

Ph.D. 升学分享讲座

王捷 (Jie Wang)

Slides Available at <https://walterbabyrudin.github.io/>

April 24, 2020

个人简介

- Summer, 2017 - Spring, 2021: RA in Network Coding Lab;
 - Direction: Information Theory (Advisor: Prof. S. Yang);
 - Published 4 papers in conference ISIT.
- Summer, 2019 - Summer 2020: RA in SDS;
 - Direction: Stochastic Optimization & Robust Optimization;
 - Paper submitted into Operations Research journal.
- Taken 9 graduate courses at CUHK-SZ:
- Fall 2020 - Spring 2021: Online First-year Ph.D. at Gatech;
 - Statistics Track at ISyE (Advisor: Prof. Yao Xie);
 - Direction: Optimal Transport in Data Science.

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Stochastic Process	Optimization Theory
Matrix Analysis	Advanced Convex Optimization
Information Theory	Dynamic Programming
Simulation	Deep Learning Theory
VAE	Kernel Method
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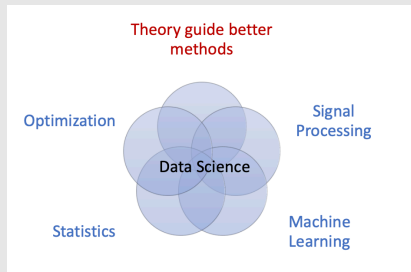
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读博的动机

- 对想读博的专业领域很感兴趣，有继续探索的意愿。
- 如果以后打算把科研当作以后的工作，博士期间的训练以及博士学位是必备的。
- 博士学位有可能在未来的职业生涯中有所加成，但如果坚定以就业为导向那么读硕的性价比可能更高。
- 有能力处理读博期间遇到的困难：
 - 本科或者硕士阶段的专业课足够优秀；
 - 有独立思考的能力；
 - 积累了一定的科研经验，对于读博的专业有一定的了解；
 - 心态平稳，遇到挫折也可以努力克服。

选专业 & 选导师 & 选校

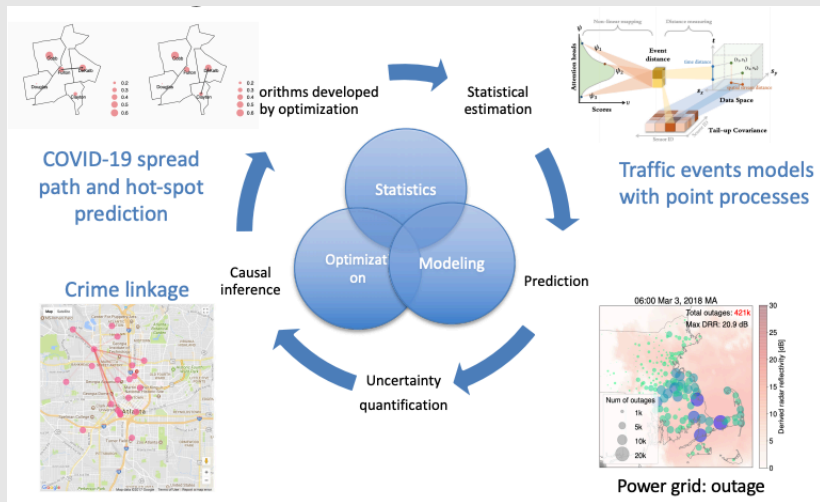
- 兴趣是选专业最重要的指标。



MY OPINION: STATISTICAL AND OPTIMIZATION THEORY GUIDES BETTER METHODS

- 新来的导师更 push，年长的导师倾向于放养。
- 选校的 QS/US News 综合排名仅供参考，更应该关注专业排名。

选 OR 专业的动机 (1)



选 OR 专业的动机 (2)

• Statistics

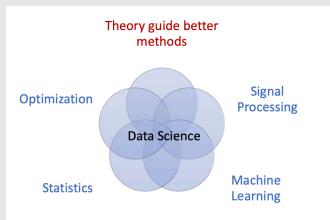
- Statistical models;
- Estimation and hypothesis testing;
- Minimax Optimality;
- Sequential change-point detection;
- Uncertainty quantification.

