# Zhen Qin

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**Biography.** I am a 3nd-year Ph.D. Student at College of Computer Science and Technology, Zhejiang University, China, working on ***Federated Learning*** (FL) under the supervision of Prof. Shuiguang Deng. Currently, I mainly focus on 1) ***Federated Fine-tuning of Large Language Models***, 2) ***Personalized FL*** and 3) ***Trustworthy FL***. So far, I have published 12 papers on ICML, SIGKDD, WWW, AAAI, IEEE TSC, ICSOC, IEEE ICWS, etc.

Currently, I am working as a research intern at Damo Academy, Alibaba Group, focusing on ***Federated Fine-tuning of Large Language Models***. Prior to that, I worked as a research intern in 2012 Lab, Huawei Technologies Ltd. Co. from Mar. 2022 to May 2023, focusing on ***Preliminary Research of 6G architecture***.

## Research Topics

Currently, I am focusing on several research topics in FL including :

- Federated LLM Fine-tuning
  Designing federated fine-tuning techniques for billion-sized large language models (LLMs), leveraging the vast quantities of data continuously generated at end devices to enhance the responsibility of LLMs to NLP tasks.
- Personalized Federated Learning
  Designing the personalized FL framework to provide adaptability to the statistical heterogeneity of data among distributed clients, to provide high model accuracy regardless of the degree of non-IIDness.
- Trustworthy Federated Learning
  - The defenses to backdoor attacks in FL through anomaly detection techniques.
  - Building fully decentralized FL systems based on blockchain, providing distributed trustworthiness.

## Education

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|---|---|
| Sep 2021 – Mar 2025 (expected) | PhD Student (*Computer Science and Technology*)<br>College of Computer Science and Technology, Zhejiang University (ZJU), Hangzhou, China<br>Supervisor : Prof. Shuiguang Deng |
| Sep 2018 – Apr 2021 | Master of Science in Engineering (*Computer Application Technology*)<br>School of Computer Engineering and Science, Shanghai University (SHU), Shanghai, China<br>Supervisor : Prof. Guobing Zou<br>Score : 90.0/100 |
| Sep 2014 – Jun 2018 | Bachelor of Engineering (*Computer Science and Technology*)<br>School of Computer Engineering and Science, Shanghai University (SHU), Shanghai, China<br>GPA : 3.22/4.0 \| Rank : Top 20%<br>Minor in Economics at East China Normal University (ECNU), Shanghai, China |

## Publications (First Author or First Student Author)

- Zhen Qin, Daoyuan Chen, Wenhao Zhang, Liuyi Yao, Yilun Huang, Bolin Ding, Yaliang Li*, Shuiguang Deng*. The Synergy between Data and Multi-Modal Large Language Models : A Survey from Co-Development Perspective. arXiv, 2024.
  **[PDF] [Code]**
- Zhen Qin, Daoyuan Chen, Bingchen Qian, Bolin Ding, Yaliang Li*, Shuiguang Deng*. Federated Full-Parameter Tuning of Billion-Sized Language Models with Communication Cost under 18 Kilobytes. **accepted by The Forty-first International Conference on Machine Learning (ICML)**, 2024.
  **(CCF A) (CORE A*) [PDF] [Code]**
- Zhen Qin, Xueqiang Yan, Mengchu Zhou, Shuiguang Deng*. BlockDFL : A Blockchain-based Fully Decentralized Federated Learning Framework. **The 2024 ACM Web Conference (WWW)**, 2024.
  **(CCF A) (CORE A*) [PDF]**
- Zhen Qin, Feiyi Chen, Chen Zhi, Xueqiang Yan, Shuiguang Deng*. Resisting Backdoor Attacks in Federated Learning via Bidirectional Elections and Individual Perspective. **AAAI Conference on Artificial Intelligence (AAAI)**, 2024.
  **(CCF A) (CORE A*) [PDF] [Code]**
- Zhen Qin, Shuiguang Deng*, Mingyu Zhao, Xueqiang Yan. FedAPEN : Personalized Cross-silo Federated Learning with Adaptability to Statistical Heterogeneity. **ACM SIGKDD Conference on Knowledge Discovery and Data Mining**

(SIGKDD), pp. 1954-1964, 2023.
**(CCF A) (CORE A*) [PDF][Code]**

› Zhen Qin, Shuiguang Deng*, Xueqiang Yan, Lu Lu, Mingyu Zhao, Yan Xi, Jianjun Wu, Tao Sun, Nanxiang Shi. 6G Data Plane : A Novel Architecture Enabling Data Collaboration with Arbitrary Topology. **Mobile Networks and Applications**, vol.28, pp. 394–405, 2023.
**(CCF C) (IF=3.077) [PDF]**

