WENZHI FANG

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EDUCATION

Purdue University *West Lafayette, IN, US*
Elmore Family School of Electrical and Computer Engineering
Ph. D. Candidate in Electrical and Computer Engineering *Aug. 2023 – Present*

ShanghaiTech University *Shanghai, China*
School of Information and Science Technology
M.S. in Communication and Information Systems *Sept. 2020 – Jul. 2023*

Shanghai University *Shanghai, China*
School of Communication and Information Engineering
B.S. in Communication Engineering *Sept. 2016 – Jul. 2020*

MAJOR COURSE

- Convex Optimization, Matrix Computation
- Machine Learning, Reinforcement Learning, Bayesian Data Analysis

RESEARCH INTERESTS

- Distributed Optimization
- Federated Learning
- Efficient Fine-Tuning of LLM

TECHNICAL STRENGTHS

Technical Skills Python, Torch

SELECTED PUBLICATIONS

[1] W. Fang, D-J. Han, E, Chen, S. Wang, and C. G. Brinton, Hierarchical Federated Learning with Multi-Timescale Gradient Correction, *Neural Information Processing Systems (NeurIPS) 2024*. [Paper] [Code]

[2] W. Fang, D-J. Han, and C. G. Brinton, Submodel Partitioning in Hierarchical Federated Learning: Algorithm Design and Convergence Analysis, *IEEE International Conference on Communications (ICC) 2024* [Paper] [Code]

[3] W. Fang, Z. Yu, Y. Jiang, Y. Shi, C. Jones, and Y. Zhou, Communication-Efficient Stochastic Zeroth-Order Optimization for Federated Learning, *IEEE Transactions on Signal Processing (TSP) 2022*. [Paper] [Code]

[4] D-J. Han, W. Fang, S. Hosseinalipour, M. Chiang, C. G. Brinton, Orchestrating Federated Learning in Space-Air-Ground Integrated Networks: Adaptive Data Offloading and Seamless Handover, *IEEE Journal on Selected Areas in Communications (JSAC) 2024* [Paper]

Highlight

- In [1], we proposed an algorithm to address multi-level data heterogeneity in hierarchical federated learning (HFL), deriving strong theoretical results without relying on additional data heterogeneity assumptions. This work fills a critical gap in the existing HFL literature.

- In [2], we investigated the idea of model partitioning over hierarchical networks on some classical models, such as FCNs and CNNs. We are working to extend this idea to LLMs to enhance the fine-tuning efficiency.
- In [3], we proposed a federated zeroth-order algorithm (FedZO) with a convergence guarantee. This algorithm makes the training process forward-only, eliminating the memory overhead of backward propagation, which has since inspired numerous works in LLMs.

PREPRINT

[5] W. Fang, D-J. Han, and C. G. Brinton, Federated Learning over Hierarchical Wireless Networks: Training Latency Minimization via Submodel Partitioning, under Major Revision for IEEE/ACM Transactions On Networking

WORKING EXPERIENCE

Optimization for Machine Learning Lab *Aug., 2022 - Feb. 2023*

Summer Intern *Advisor: Prof. Peter Richtarik* KAUST

ION Lab *Aug., 2023 - Present*

Research Assistant *Advisor: Prof. Christopher G. Brinton* Purdue University

TEACHING EXPERIENCE

SI263: Distributed Optimization *Spring, 2022, ShanghaiTech*

ACEDEMIC SERVICE

Reviewer of NeurIPS, ICLR, AISTAT, TMLR, TMC

CONTESTS AND AWARDS

China National Scholarship (Top 0.2% Nationwide), *Ministry of Education in China, 2021*

First prize of China National Undergraduate Electronic Design Competition, *2019*

First prize of Chinese Mathematics Competitions, Shanghai, *2017*