Shixiang Chen

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Education

Doctor of Philosophy, Operation Research
Department of System Engineering and Engineering Management, The Chinese University of Hong Kong   2015-2019
Advisors: Shiqian Ma & Anthony Man-Cho So

Bachelor of Science
Department of Mathematics   2011–2015
Nanjing University

Working & Internship Experience

Research scientist
Jingdong Technology   Sep 2021 - now

Postdoctoral Associate
Wm Michael Barnes '64 Department of Industrial & Systems Engineering   Sep 2019-Aug 2021
Texas A&M University

Intern
Tencent AI Lab   Jun-Sep 2018
mentored by Tong Zhang

Teaching Assistant
ENGG 2440B Discrete Mathematics for Engineers   2015,2016 Spring
SEEM 3570 Stochastic Models   2015,2016,2017 Winter
ENGG 5501 Foundations of Optimization   2017,2018 Spring

Research Interest

Optimization; Distributed algorithms; Machine Learning.

Project and Research

Research on distributed stochastic algorithms for training large-scale models, including Transformers and GANs.
Sep, 2021- Now
Research on the distributed alogrithms for nonconvex optimization. Study the consensus problem on manifold. Design the first decentralized Riemannian gradient tracking algorithm for solving optimization problems on Stiefel manifold with exact convergence guarantee.
Feb, 2020- Aug, 2021
Research on the decentralized stochastic subgradient method weakly convex optimization problem. Present the global and local convergence results.   Sep, 2019 - Feb, 2020
Research on the stochastic subgradient method for a class of weakly convex and nonsmooth optimization problem on Stiefel manifold. Present the first theoretical convergence results.   Jul, 2019 - Sep, 2020
Research on objective detection, and design a new optimization method(Manifold proximal point method).   Jun-Apr, 2019
Research on nonsmooth and nonconvex problem on manifold, and design a new algorithm(Manifold proximal gradient method) with significant improvement.   Jan-Oct, 2018

Publications

Preprints

[1] **Shixiang Chen**, Alfredo Garcia, Mingyi Hong, Shahin Shahrampour. *On the Local Linear Rate of Consensus on the Stiefel Manifold* arXiv:2101.09346(under second major revision in IEEE Transactions on Automatic Control.)

Journal(* equal contribution)
[6] **Shixiang Chen**, Zengde Deng, Shiqian Ma, Anthony Man-Cho So. *Manifold Proximal Point Algorithms for Dual Principal Component Pursuit and Orthogonal Dictionary Learning.* IEEE Transactions on Signal Processing, 69 (2021): 4759-4773.

[5] Zhongruo Wang, Bingyuan Liu, **Shixiang Chen**, Shiqian Ma, Lingzhou Xue, Hongyu Zhao. *A Manifold Proximal Linear Method for Sparse Spectral Clustering with Application to Single-Cell RNA Sequencing Data Analysis* , Informs Journal on Optimization.

[4] Xiao Li*, **Shixiang Chen***, Zengde Deng, Qing Qu, Zhihui Zhu and Anthony Man-Cho So. *Weakly Convex Optimization over*

Stiefel Manifold Using Riemannian Subgradient-Type Methods, SIAM Journal on Optimization, 31 (3), 1605-1634, 2021.

[3] **Shixiang Chen**, Alfredo Garcia and Shahin Shahrampour. *On Distributed Non-convex Optimization: Projected Subgradient Method For Weakly Convex Problems in Networks.* IEEE Transactions on Automatic Control, 67 (2021): 662 - 675.

[2] **Shixiang Chen**, Shiqian Ma, Lingzhou Xue and Hui Zou. *An Alternating Manifold Proximal Gradient Method for Sparse PCA and Sparse CCA,* Informs Journal on Optimization, 2(3):192–208, 2020

[1] **Shixiang Chen**, Shiqian Ma, Anthony Man-Cho So, and Tong Zhang. *Proximal Gradient Method for Nonsmooth Optimization over the Stiefel Manifold,* SIAM Journal on Optimization, 30(1):210–239, 2020.

Conference

[6] Yibo Yang, **Shixiang Chen**, Liang Xie, Xiangtai Li, Zhouchen Lin, Dacheng Tao. Do We Really Need a Learnable Classifier at the End of Deep Neural Network?. **NeurIPS 2022 (CCF A).**

[5] Linrui Zhang, Li Shen, Long Yang **Shixiang Chen**, Bo Yuan , Xueqian Wang , Dacheng Tao. *Penalized Proximal Policy Optimization for Safe Reinforcement Learning.* **IJCAI 2022 (CCF A).**

[4] **Shixiang Chen**, Alfredo Garcia, Mingyi Hong, Shahin Shahrampour. *Decentralized Riemannian Gradient Descent on the Stiefel Manifold,* **ICML 2021. (CCF A)**

[3] Huikang Liu, Zengde Deng, Xiao Li, **Shixiang Chen**, Anthony Man-Cho So. *Nonconvex Robust Synchronization of Rotations,* NeurIPS Workshop on Optimization for Machine Learning (NeurIPS OPT Workshop 2020).

[2] **Shixiang Chen**, Zengde Deng, Shiqian Ma and Anthony Man-Cho So. *Manifold proximal point algorithms for dual principal component pursuit and orthogonal dictionary learning,* Asilomar Conference on Signals, Systems, and Computers, 2019.

[1] **Shixiang Chen**, Shiqian Ma and Wei Liu. *Geometric descent method for convex composite minimization,* **NeurIPS 2017 (CCF A).**

Programming language and skills

Python, C++, Matlab

Reviewer

- SIAM Journal on Optimization
- IEEE Transactions on Pattern Analysis and Machine Intelligence
- IEEE Transactions on Automatic control
- IEEE Transactions on Signal Processing
- Optimization Methods and Software
- Computational Optimization and Applications
- Journal of Global Optimization
- Optimization
- ICML, Neurips, ICLR, CDC