

Guangji Bai

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Research Statement

I am a fifth-year Ph.D. student at CS Department, Emory University working with Prof. [Liang Zhao](#). I am generally interested in designing **efficient** and **generalizable** machine learning algorithms. Specifically, my current research topics include but are not limited to **1.** Domain/knowledge transfer, such as multi-task learning, domain adaptation, and domain generalization. **2.** Efficient machine learning for large-scale problems, such as model compression and acceleration of Large Language Models (LLMs), distributed training algorithms of deep neural networks. **3.** Memory-efficient continual/lifelong learning with experience replay and neuroscience inspiration.

Education

Emory University	Atlanta, GA
Ph.D. in Computer Science (GPA 3.95/4)	2020.8-Present
The George Washington University	Washington D.C.
M.S. in Statistics	2018.9-2020.5
Fudan University	Shanghai, China
B.S. in Mathematics	2014.9-2018.6

Internship

Argonne National Laboratory	Lemont, IL.
Mathematics and Computer Science Division	2024.5-2024.8

- I worked on how to integrate model pruning of LLMs under the privacy-preserved federated learning setting. The key challenges I addressed in this project include how to conduct model pruning of LLMs in a distributed manner and how to avoid communication overhead due to the massive size of LLMs.
- I proposed an adaptive LLM pruning algorithm with personalization, tailored for the federated learning setting. The deliverable [paper](#) has been published at NAACL 2025.

NEC Laboratory America	Princeton, NJ.
Data Science and System Security Team	2023.5-2023.8

- I worked on developing machine learning algorithms for domain adaptation on time series data.
- We generalized the prompt tuning techniques from NLP to time series domain and leveraged the prompts to learn domain-specific and domain-invariant representation. [Our work](#) has been accepted by KDD 2024.

Publications (* denotes equal contribution.)

- Guangji Bai**, Yijiang Li, Zilinghan Li, Liang Zhao, Kibaek Kim. “FedSpaLLM: Federated Pruning of Large Language Models.” (*NAACL 2025 main*)
- Guangji Bai**, Ziyang Yu, Zheng Chai, Yue Cheng, Liang Zhao. “Staleness-Alleviated Distributed GNN Training via Online Dynamic-Embedding Prediction.” (*SDM 2025*)
- Guangji Bai**, Yijiang Li, Chen Ling, Kibaek Kim, Liang Zhao. “*SparseLLM*: Towards Global Pruning for Pre-trained Language Models.” (*NeurIPS 2024*)
- Junxiang Wang*, **Guangji Bai***, Wei Cheng, Zhengzhang Chen, Liang Zhao, Haifeng Chen. “Prompt-based Domain Discrimination for Multi-source Time Series Domain Adaptation.” (*KDD 2024*)
- Zekun Cai, **Guangji Bai**, Renhe Jiang, Xuan Song, Liang Zhao. “Continuous Temporal Domain Generalization”. (*NeurIPS 2024*)
- Yifei Zhang, Siyi Gu, Bo Pan, **Guangji Bai**, Xiaofeng Yang, Liang Zhao. “Visual Attention-Prompted Prediction and Learning.” (*IJCAI 2024*)
- Chen Ling, Xujiang Zhao, Xuchao Zhang, Wei Cheng, Yanchi Liu, Yiyong Sun, Mika Oishi, Takao Osaki, Katsushi Matsuda, Jie Ji, **Guangji Bai**, Liang Zhao, Haifeng Chen. “Uncertainty Quantification for In-Context Learning of Large Language Models.” (*NAACL 2024 main*)
- Guangji Bai***, Chen Ling*, Liang Zhao. “Temporal Domain Generalization with Drift-Aware Dynamic Neural Networks”. (*ICLR 2023, Oral, top 1% among all papers*).
- Guangji Bai**, Chen Ling, Yuyang Gao, Liang Zhao. “Saliency-Augmented Memory Completion for Continual Learning.” (*SDM 2023*)
- Guangji Bai**, Johnny Torres, Junxiang Wang, Liang Zhao, Cristina Abad, Carmen Vaca. “Sign-Regularized Multi-task Learning.” (*SDM 2023*)

