Qinghua Ding

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Education

- **Tsinghua University** — Beijing,China
  Bachelor of Science in Computer Science; GPA: 3.5/4.0 — *Jun 2019 (expected)*
- **The Chinese University of Hong Kong** — Shatin,HK
  Visiting student in IE Dept, hosted by Prof. Jianwei Huang. — *Jan - May 2017*
- **Singapore University of Technology and Design** — Singapore
  Visiting student in ESD Pillar, hosted by Prof. Lingjie Duan. — *Aug - Nov 2017*

Research Interests

- [**Theoretical Machine Learning**] Non-convex Optimization, Computational Learning Theory.
- (*Former*) Applied Machine Learning, Optimization in Computer Networks.

Research Experience

- **ITCS Lab, THU** — Jian Li
  Non-convex Composite Optimization — *Mar 2018 - present*
  - **SMART+**: Non-convex composite optimization is widely used in many applications, but it's theory is still illusive. It's not clear how far we can reach for this hard problem. We're also considering about this problem, and try to make a further step towards the understanding of the theory of non-convex optimization.

Some Writings

The following writings are about theoretical machine learning, especially optimization.

- A Note on Fully Non-convex Optimization.
  [read here] **Qinghua Ding**, Jian Li, May 2018.
- Stochastic, Non-convex and Composite Optimization from the Machine Learnings Perspective.
  [read here], **Qinghua Ding**, May 2018.
- Summary of the Classical Methods for Convex and Non-convex Optimization.
  [read here] **Qinghua Ding**, Apr 2018.

(Former) Selected Projects

These are selected research projects about applied machine learning and optimization in networks.

NLP Lab, THU — Minlie Huang
Hierarchical Reinforcement Learning in Text Summarization — *Nov 2017 - Jan 2018*

- **SumHRL**: The SumHRL uses a hierarchical reinforcement learning (HRL) method for text simplification problems. The network we proposed features a "Word2Vec-LSTM-RL" structure. We used classical reinforcement learning method for sentence selection and deep reinforcement learning for sentence summarization. SumHRL is comparable to the state-of-art method on ROUGE scores over NYT Dataset.

CMCL Lab, CMU — Srinivasan Seshan
Mechanism Design in Content Delivery Network — *Jun - Sept 2017*

- **VDX**: The VDX is a double auction platform which is operated by the third party (e.g., Conviva) who coordinates between the content delivery operators and the content providers. It breaks the network bottleneck by aggregating the content requests and auctioning the delivery tasks. In this way, it releases the power of multi-CDN for content delivery and greatly improves the video streaming performance.

NetMan Lab, THU — Dan Pei
Reinforcement Learning in Network Systems — *May - Nov 2017*

- **iTCP**: Our iTCP uses a reinforcement learning based method for TCP initial window selection. It first uses clustering algorithm for grouping clients based on the features of their requests. Then iTCP uses sliding window UCB to balance the exploitation and exploration for selecting the window size in each user group. Our method improved the network performance (rtt+latency) by 10% in online tests at Baidu's datacenters.

(Former) Publications

The following works are about optimization in networks and computer-aided building construction.

- Competitive Analysis of Data Sponsoring and Edge Caching for Mobile Video Streaming.
  Haitian Pang, Lin Gao, **Qinghua Ding**, Jiangchuan Liu, Lifeng Sun, *NOSSDAV* 2018.
- Location Dependent Pricing in Edge Caching Market with Non-uniform Popularity.
  Qinghua Ding, Haitian Pang, Lifeng Sun, *ICC* 2018.
- Image-and-Skeleton-Based Parameterized Approach to Real-Time Identification of Construction Workers Unsafe Behaviors.
  Hongling Guo, Yantao Yu, **Qinghua Ding**, Martin Skitmore, *Journal of Construction Engineering and Management*, 2018, **IF: 1.735**.
- When Data Sponsoring Meets Edge Caching: A Game-Theoretic Analysis.
  Haitian Pang, Lin Gao, **Qinghua Ding**, Lifeng Sun, *Globecom* 2017.
- SAM: Cache space allocation in collaborative edge-caching network.
  Qinghua Ding, Haitian Pang, Lifeng Sun, *ICC* 2017.
- First Mile in Crowdsourced Live Streaming: A Content Harvest Network Approach.
  Haitian Pang, Zhi Wang, Chen Yan, **Qinghua Ding**, Lifeng Sun, Thematics Workshop, *Multimedia* 2017.
- An experimental study of real-time identification of construction workers' unsafe behaviors.
  Hongling Guo, Yantao Yu, **Qinghua Ding**, Martin Skitmore, *Automation in Construction*, 2017, **IF: 2.919**.

(Former) Drafts

Here are some of my former drafts on works with Prof. Lingjie and Prof. Jianwei.

- Contract-and-Spot Hybrid Mechanism for Edge Caching Service Provisioning.
  [read here] **Qinghua Ding**, Haoran Yu, Lin Gao, Jianwei Huang, Dec 2017, work done at CUHK.
- On the Collaboration of the Wireless Service Provider and the Content Providers.
  [read here] **Qinghua Ding**, Lingjie Duan, Dec 2017, work done at SUTD.

Misc

I joined in system implementation or algorithm design in these projects and was acknowledged in them.

- Reducing Web Latency through Dynamically Setting TCP Initial Window with Reinforcement Learning.
  Xiaohui Nie, Youjian Zhao, Guo Chen, Kaixin Sui, Dan Pei, *IWQoS* 2018.
- Redesigning CDN-Broker Interactions for Improved Content Delivery.
  Matthew K. Mukerjee, Ilker Nadi Bozkurt, Devdeep Ray, *et al. CoNext* 2017, **Best Paper Award**.

Skills

- **Knowledge** Non-Convex Optimization, Computational Learning Theory, Basic Machine Learning, Game Theory and Mathematical Economics.
- **Languages** Python, C, C++, Tensorflow (CNN, RNN)
- **Toefl** 30/30 (Reading), 28/30 (Listening), 20/30 (Speaking), 28/30 (Writing)
- **GRE** 170/170 (Quantitative), 150/170 (Verbal), 3.0 (Writing)