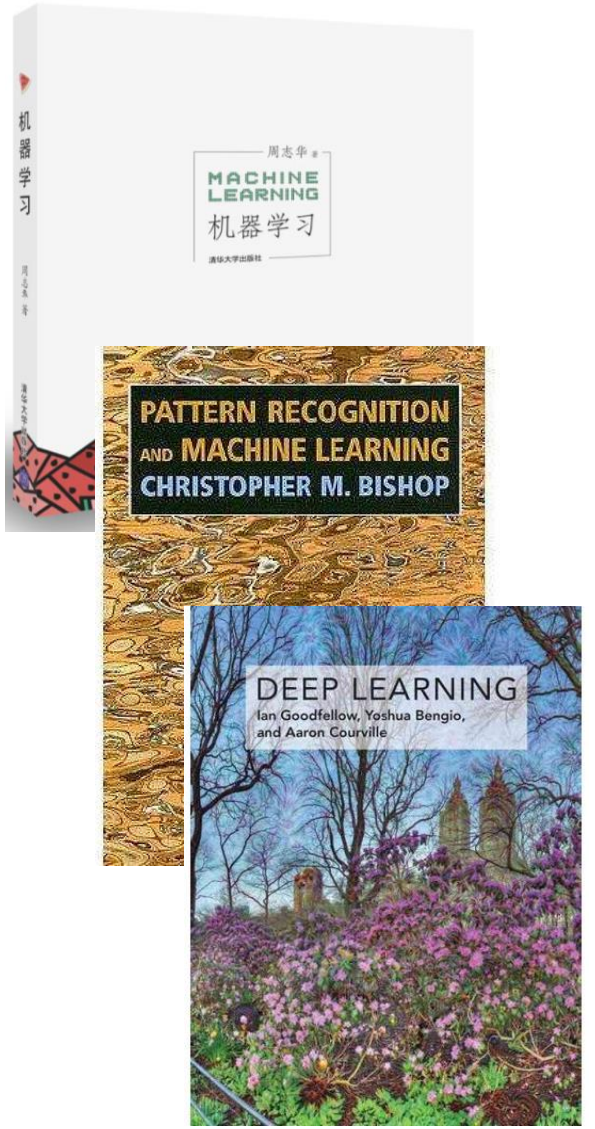
- Familiar with *probability*, *statistics* and *linear algebra* (vector spaces and matrix theory) as thought in typical undergraduate courses.

- Familiar with programming environments such as MATLAB, Python or be able to program in standard languages such as C, C++, etc.

Text Book and References

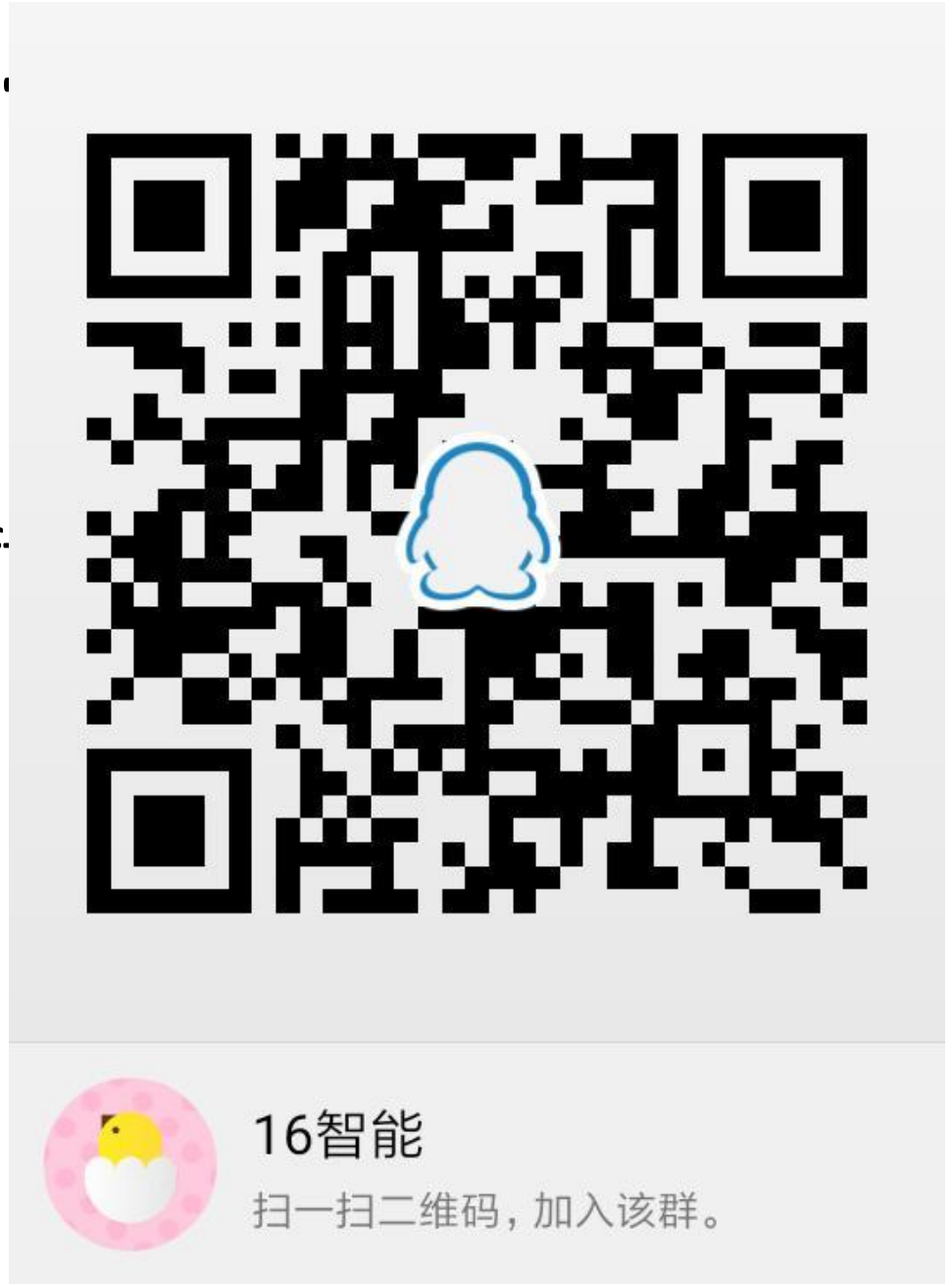
- 机器学习（周志华）
- Pattern Recognition and Machine Learning (*Christopher Bishop*) (E-edition)
- Deep Learning (*Ian Goodfellow, Yoshua Bengio, Aaron Courville*) (E-edition)

