Zhilin Wang

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Research interests

Distributed Systems, Federated Learning, Distributed Optimization, Blockchain, Security & Privacy, Anomaly Detection, Adversarial Learning

Education

01/2021 – 12/2024 (expected)
Purdue University – Indianapolis, Indiana, USA
PhD in Computer Science
Advisor: Prof. Qin Hu

09/2016 – 06/2020
Nanchang University – Nanchang, Jiangxi, China
BS in Management
Advisor: Prof. Faming Zhang

Projects

Present
DisOpt: A Framework of Large-scale Distributed Optimization Optimizer
I am currently leading a team to develop a new tool that integrates currently popular distributed optimization algorithms for solving large-scale optimization problems. (It will be released soon.)

Fall 2023
xiezhi: The Anomaly Detection Tool for One-dimensional Data
This is a released Python package, which can be applied to conduct anomaly detection for one-dimensional data, especially when the data size is large while only a few of them are abnormal.

Spring 2023
NEXT: A Flexible Federated Learning Framework for Security Analysis
This framework integrates dozens of the latest and most popular defense and attack methods in federated learning, supporting more than a dozen datasets and deep models. Based on this framework, researchers can monitor the security of the whole process of FL. (It will be released soon.)

Summer 2022 **HFL: Hierarchical Federated Learning Framework**
A benchmark of hierarchical federated learning based on TensorFlow.

Spring 2022 **RL-based Knapsack Problem Solver**
We provide a learning-based solution to multiple knapsack problems, which can get the approximate optimal solutions in polynomial time.

Spring 2022 **Blockchain-based Federated Learning Framework**
A user-friendly and robust blockchain-based federated learning framework in MEC will be applied to facilitate research and practical applications.

Spring 2020 **Correlated Equilibrium Optimizer**
An approximation method is provided for blockchain transaction pricing.

Research experience

2021 – Present **Research Assistant**
Advisor: Prof. Qin Hu.
There are two main research directions, one is to design efficient decentralized federated learning systems, and the other is to improve the robustness of federated learning systems.

2017 – 2019 **Research Assistant**
Advisor: Prof. Faming Zhang
Mainly engaged in studies and research on decision science, optimization theory, and game theory.

Selected Papers

2023 **Can We Trust the Similarity Measurement in Federated Learning?**
Zhilin Wang, Qin Hu, Xuakai Zou
Submitted to USENIX Security 2024

Incentive Mechanism Design for Joint Resource Allocation in Blockchain-Based Federated Learning
Zhilin Wang, Qin Hu, Ruinian Li, Minghui Xu, Zehui Xiong
IEEE Transactions on Parallel and Distributed Systems

Resource Optimization for Blockchain-based Federated Learning in Mobile Edge Computing
Zhilin Wang, Qin Hu, Zehui Xiong, Yuan Li, Dusit Niyato
IEEE Internet of Things Journal (Minor Revision)

Straggler Mitigation and Latency Optimization in Blockchain-based Hierarchical Federated Learning
Zhilin Wang, Qin Hu, Minghui Xu, Zehui Xiong
Submitted to IEEE Transactions on Computers

PoFEL: Energy-efficient Consensus for Blockchain-based Hierarchical Federated Learning
Shengyang Li, Qin Hu, Zhilin Wang
Submitted to IEEE Transactions on Mobile Computing

Blockchain-based Federated Learning: A Comprehensive Survey
Zhilin Wang, Qin Hu
Submitted to IEEE Communications Surveys & Tutorials.

2022 **Blockchain-based Edge Resource Sharing for Metaverse**
Zhilin Wang, Qin Hut, Minghui Xu, Honglu Jiang
2022 IEEE 19th International Conference on Mobile Ad Hoc and Smart Systems (MASS)

Online-Learning-Based Fast-Convergent and Energy-Efficient Device Selection in Federated Edge Learning
Cheng Peng, Qin Hu, Zhilin Wang, Ryan Wen Liu, Zehui Xiong
IEEE Internet of Things Journal

Defense Strategies Toward Model Poisoning Attacks in Federated Learning: A Survey
Zhilin Wang, Qiao Kang, Xinyi Zhang, Qin Hu
2022 IEEE Wireless Communications and Networking Conference (WCNC)

Transaction Pricing Mechanism Design and Assessment for Blockchain
Zhilin Wang, Qin Hu, Yawei Wang, Yinhao Xiao
High-Confidence Computing

2021 **Blockchain and Federated Edge Learning for Privacy-Preserving Mobile Crowdsensing**
Qin Hu, Zhilin Wang, Minghui Xu, Xiuzhen Cheng
IEEE Internet of Things Journal

2020 **A Correlated Equilibrium based Transaction Pricing Mechanism in Blockchain**
Qin Hu, Yash Nigam, Zhilin Wang, Yawei Wang, Yinhao Xiao
2020 IEEE International Conference on Blockchain and Cryptocurrency (ICBC)

Talks

10/2022 Blockchain-based Edge Resource Sharing for Metaverse
IEEE MASS 2022, Denver, CO, USA

04/2022 Defense strategies toward model poisoning attacks in federated learning: A survey
IEEE WCNC 2022, Austin, TX, USA

Professional Services

Reviewer IEEE TPDS, IEEE IoTJ, Elsevier JNCA, IEEE TCCN, and IEEE ICC

TPC Member IEEE ICC'22 Workshop

Professional Memberships

2021 – Present Institute of Electrical and Electronics Engineers (IEEE)
Graduate Student Member

2021 – Present The Center for Education and Research in Information Assurance and Security at Purdue (CERIAS)
PhD Student Member