

Reinforcement Learning

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March 02, 2020

Outline

1 People: TAs & Professor

2 Course Information

3 Conclusion

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Teaching Assistants

- Xi Huang: 黃曦
- Xin Gao: 高欣
- Junge Zhu: 朱俊閣

Professor Ziyu Shao



Laboratory for Intelligence
Information and Decision

智能信息与决策实验室

- Director of IID Lab: make intelligent decision under incomplete information
- Co-design of computing, communication and control for large-scale intelligent systems

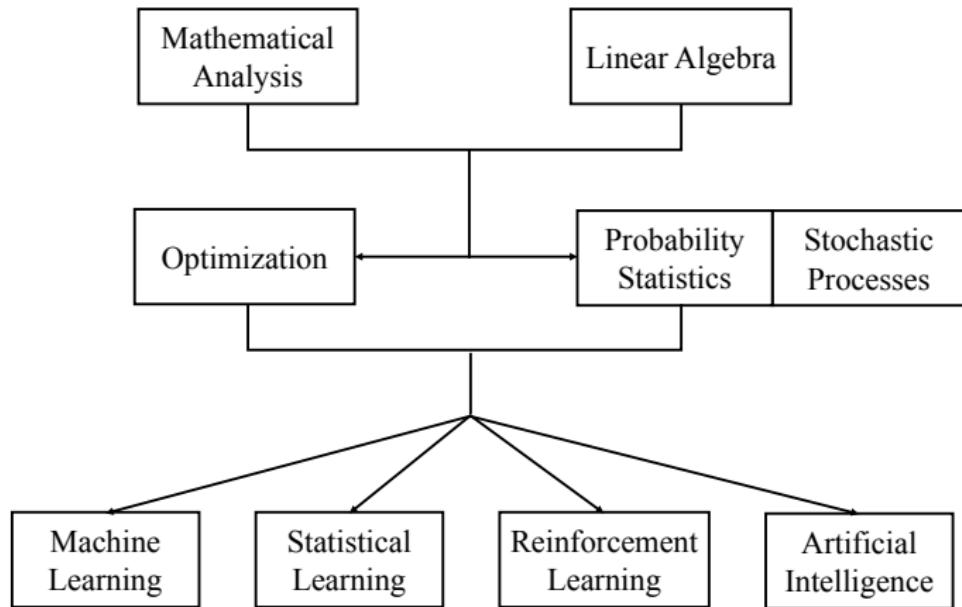
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The Role of This Course



Course Features

- Solid foundation of RL: modeling analysis and theoretical proof
- Computational thinking: algorithmic perspective and programming practice
- Application mentality: many examples from AI and related fields (computing, communication and control)
- Research-oriented: aims to produce high-quality original research results and publish in top conferences & journals

Time & Venue

- Time: every Monday and Wednesday 10:15-11:55am
- Course Forum in Piazza:
<https://piazza.com/shanghaitech.edu.cn/spring2020/si252/>
- Online Course with Zoom

Course Schedule

- Lecture 1: Review of Probability & Statistics
- Lecture 2: Probability Inequalities
- Lecture 3: Conditional Expectation
- Lecture 4: Bandit Algorithms
- Lecture 5: Markov Chain
- Lecture 6: Markov Chain Monte Carlo
- Lecture 7: Reinforcement Learning
- Lecture 8: Markov Decision Process
- Lecture 9: Dynamic Programming
- Lecture 10: Model-Free Prediction
- Lecture 11: Model-Free Control
- Lecture 12: Value Function Approximation
- Lecture 13: Policy Gradient
- Lecture 14: Model-based Reinforcement Learning
- Lecture 15: Research Topics

Course Grade

- *Homework 60%*: six problem sets.
- *Final Project 40%*: research-oriented.

Homework Policy

- Write the homework with LaTeX and output it as a PDF file.
- Write the programming assignment with Python
- **Later** homework receives no credit.
- You are allowed to discuss with others and use any references, but if you do so please list your collaborators and cite your references for each question.
- Not writing your own solutions or not listing your collaborators or not citing your references may be considered plagiarism.

LaTeX Setup

- LaTeX Package (Unix, Windows): TeXLive
(<https://tug.org/texlive/>)
- LaTeX Package (MacOs): MacTeX (<http://tug.org/mactex>)
- Popular LaTex Editors
 - ▶ Texpad (MacOs): <https://www.texpad.com>
 - ▶ TeXstudio (Windows,MacOs): <http://www.texstudio.org>
 - ▶ LyX(Windows,MacOs): <https://www.lyx.org>
 - ▶ WinEdt (Windows): <http://www.winedt.com/>