- Lectures are important, but not enough.
- You are strongly suggested to explore more (via the *Internet* or even just the *wikipedia*) after the class.



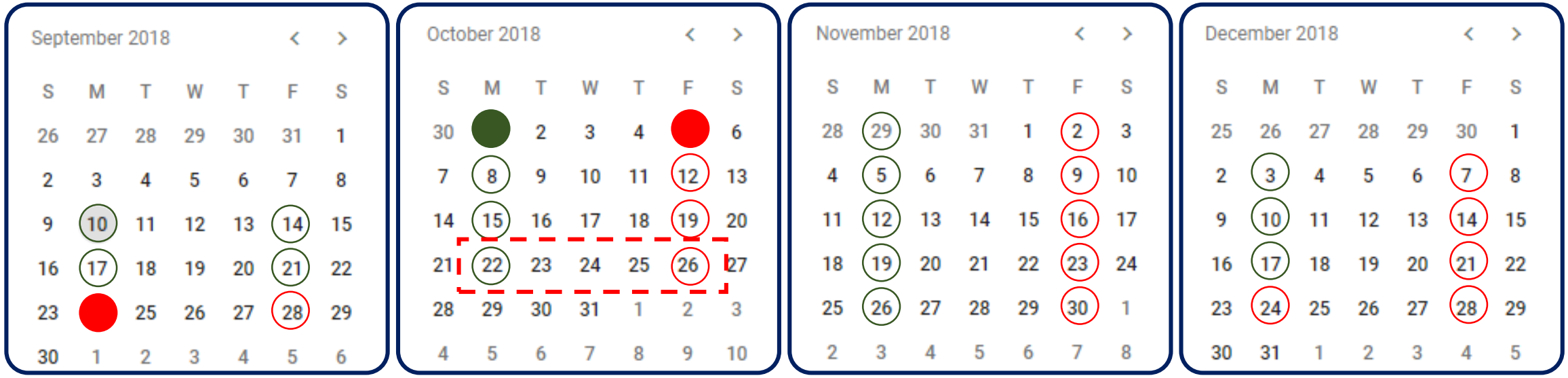
Assessmen

- Lecture slides in PDF format
  - Via the link the QQ group.
- Homework assignments (5%)
  - Solutions will be provided one week af
- Experiments (15%)
  - Will be released soon.
- Final Project (20%)
  - Will be released soon.
- Final Exam (60%)
  - Closed-book, 2 hrs.



Schedule

- Monday: 5-6-7; Friday: 5-6.
- ◯ : Theory. ◯: Experiment, Location: N3 124 (126).
- ●&●: No class (Public holiday).
- ▭: To be determined.