- Zishan Gu, Ke Zhang, **Guangji Bai**, Liang Chen, Liang Zhao, Carl Yang. “Dynamic Activation of Clients and Parameters for Federated Learning over Heterogeneous Graphs”. (*ICDE 2023*)
- **Guangji Bai**, Liang Zhao. “Saliency-Regularized Deep Multi-Task Learning.” (*KDD 2022*)
- Yuyang Gao, Tong Steven Sun, **Guangji Bai**, Siyi Gu, Sungsoo Ray Hong, Zhao Liang. “Res: A Robust Framework for Guiding Visual Explanation”. (*KDD 2022*)
- Dazhou Yu, **Guangji Bai**, Yun Li, Liang Zhao. “Deep Spatial Domain Generalization.” (*ICDM 2022*)

Preprints

- **Guangji Bai**, *et al.* “Beyond Efficiency: A Systematic Survey of Resource-Efficient Large Language Models.” *Under review of CSUR*.
- **Guangji Bai***, Zheng Chai*, Liang Zhao, Yue Cheng. “Distributed Graph Neural Network Training with Periodic Historical Embedding Synchronization.” (2023)
- Xiongxiao Xu, Canyu Chen, Yueqing Liang, Baixiang Huang, **Guangji Bai**, Liang Zhao, Kai Shu. “SST: Multi-Scale Hybrid Mamba-Transformer Experts for Long-Short Range Time Series Forecasting”. (2024)

Professional Services, Grants and Awards

- PC member for AISTATS (23’24’), NeurIPS (22’23’24’), ICLR (24’), AAAI (24’), ICML (24’), etc.
- Primary writer for the NSF NAIIR 240189 grant (\$15k) on parallel and distributed training of LLMs on graphs.
- Travel Awards: KDD 2022, CIKM 2022, ICLR 2023, SDM 2023, NeurIPS 2024.
- 2017 American mathematical modeling competition (H prize).
- Third Prize Scholarship for the 2016-2017 academic year of Fudan University (top 30% among all undergrads).

Skills

- **Programming:** Python, PyTorch, TensorFlow, MATLAB
- **Operation System:** Windows, Mac OS, Linux, Ubuntu
- **Cloud Services:** Oracle Cloud, Amazon Web Service, Google Cloud Platform
- English-Proficiency

Courses

- **Computer Science:** Data Structures and Algorithms, Object-Oriented Programming, Operating Systems, Database Systems, Machine Learning, Deep Learning (with a focus on CNNs, RNNs, LLMs), Natural Language Processing, Neural Networks and Deep Learning.
- **Mathematics:** Calculus I, II, III, Linear Algebra, Numerical Methods, Differential Equations (ODE and PDE), Convex Optimization, Stochastic Processes, Optimization, Multivariate Calculus, Combinatorial Optimization, Game Theory, Mathematical Physics.
- **Statistics:** Probability Theory, Statistical Inference, Bayesian Inference, Multivariate Analysis, Statistical Data Mining, Applied Regression Analysis, Longitudinal Data Analysis.

Teaching Experiences

- Teaching Assistant, *Introduction to Statistics* – GWU, Spring 2019
Assisted in grading, tutorials, and student support for undergraduate statistics.
- Teaching Assistant, *Data Mining* – Emory, Spring 2021
Supported undergraduates with assignments and data mining concepts.
- Teaching Assistant, *Artificial Intelligence* – Emory, Fall 2021
Guided graduate students in AI methodologies and project work.
- Teaching Assistant, *System Programming* – Emory, Spring 2022
Helped undergraduates with programming assignments and debugging.

Mentoring Experiences

- Ziyang Yu (2022-2024)
Mentored on distributed GNN training and LLMs.
Now an incoming CS PhD student at Emory.
- Qilong Zhao (2022-2024)
Guided research on memory-efficient continual learning.
Now a CS Master's student at Emory.
- Tingwei Shi (2023-2024)
Guided research on resource-efficient LLMs.
Now a SDE at Amazon Web Services (AWS).