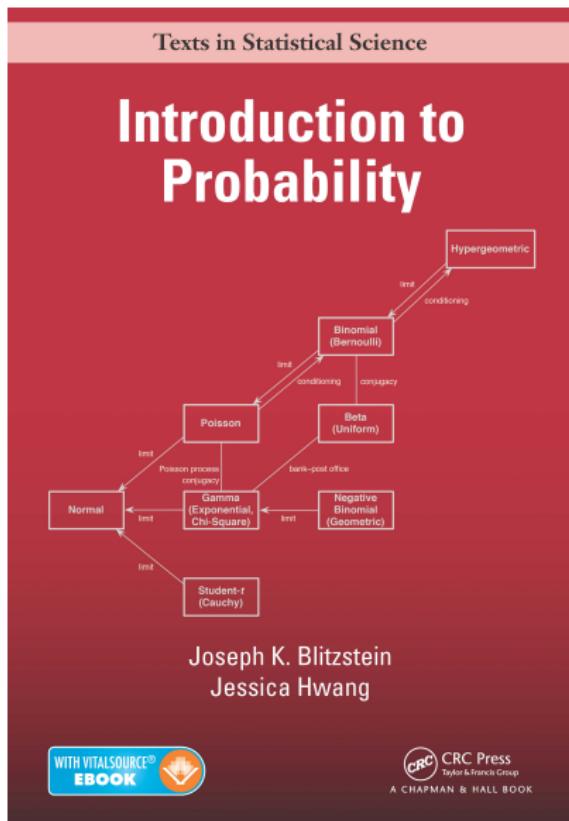
LaTeX Tutorials

- Wiki LaTeX Book: <http://en.wikibooks.org/wiki/LaTeX>
- Collection of links for LaTeX: <https://www.tug.org/begin.html>
- Forum: <https://tex.stackexchange.com/>

Main References

- **No** required textbooks
- References are provided for each lecture individually.

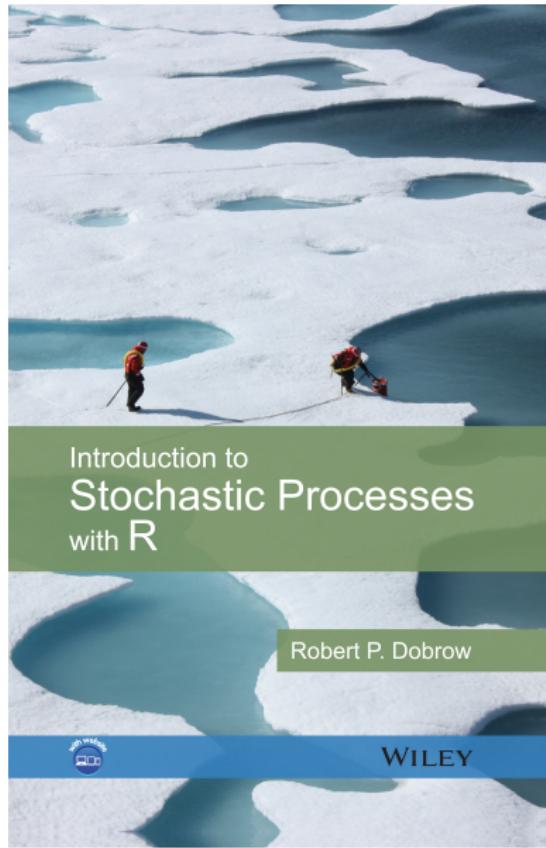
Main Reference on Probability & Statistics



BH

- Introduction to Probability
- Chapman & Hall/CRC, 2014.
- Chapman & Hall/CRC, 2019.

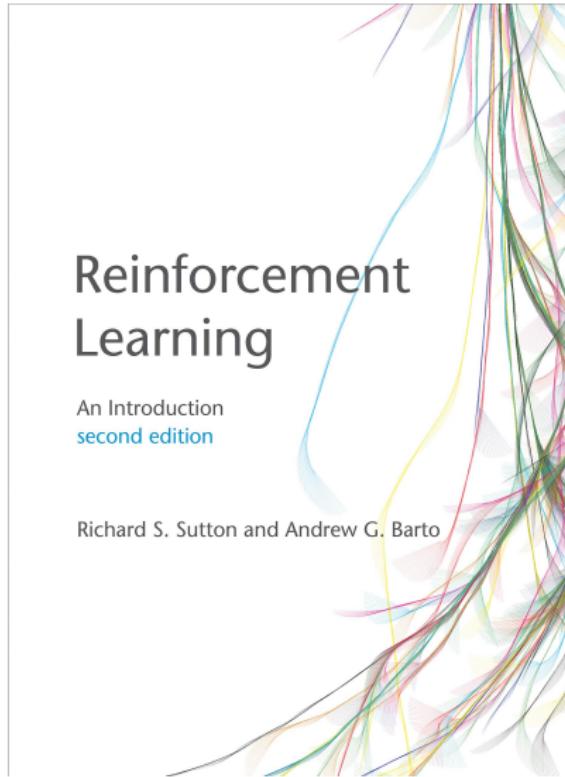
Main Reference on Stochastic Processes



SPR

- Introduction to Stochastic Processes with R
- John Wiley & Son, 2016.

Main Reference on Reinforcement Learning



SPR

- Reinforcement Learning: An Introduction
- The MIT Press, 2018

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Reading Assignment

Please refresh your knowledge of probability & Python.

Let the Adventure Begin!