Feedbacks

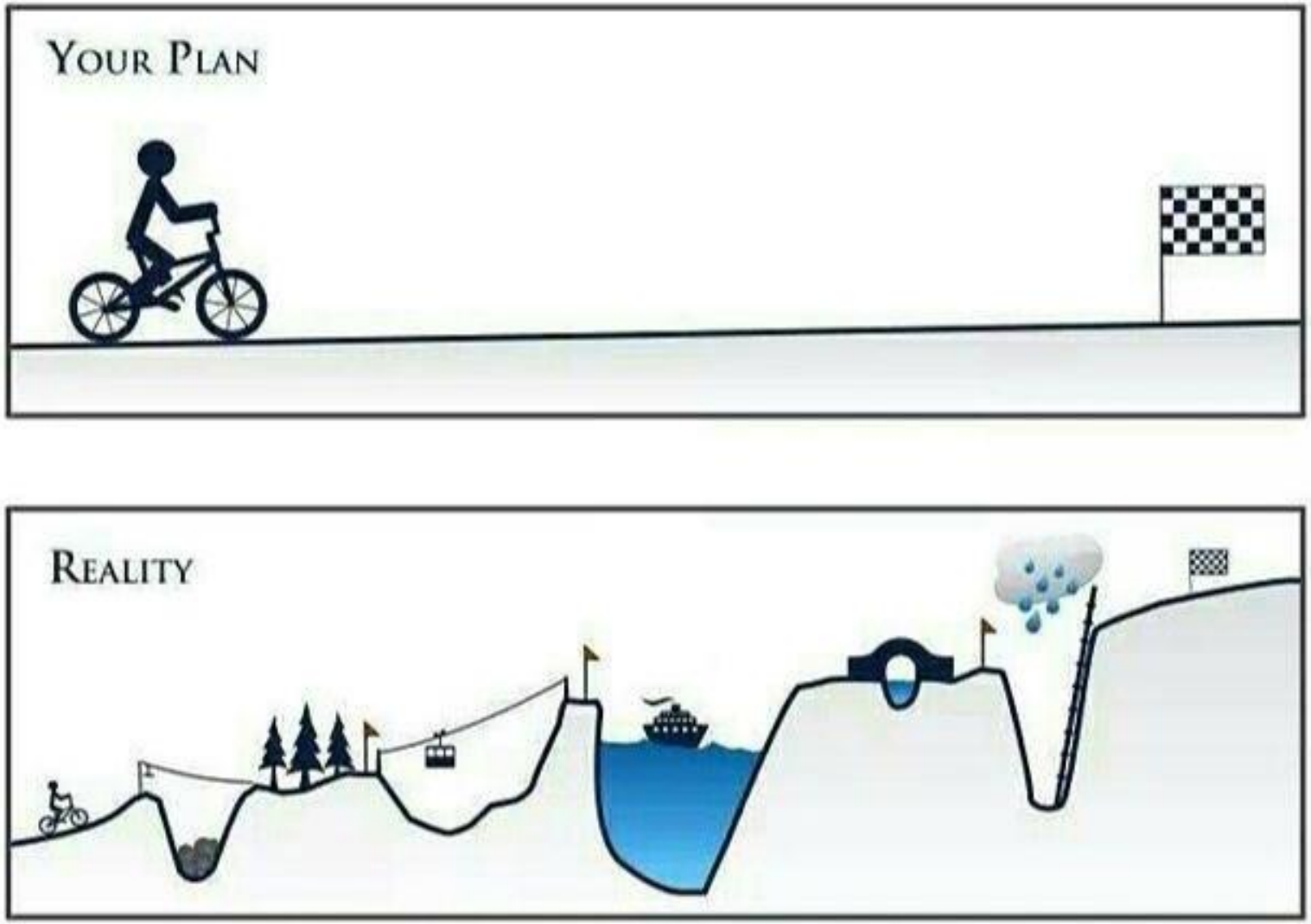
- Gather feedback via the education admin system.
- Your opinions do matter. **Please participate!**
- If you find any typos (or any other problems) in the slides, please feel free to contact me at sxmustc@gmail.com or talk to me directly in the class. Thanks!

Syllabus

I *plan* to introduce the following topics…

1. Introduction to Machine Learning
2. Review of linear algebra & probability
3. Linear Algorithms
4. Optimization methods (GD, Newton, Momentum, SGD…)
5. Unsupervised Feature Extraction (PCA, NMF)
6. Supervised Feature Extraction (LDA)
7. Baysian Decision Theory
8. K-Nearest-Neighbor (KNN)
9. Deep Learning
10. Support Vector Machine
11. Decision Tree
12. Clustering---K-means, Hierarchical clustering
13. Ensemble Methods (Bagging and Boosting)
14. Feature Selection (Sparse Coding)
15. Generative Adversarial Networks (GAN)
16. Maybe some other new topics…

However…



Hope you would enjoy it.