



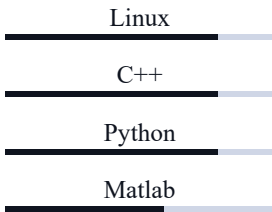
GUOZHENG WANG (Ph.D.)

SHANGHAI UNIVERSITY • 99 SHANGDA ROAD, SHANGHAI, 200444, CHINA ☎ +(86) 131-2057-9257

◦ DETAIL ◦

99 Shangda Road, ShangHai,
200444
Tel: +(86) 131-2057-9257
E-mail: gzh.wang@outlook.com
Date of Birth: March 1992

◦ SKILL ◦



◦ CERTIFICATE ◦

- CET-6
- Artificial Intelligence in Computer Science Level 4



INTRODUCTION

In the research, the focus is on developing large-scale distributed machine learning algorithms and distributed computing frameworks in high-performance computing systems. Participation in the Chinese National Natural Science Foundation project involved in-depth research on basic algorithms and programming support environments for big data analysis and processing based on supercomputing. The basic algorithms were researched and improved, and optimized in distributed environments to improve the efficiency and accuracy of training and inference. At the same time, efforts were made to build more efficient and scalable distributed computing frameworks, reducing the workload of developers in big data analysis and processing.



EDUCATION

- Sep 2019 — now **Shanghai University** **Ph.D.**
Major: Computer Applied Technology
Focus on: Distributed Machine Learning; Distributed Optimization Algorithm
- 2019 **University of Shanghai for Science and Technology** **MASTER**
Major: Computer Science and Technology
Focus on: Natural Scene Text Detection and Recognition
- 2016 **Zhengzhou University of Aeronautics** **BACHELOR**
Major: Computer Science and Technology



PROJECT EXPERIENCE

- Jan 2019 — Dec 2022 **National Natural Science Foundation of China (U1811461)**
The Basic Algorithm and Programming Environment of Big Data Analysis Based on Supercomputing.
- Apr 2022 — Mar 2025 **Shanghai Natural Science Foundation (22ZR1423200)**
Research on Rough Multi-Instance Deep Neural Networks for Scene Classification in High-Resolution Remote Sensing Images.



MAIN WORK

- **Research on Algorithm for Solving Sub-problems in Distributed ADMM Framework**
ADMM algorithm has the characteristic of decomposition and assembly, which can decompose the original problem into sub-problems. The sub-problems can usually be solved using first-order or second-order numerical optimization algorithms. However, using optimization methods to solve sub-problems may lead to inconsistent convergence speeds among nodes, resulting in low efficiency of global synchronization and posing challenges to the scalability of distributed ADMM algorithms. To tackle this challenge, we propose several enhancement methods aimed at reducing the variance in solving sub-problems' speeds. By ensuring that all nodes can complete the computation of sub-problems as early as possible, we aim to minimize the waiting time for other nodes to finish their tasks.

➤ **Research on Efficient Communication Library based on MPI-AllReduce Interface**

In distributed training, the synchronization of large model parameters is a communication process, and as the model size increases, communication efficiency becomes a crucial factor hindering the scalability of distributed algorithms. To address this issue, we have designed an efficient communication library based on the MPI-AllReduce interface, optimizing it according to the topology and communication bandwidth among nodes. This communication library is primarily used for synchronizing large model parameters. To improve the efficiency of model parameter synchronization, we introduce an asynchronous ADMM technique and design the Calculator-Communicator-Coordinator scheduling architecture to coordinate the computation and communication of the distributed ADMM algorithm framework.

➤ **Research on Distributed Training Framework based on ADMM**

The distributed training framework based on ADMM achieves parallel computation and synchronized updates in distributed training by partitioning data into multiple computational nodes and using the ADMM algorithm for model parameter updates and transmission. This framework helps accelerate the training process and improve model performance. The ADMM-based distributed training framework we propose can be adjusted according to specific applications and requirements. Different optimization algorithms, communication modes, and data partitioning strategies can be used to optimize the performance of distributed training. Additionally, fault-tolerance mechanisms and dynamic adjustment methods can be employed to address issues such as computational node failures or network delays, enhancing the reliability and efficiency of distributed training.