› Guobing Zou, Zhen Qin, Shuiguang Deng, Kuan-Ching Li, Yanglan Gan*, Bofeng Zhang*. Towards the Optimality of Service Instance Selection in Mobile Edge Computing. **Knowledge-Based Systems**, vol. 217, p. 106831, 2021.
**(CCF C) (IF=8.139) [PDF]**

› Guobing Zou, Zhen Qin, Qiang He, Pengwei Wang, Bofeng Zhang, Yanglan Gan*. DeepWSC : Clustering Web Services via Integrating Service Composability into Deep Semantic Features. **IEEE Transactions on Services Computing**, vol. 15, no. 4, pp. 1940-1953, 2021.
**(CCF A) (CORE A*) (IF=11.019) [PDF]**

› Guobing Zou, Zhen Qin, Qiang He, Pengwei Wang, Bofeng Zhang, Yanglan Gan*. DeepWSC : A Novel Framework with Deep Neural Network for Web Service Clustering. **IEEE International Conference on Web Services (ICWS)**, 2019, pp. 434-436.
**(CCF B) (CORE A) [PDF]**

## Publications (Co-authored)

› Feiyi Chen, Zhen Qin, Yingying Zhang, Shuiguang Deng*, Yi Xiao, Guansong Pang, Qingsong Wen. LARA : A Light and Anti-overfitting Retraining Approach for Unsupervised Anomaly Detection. **The 2024 ACM Web Conference (WWW)**, 2024.
**(CCF A) (CORE A*) [PDF]**

› Feiyi Chen, Yingying Zhang, Zhen Qin, Lunting Fan, Renhe Jiang, Yuxuan Liang, Qingsong Wen, Shuiguang Deng*. MACE : A Multi-pattern Accommodated and Efficient Anomaly Detection Method in the Frequency Domain. **accepted by The annual IEEE International Conference on Data Engineering (ICDE)**, 2024.
**(CCF A) (CORE A*) [PDF][Code]**

› Guobing Zou, Ya Liu, Zhen Qin, Jin Chen, Zhiwei Xu, Yanglan Gan*, Bofeng Zhang, Qiang He*. ST-EUA : Spatio-temporal Edge User Allocation with Task Decomposition. **IEEE Transactions on Services Computing**, vol. 16, no. 1, pp. 628-641, 2022.
**(CCF A) (CORE A*) (IF=11.019) [PDF]**

› Guobing Zou, Ya Liu, Zhen Qin*, Jin Chen, Zhiwei Xu, Yanglan Gan, Bofeng Zhang, Qiang He*. TD-EUA : Task-decomposable Edge User Allocation with QoE Optimization. **International Conference on Service Oriented Computing (ICSOC)**, 2020, pp. 215-231.
**(CCF B) (CORE A) [PDF]**

## </> Internship Experience

**Jun 2023 – Now** | DAMO Academy, Alibaba Group (*Research Intern*)
› **Federated Fine-tuning of LLMs :** Exploring the possibilities of tuning large models based on federated learning, mainly addressing communication overhead and memory cost issues.
› **System Development :** Exploring memory-efficient fine-tuning techniques for LLMs which are suitable for cross-device FL, and implementing them based on FederatedScope.
`Federated Learning` `Large Language Model` `Development`

**Mar 2022 – Apr 2023** | 2012 Lab, Huawei Technologies, Ltd. Co. (*Research Intern*)
› **Network Architecture :** Investigating existing network architectures; and designing 6G network architecture according to the visions of 6G communications.
› **Collaboration Architecture :** Designing collaboration frameworks for decentralized FL.
› **White Paper :** Participating in the writing of two white papers for 6G ANA, i.e., i) 6G Data Service Framework and Enabling Technologies and ii) Wireless Network Data Dictionary.
`Federated Learning` `6G Architecture` `Blockchain`

## Honors & Awards

Nov 2023 Outstanding Graduate Student of Zhejiang University in 2023
Nov 2022 Outstanding Graduate Student of Zhejiang University in 2022
Mar 2021 Excellent Graduate of Shanghai
Oct 2020 National Scholarship for Graduate Students (in Shanghai University)
Dec 2019 National Scholarship for Graduate Students (in Shanghai University)
Dec 2018 Second Prize of China Post-graduate Mathematical Contest in Modeling (<14.5%)