

Fangshuo (Jasper) Liao

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Google Scholar. [[Link](#)]

RESEARCH INTEREST

- Deep learning theory
- Optimization for machine learning
- Convex and non-convex analysis and optimization
- Efficient training and inference for large models
- Structured low dimensional models / pruning / compression

ACADEMIC BACKGROUND

Ph.D. *Computer Science* 2020-now
George R. Brown School of Engineering, Rice University
Advisor: Prof. Anastasios Kyrillidis [[website](#)] GPA: 4.00

B.S. *Computer Science* 2016-2020
George R. Brown School of Engineering, Rice University GPA: 3.92

B.A. *Mathematics* 2016-2020
Wiess School of Natural Science, Rice University GPA: 3.92

Research Experience

Rice University, Computer Science Department Feb.2019-Now
Ph.D. (previously undergraduate) student working with Prof. Anastasios Kyrillidis

- Theoretical guarantees of neural network training.
- Efficient and distributed training and inference of large models.
- Theoretical guarantees of principal component analysis through deflation.
- Theoretical aspects of neural network pruning and the lottery ticket hypothesis.
- Solve inverse problems for image compression with deep learning approach.

Baylor College of Medicine Jun.2018-Sept.2018
Undergraduate research assistant working with Prof. Robert Waterland

- Finding genetic sequence blocks with systematic individual variation in epigenetics.

CONFERENCE PAPER

Fangshuo Liao, Wenyi Su, and Anastasios Kyrillidis, "*Provable Model-Parallel Distributed Principal Component Analysis with Parallel Deflation*", CPAL, 2025.

Fangshuo Liao, Junhyung Lyle Kim, Cruz Barnum, and Anastasios Kyrillidis, "*On the Error-Propagation of Inexact Deflation for Principal Component Analysis*", ICML, 2024. [[Link](#)]

Fangshuo Liao and Anastasios Kyrillidis, "*Provable Accelerated Convergence of Nesterov's Momentum for Deep Neural Networks*", ALT, 2024. [[Link](#)]

Zichang Liu, Aditya Desai, **Fangshuo Liao**, Weitao Wang, Victor Xie, Zhaozhuo Xu, Anastasios Kyrillidis, Anshumali Shrivastava, "*Scissorhands: Exploiting the Persistence of Importance Hypothesis for LLM KV Cache Compression at Test Time*", NeurIPS, 2023. [[Link](#)]

Zheyang Xiong*, **Fangshuo Liao*** and Anastasios Kyrillidis, “*Strong Lottery Ticket Hypothesis with ϵ -perturbation*”, AISTATS, 2023. [Link]

Qihan Wang*, Chen Dun*, **Fangshuo Liao*** and Anastasios Kyrillidis, “*LOFT: Finding Lottery Tickets through Filter-wise Training*”, AISTATS, 2023. [Link]

JOURNAL PAPER

Cameron R Wolfe*, **Fangshuo Liao***, Qihan Wang, Junhyung Lyle Kim, Anastasios Kyrillidis, “*How Much Pre-training Is Enough to Discover a Good Subnetwork?*”, Transactions on Machine Learning Research (TMLR), 2024. [Link]

Fangshuo Liao and Anastasios Kyrillidis, “*On the Convergence of Shallow Neural Network Training with Randomly Masked Neurons*”, Transactions on Machine Learning Research (TMLR), 2022. [Link]

Cameron R Wolfe*, Jingkang Yang*, **Fangshuo Liao***, Arindam Chowdhury, Chen Dun, Artun Bayer, Santiago Segarra, Anastasios Kyrillidis, “*GIST: Distributed Training for Large-Scale Graph Convolutional Networks*”, Journal of Applied and Computational Topology, 2023. [Link]

PREPRINT

Fangshuo Liao, Evan Dramko, Ziyun Guang, Anastasios Kyrillidis, “*Convergence Analysis of Two-Layer Neural Networks under Gaussian Input Masking*”, under review, 2025.

Mahtab Alizadeh Vandchali*, **Fangshuo Liao***, Nikhil Chigali, Anastasios Kyrillidis, “*One Rank at a Time: Cascading Error Dynamics in Sequential Learning*”, under review, 2025.

TEACHING ASSISTANT

COMP 540 – Statistical Machine Learning

- Spring 2022, 2021, 2020
- Designing course projects, improving and grading homework, giving multiple recitation lectures, and holding office hours.

COMP 440/557 – Artificial Intelligence

- Fall 2021, 2019
- Improving and grading homework, giving recitation lectures, holding office hours.

MENTORSHIP

With Prof. Anastasios Kyrillidis

- **Barbara (Wenyi) Su** (Rice University) Feb.2024-Nov.2024
Distributed Principal Component Analysis with Parallel Deflation.
- **Aaron Duong & Albert Zhu** (Rice University) May.2023-May.2024
Efficient Distributed Linear Regression via Feature Subsampling.
- **Isabel Cevallos** (Villanova University) May.2023-Aug.2023
Distributed Principal Component Analysis with Deflation Method.
- **Zheyang (Eddie) Xiong** (Rice University) Aug.2021-May.2023
Strong Lottery Ticket Hypothesis with ϵ -Perturbation.
- **Yuan Gao** (Purdue University) May.2022-Aug.2022
Federated Learning using Graph Independent Subnet Training.
- **Kaichun Luo** (Rice University) May.2020-Aug.2021
Sparse Simplex Projection for Multi-label Classification and Neural Architecture Search.

*Equal Contribution

**INVITED TALKS
& WORKSHOPS**

Provable Model-Parallel Distributed Principal Component Analysis with Parallel Deflation. CPAL (Poster). March, 2025.

Provable Accelerated Convergence of Nesterov's Momentum for Deep Neural Networks. International Conference on Algorithmic Learning Theory (Oral). February, 2024.

Strong Lottery Ticket Hypothesis with ϵ -perturbation. NeurIPS OPT-ML Workshop (Oral). December, 2022.

LoFT: Finding Lottery Tickets through Filter-wise Training. NeurIPS HITY Workshop (Poster). December, 2022.

GIST: Distributed Training for Large-Scale Graph Convolutional Networks. NeurIPS GLFrontier Workshop (Poster). December, 2022.

LoFT: Finding Lottery Tickets through Filter-wise Training. Intel's MLWiNS Annual Workshop. October, 2023.

LoFT: Finding Lottery Tickets through Filter-wise Training. Intel's MLWiNS Annual Workshop. October, 2022.

Provable distributed Learning of Deep Neural Networks using Independent Subnet Training. Intel's MLWiNS Mid-Year Workshop. April, 2022.

On the Convergence of Shallow Neural Network Training with Randomly Masked Neurons. Google's Federated Learning and Analytics Workshop. November, 2021.

SERVICE

Reviewer:

- AISTATS 2023; ICML 2023,2024; ICLR 2024,2025, NeurIPS 2024.

Workshop:

- TL;DR 2023: Co-organizer for "Texas Colloquium on Distributed Learning" [Website]