PUBLICATION

- **Wang G**, Lei Y, Qiu Y, et al. Communication-efficient ADMM-based distributed algorithms for sparse training[J]. *Neurocomputing*, 2023, 550: 126456.
- **Wang G**, Lei Y, Zhang Z, et al. A Communication Efficient ADMM-based Distributed Algorithm Using Two-Dimensional Torus Grouping AllReduce[J]. *Data Science and Engineering*, 2023, 8: 61-72.
- **Wang G**, Lei Y, Zhang Z. et al. 2D-THA-ADMM: communication efficient distributed ADMM algorithm framework based on two-dimensional torus hierarchical AllReduce[J]. *International Journal of Machine Learning and Cybernetics*. (2023). <https://doi.org/10.1007/s13042-023-01903-9>.
- **Wang G**, Wang D, Li C, et al. Fast Inertial ADMM Optimization Framework for Distributed Machine Learning. (Submitted to *Future Generation Computer Systems*, Under Review)
- Cui M, Li Y, Zhou R, Xiao X, **Wang G**. Using PICRAT framework to analyze and evaluate pedagogical innovations in technology supported environment. (Submitted to *Neural Computing and Applications*, Under Review)
- Wang D, Lei Y, Xie J, **Wang G**. HSAC-ALADMM: an asynchronous lazy ADMM algorithm based on hierarchical sparse allreduce communication[J]. *The Journal of Supercomputing*, 2021, 77: 8111-8134.
- Qiu Y, Lei Y, **Wang G**. PSRA-HGADMM: A Communication Efficient Distributed ADMM Algorithm[C]//*Proceedings of the 52nd International Conference on Parallel Processing*. 2023: 82-91.
- Qiu Q, Lei Y, Wang D, **Wang G**. An efficient hybrid MPI/OpenMP parallelization of the asynchronous ADMM algorithm[C]//*2021 IEEE Intl Conf on Parallel & Distributed Processing with Applications, Big Data & Cloud Computing, Sustainable Computing & Communications, Social Computing & Networking (ISPA/BDCLOUD/SocialCom/SustainCom)*. IEEE, 2021: 563-570.
- Huang X, **Wang G**, Lei Y. GR-ADMM: A Communication Efficient Algorithm Based on ADMM[C]//*2021 IEEE Intl Conf on Parallel & Distributed Processing with Applications, Big Data & Cloud Computing, Sustainable Computing & Communications, Social Computing & Networking (ISPA/BDCLOUD/SocialCom/SustainCom)*. IEEE, 2021: 220-227.
- Zhang Z, Lei Y, Wang D, **Wang G**. Distributed ADMM Based on Sparse Computation and Allreduce Communication[C]//*2022 IEEE Intl Conf on Parallel & Distributed Processing with Applications, Big Data & Cloud Computing, Sustainable Computing & Communications, Social Computing & Networking (ISPA/BDCLOUD/SocialCom/SustainCom)*. IEEE, 2022: 722-729.
- **Guozheng Wang**, Yongmei Lei. Adaptive Sparse Parameter Model Design and Quantized Transmission Method for Distributed Machine Learning [P]. Chinese Patent. CN202110851560.8.
- Cunlu Peng, **Guozheng Wang**, Yongmei Lei. Data Aggregation Method Based on Optimization Algorithm for Classification Problems on Spark Platform [P]. Chinese Patent. CN202210800809.7.



AWARD

- 2023-2024 Scholarship of Shanghai Yovole Networks.
- 2021-2022 First-class Scholarship of Shanghai University.
- 2020-2021 Second-class Scholarship of Shanghai University.
- 2019-2021 Outstanding Student of Shanghai University twice during Ph.D..
- 2019-2020 2019 National College Student Mini Marathon Public Welfare Challenge Winner's Award.
- 2016-2019 Second-class Scholarship of University of Shanghai for Science and Technology.



PERSONAL STATEMENT

- Passionate about research work, possessing good self-discipline and perseverance, with solid academic foundations and research abilities. Particularly interested in the fields of operating system kernels, reinforcement learning, and intelligent robotics.
- During doctoral studies, research primarily focused on high-performance computing and distributed optimization algorithms. Strong self-learning abilities and a keen interest in cutting-edge technologies and the latest research fields.
- Demonstrates responsibility and enthusiasm towards life, actively participating in social activities and team cooperation, while embracing new experiences and cultures.