SIJIN CHEN

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EDUCATION

The Chinese University of Hong Kong (CUHK) Hong Kong

B. Sc. in Computer Science with minor in Mathematics *Sept. 2019 – Present*

- Major GPA: **3.969**/4.000; Cumulative GPA: **3.884**/4.000
- TOEFL iBT: 113/120; GRE General: 330/340; IELTS Academic: 8.0/9.0
- Honors and Awards:
  Hong Kong Government Scholarship (2022); Department Award for Outstanding Academic Performance (2022); Dean's List (2020–22); ELITE Stream Scholarship (2020–22); Best Project Award of Research Internship (2020)
- Advanced Courses:
  Theoretical Computer Science: Advanced Algorithms, Computational Learning Theory
  Mathematics: Mathematical Analysis III, Abstract Algebra, Stochastic Processes

RESEARCH INTEREST

Theory and provable algorithms for machine learning and optimization.

PUBLICATIONS AND MANUSCRIPTS

1. **Sijin Chen**, Zhize Li, and Yuejie Chi, *Escaping Saddle Points in Heterogeneous Federated Learning via Distributed SGD with Communication Compression*, submitted to ICML, 2023.
2. **Sijin Chen**, Xiwei Cheng, and Anthony Man-Cho So, *Non-Convex Joint Community Detection and Group Synchronization via Generalized Power Method*, 2022. https://arxiv.org/abs/2112.14204
3. Wu Zheng, Weiliang Tang, **Sijin Chen**, Li Jiang, and Chi-Wing Fu, *CIA-SSD: Confident IoU-Aware Single-Stage Object Detector from Point Cloud*, 35th AAAI Conference on Artificial Intelligence, 2021. https://ojs.aaai.org/index.php/AAAI/article/view/16470

RESEARCH EXPERIENCES

Second-order stationarity of communication-efficient distributed SGD

supervised by Prof. Yuejie Chi, Carnegie Mellon University *May 2022 – Present*

- Designed a distributed SGD algorithm with a novel error-feedback mechanism for communication compression
- Proved a high-probability bound for the convergence to second-order stationary points of the proposed algorithm by showing the saddle-escaping property with the coupling sequence technique
- Removed the commonly used assumptions on local objective similarity to accommodate the federated learning settings

Provably fast methods for non-convex optimization problems

supervised by Prof. Anthony Man-Cho So, CUHK *June 2021 – Dec. 2021*

- Proposed a generalized power method (GPM) with spectral initialization to solve a joint problem of group synchronization and community detection
- Established an estimation error bound for the spectral initialization using random matrix and random graph arguments
- Proved the linear convergence guarantee for GPM, ensuring a significantly lower time complexity than the state-of-the-art semidefinite relaxation method

3D computer vision via deep learning

supervised by Prof. Philip Chi-Wing Fu, CUHK *June 2020 – Nov. 2020*

- Cooperated with PhD researchers to design 3D convolutional neural network models for autonomous driving scenes
- Proposed data augmentation methods for performance improvement, validated their efficiency for model training on the benchmark dataset KITTI
- Won the Best Project Award of Summer Research Internship

LEADERSHIP

Organizer and student lecturer

at WISE, a knowledge-sharing platform at CUHK *Jan. 2021 – Present*

- Organized biweekly talks by inviting speakers from different disciplines and promoting the activity to the audience
- Maintained the official website via cooperation on GitHub
- Gave two talks on non-convex optimization and basic topology to the audience from engineering background

SKILLS

Languages: Mandarin Chinese (native), Cantonese (conversational)
Programming: MATLAB, Python, PyTorch, C/C++, Java, HTML/CSS, LaTeX
Computer: Linux, SSH, Microsoft Office