• Optimization

- Model estimation;
- Computational efficiency;
- Optimal decision based on data;
- Sequential decision making and RL;
- Robust Optimization.

• Machine Learning

- Neural Networks;
- Adversarial learning;
- Domain adaption;
- Unsupervised learning.



读博的日常

- 课业：在不拖延科研的情况下尽量完成。
- 每周和老板开组会 1-2 次汇报科研进展。
- 每周有组里的同学给 formal presentation 或者感兴趣的 seminar meeting 需要参加。
- 在 paper 交稿 ddl 还远的时候保持正常工作进展，比如每天工作 8 小时左右；在 paper 交稿日期临近或者 Rebuttal 期间需要保证高强度工作。
 - 平时工作的内容主要是攻克要做的 project，但也会学习一些跟课题相关的论文。
 - 在平时就应该尽量提升学术写作能力。比如在写作业或者 Take-home Exam 的时候都当作写 paper，确保逻辑清晰，节奏流畅。养成使用 LaTeX 的习惯。

申请材料

- Transcripts: GPA ≥ 3.5 ;
- Resume;
- English Tests:
 - TOEFL: ≥ 100 (110);
 - GRE: ≥ 320 (330);
- Personal Statement;
- Scientific Publications;
 - 本科直博对于出版物的要求会比硕士申博稍微低一些
- Recommendation Letters.

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对于和英文写作相关的材料要反复检查用词和语法，再找精通英语的人帮助修改。充满语法错误的材料无法让人信服你的英语能力。

Transcripts

- 尽量刷高 cGPA/mGPA;
- 和 Ph.D. 专业相关的课程是否都学了;
- 交换项目或者暑课修读的课程;
- 最好学了一些博士生课程（以证明能够胜任读博阶段的课程学习）。

Stochastic Process
Matrix Analysis
Information Theory
Simulation
VAE

Optimization Theory
Advanced Convex Optimization
Dynamic Programming
Deep Learning Theory
Kernel Method

简历

- 推荐用 LaTeX 制作简历，也可以参考海外在读博士生个人网站上的简历；
- 强调重点：
 - GPA Information (cGPA/mGPA);
 - 和申请相关的核心课程，特别是研究生课程；
 - Research Experience
- 尽量精简，注意 Page Limit。

简历

Shunan Jiang

Shunan Jiang

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959 55th Str, Oakland, CA

EDUCATION

University of California, Berkeley 09/2019 - Now
Ph.D. program in Industrial Engineering and Operations Research

The Chinese University of Hong Kong (CUHK), Shenzhen, China 09/2015 - 05/2019
B.S. in Computer Science and Engineering

RESEARCH

Optimal Asynchronous Multi-Sensor Registration in Three Dimensions 06/2017 - 06/2018
Research Assistant, Shenzhen Research Institute of Big Data *Supervisor: Prof. Zhi-Quan Luo*

- Developed and validated a novel sensor registration strategy for estimating sensor biases from asynchronous measurements.
- Proposed a nonlinear least squares (LS) formulation for eliminating the need for target states and developed a block coordinate descent (BCD) scheme with semidefinite relaxation.
- Implemented the algorithms; experiment results exhibited nearly zero optimality gap.
- Delivered a rigorous proof concerning solution's optimality in noise-free case.

Large Scale Dataset Establishment and Image Classification 12/2017 - 03/2018
Research Intern, SenseTime Group Ltd. *Supervisor: Prof. Ping Luo*

- Built a clothing image dataset with 5M+ data points; individual contributions include:
 - Data crawling, pre-processing, cleansing and labeling.
 - Task-dependent dataset annotation, covering attribute prediction, keypoint detection, and customer-to-shop clothes matching.
- Conducted image classification with ResNet and Differentiable Neural Computer (DNC)
 - Introduced inter-layer memory to ResNet for enabling the memorization of information during testing.
 - Leveraged ImageNet data to train, validate and test the developed model; obtained favorable results.

