Lingjun Guo

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Education

University of Michigan, Ann Arbor — Ann Arbor, MI, USA
Master of Science in Industrial and Operations Engineering, GPA: 4.0/4.0 — *Aug. 2021 – Jan. 2023*
Courses taken: Nonlinear/Linear/Integer Optimization, Machine Learning, Dynamic Programming

Fudan University — Shanghai, China
Undergraduate in the College of Engineering — *Aug. 2015 – July. 2016*
Bachelor of Science in Mathematics and Applied Mathematics — *Aug. 2016 – July. 2020*
Courses taken: Linear&Nonlinear Optimization, Lebesgue Measurement Theory, Topology, Control Theory.

Australia National University — Canberra, Australia
Undergraduate Exchange Program in the Department of Mathematics — *Jan. 2019 – July. 2019*

Paper Under Review

- Jianhao Ma, **Lingjun Guo**, and Salar Fattahi. Behind the scenes of gradient descent: A trajectory analysis via basis function decomposition. 2022. *arXiv preprint arXiv:2210.00346*. [Code in Github].

Research Experience

Research Internship — Jan. 2022 - Oct. 2022
University of Michigan, Ann Arbor, Department of IOE — *Advised by Prof. Salar Fattahi*

- **Topic**: A trajectory analysis via basis function decomposition for deep neural networks.
- **Proved** the convergence for the orthogonal symmetric tensor decomposition problem. In particular, when the initialization point is nearly aligned with the ground truth but is small in magnitude, the entire solution trajectory via gradient descent will remain aligned with the ground truth.(in Theorem 4, Appendix F)
- **Showed** the monotonic learning phenomenon via basis function decomposition and gradient descent exists for a wide range of practical neural networks and datasets.
- **Proposed**, with my collaborator, that using conjugate kernel after training as valid orthogonal basis functions for deep neural networks.
- Paper under review of ICLR.

Research Internship — July. 2020 - May. 2021
Fudan University, Department of Data Science — *Advised by Prof. Xudong Li and Prof. Rujun Jiang*

- **Topic**: A distributed algorithm for high dimensional lasso regression.
- **Proposed** an efficient distributed semi-smooth Newton algorithm for solving high-dimensional Lasso regression.
- **Reached** competitive computation/communication efficiency with state-of-art algorithms.
- **Read** a lot of papers with proofs for distributed machine learning algorithms. **Implemented** the proposed algorithm and baseline algorithms. **Wrote** a technical report for our algorithm.

Rising Star Program — Sept. 2017 - May. 2018
Fudan University, Department of Physics — *Advised by Prof. Guanghong Zuo*

- **Topic**: Verifying the correctness of an evolutionary assumption for species genes.
- **Implemented** Python models for gene evolution and verified the correctness of the outcome.
- **Won** 'Outstanding Team' prize (top 3/16) in the Final Evaluation of the Program.

Skills

- **Software**: Python, LaTeX, MATLAB®,R
- **Language**: Mandarin Chinese(native), English(fluent. TOFEL: 107/120)