PUBLICATIONS

- Jiang, S., Pu, W., Luo, Z., *Optimal Asynchronous Multi-Sensor Registration in Three Dimensions*. 2018 IEEE Global Conference on Signal and Information Processing (GlobalSIP)

COURSEWORK & PROJECTS

Comparative Studies of Optimization Algorithms 09/2018 - 12/2018

- Implemented several optimization algorithms for comparison on synthetic functions, including different versions of gradient descent, Nesterov's acceleration, Newton's method, Gauss-Newton method, etc. Analyze the convergence rate.

Optimal Travelling Planner 07/2018 - 08/2018

- Formulated an optimize model for travelling planning problem with multi-stop route planning.
- Collect geographical data from 1500 top tourist attractions in China from government websites and Google Map Platform API.

Shunan Jiang

- Employed divide-and-conquer strategy, customized two versions of genetic algorithms, convert the problem into a hierarchy of Travelling Salesman Problem (TSP) and a Multiple Travelling Salesman Problem (mTSP).
- Performed sensitivity analysis and result interpretation.

Development and C++ Implementation of A Linear Regression Toolkit 03/2017 - 05/2017

- Developed a user-friendly regression tool in C++ with decent robustness for input data formats, detailed statistical properties output, GUI-based user interaction, intuitive graph visualization, and flexibility in managing contaminated data. Fully leveraged object-oriented programming paradigm.

HONORS & AWARDS

- National Scholarship (Top 0.02% of CUHK, SZ, 2018);
- First Class Academic Scholarship (Top 0.6% of CUHK, SZ, 2016 - 2018);
- Dean's List (Top 10% of CUHK, SZ, 2016 - 2018);
- Undergraduate Research Award (5% of CUHK, SZ, 2017 & 2018);
- Tencent WeChat Campus Card "Digital Star" (2017)

INTERNSHIP EXPERIENCES

Front-end Developer Intern, WeChat Campus Card System and MiniApp 06/2017 - 12/2017

- Developed a WeChat-based campus card system and an associated MiniApp which unifies permissions and payments management while providing miscellaneous functions, including schedule management, sharing of announcements and news, etc.
- Systematically practiced the software engineering workflow, including requirement identification, design, implementation, testing, and maintenance.
- Deployed and accumulated 4K+ on-campus users within six months; innovation and technical merit acknowledged by a "Digital Star" award from WeChat.

CUHK(SZ) TA for Multivariable Calculus (MAT1002) 02/2017 - 05/2017

CUHK(SZ) TA for Single Variable Calculus (MAT1001) 09/2016 - 12/2016

SKILLS

Programming Languages/Software: C/C++, Python, Julia, MATLAB, R, JavaScript, MySQL, HTML, CSS

Personal Statement

- 对某专业的热情 (Research Experience)
- Why this program? Potential advisor?
- 如果成绩单中相关的专业课程有明显很差的成绩 (B 或以下), 建议在 PS 里说明。
- 尽早开始写, 反复修改, 突出自己独特的经历。留学论坛上也有很多可以参考的素材。

推荐信

- 整个 Ph.D. 申请过程中最重要的部分；
- 找关系比较密切的教授写，包括科研或课业方面的联系；
 - 9-10 月期间，发邮件询问教授是否愿意写推荐信，并告知与写推荐信相关的材料（上过 TA 的什么课，做过关于什么方向的研究，打算申请的院校，附上简历等）
 - 至少给推荐人留出一个月的时间

请求写推荐信模版

Dear Professor xxx:

Good morning! I am xxx, who have ... (describe the relevance between you and the professor).

I finally decided to apply for Ph.D. programs in the xxx field in this fall, so I am wondering could you write a recommendation letter for me to support my application? (Add a short sentence to say why you think the professor is the best choice).

I plan to apply for xx Ph.D. programs. If you are willing to write letters for me, I will send relevant materials to help with the application later.

I really appreciate your help, and thanks for your time!

Sincerely,

申请的大概时间线

任务	时间
RA	尽早开始
推荐信	9-11 月
语言考试	现在至 10 月
简历和 PS 初稿	9 月
完成 PS	9-11 月
完成网申	12 月 1 日前
面试	1-2 月

推荐信 >> 出版物 > GPA > 语言考试 > PS & 简历