Yunfeng Zhao

Ph.D.，Tianjin Key Laboratory of Advanced Networking，College of Intelligence and Computing，Tianjin University，Tianjin

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Research Field

- **Optimization methods for federated learning in the cloud-edge-end collaborative scenario**
  - Federated learning algorithm design and optimization for the cloud-edge-end collaborative scenario.
  - Federated learning resource allocation optimization methods and systems for the cloud-edge-end collaborative scenario.
- **Ubiquitous AI collaborative learning in the cloud-edge-end scenario**
  - Collaborative training and inference mechanisms in the cloud-edge-end system.
  - Resource management and optimization of collaborative learning for multiple heterogeneous devices.

Education Experience

- 2020.09——(Now)
  Ph.D., College of Intelligence and Computing, Tianjin University, Tianjin, China
  (Supervisor: Prof. Xiaofei Wang, Peiyang Young Scholar, National Thousand Youth Talents Plan)
- 2017.09——2020.07
  M.S., School of Mathematics, Tianjin University, Tianjin, China
  (Supervisor: Prof. Jing Guan)
- 2013.09——2017.07
  B.S., College of Science, Nanjing Agricultural University, Nanjing, China

Project Member Experience

- 2019.12——2022.12, "***Terminal System and Application Based on Edge Intelligent Collaboration***", National Key R&D Program of China
  Assisted in organizing the coordinating project meetings and workshops. Responsible for studying the theory of intelligent analysis technology in end-cloud collaboration.
- 2021.01——2022.12, "***Research on Key Technologies of Collaborative Artificial Intelligence Model Sharing in Cloud Edge Architecture for Electricity scenario***", Cooperation Project of Science and Technology Project of State Grid Corporation of China
  Responsible for preparing application materials and coordinating project meetings. Responsible for studying the technology of knowledge distillation and self-learning of edge computing.
- 2021.01——2022.12, "***Research on sharing of Electricity Power Data and Model Fusion Technology Based on Federated Learning***", Cooperation Project of Science and Technology Project of State Grid Corporation of China
  Responsible for coordinating project meetings and other activities. Responsible for studying the federated learning mechanism for electricity marketing data.
- 2021.01——2023.12, "***Research on Edge Intelligent Management Mechanism of Computing Power Resource***", National Natural Science Foundation of China -Youth Project
  Responsible for coordinating project meetings and other activities, while studying the intelligent and collaborative computing power resource allocation mechanism.

Academic Experience

- Assisted in organizing "Edge Computing and Visual Intelligence Workshop" on VALSE 2022.
- Assisted in organizing "Green Edge Computing and Smart Energy Workshop" on CNCC 2021.
- Assisted in organizing the "Global Edge Computing Conference" on GECC 2021.
- Assisted in organizing the "5G Edge Intelligence and Smart City Workshop" on CNCC 2020.

Responsible for meeting schedule arrangement, booking the conference room, reception work and other related activities.

- Assisted in organizing the "2018 Beijing, Tianjin and Hebei Youth probability and statistics Seminar".

Responsible for preparing project plans, meeting schedule arrangement, documents collection, reception work and other related activities.

Publication

- **Journal**

    1. Xiaofei Wang*, **Yunfeng Zhao**, Chao Qiu, Jiangtian Nie, Victor C. M. Leung, "InFEDge: A Blockchain-based Incentive Mechanism in Hierarchical Federated Learning for End-Edge-Cloud Communications" in *IEEE Journal on Selected Areas in Communications (JSAC)*, vol. 40, no. 12, pp. 3325-3342, 2022. (CAS/JCR-1, CCF-A, IF:13.081).

    2. **Yunfeng Zhao**, Zhicheng Liu, Chao Qiu, Xiuhua Li, Xiaofei Wang*, Qinghua Hu, "Socialized Learning for Smart Cities: Cognitive Paradigm, Methodology, and Solution" in *IEEE Wireless Communications*, vol. 28, no. 5, pp. 200-208, 2021. (CAS/JCR-1, IF:11.979).

    3. Zhicheng Liu, **Yunfeng Zhao**, Jinduo Song, Chao Qiu, Xu Chen, Xiaofei Wang*, "Learn to Coordinate for Computation Offloading and Resource Allocation in Edge Computing: A Rational-based Distributed Approach" in *IEEE Transactions on Network Science and Engineering (TNSE)*, vol. 9, no. 5, pp. 3136-3151, 2022. (CAS/JCR-2, IF:5.213).

    4. **Yunfeng Zhao**, Jing Guan*, "A new robust parameter estimation approach for multinomial categorical response data with outliers and mismeasured covariates, " *Communications in Statistics - Theory and Methods*, 2022. (CAS/JCR-4).

    5. Jing Guan*, **Yunfeng Zhao**, "Parameter estimation approaches to tackling measurement error and multicollinearity in ordinal probit models, " *Communications in Statistics-Theory and Methods*, vol. 49, no. 16, pp. 3835-3859, 2020. (CAS/JCR-4).

    6. Dali Feng, Hongli An, Haixing Zhu, **Yunfeng Zhao**, "The synchronization method for fractional-order hyperchaotic systems, " *Physics Letters A*, vol. 383, no. 13, pp. 1427-1434, 2019. (CAS/JCR-3).

- **Conference**

    1. **Yunfeng Zhao**, Zhicheng Liu, Chao Qiu, Xiaofei Wang*, F. Richard Yu, Victor C.M. Leung, "An Incentive Mechanism for Big Data Trading in End-Edge-Cloud Hierarchical Federated Learning," in *IEEE Global Communications Conference (GLOBECOM)*, Spain, 2021. (CCF-C).

    2. Shangxuan Cai, **Yunfeng Zhao**, Zhicheng Liu, Chao Qiu, Xiaofei Wang*, Qinghua Hu, "Multi-granularity Weighted Federated Learning in Heterogeneous Mobile Edge Computing Systems," in *International Conference on Distributed Computing Systems (ICDCS)*, Italy, 2022. (CCF-B).

    3. Shangxuan Cai, **Yunfeng Zhao**, Zhicheng Liu, Chao Qiu, Xiaofei Wang*, Qinghua Hu, "MGFL: Multi-granularity Federated Learning in Edge Computing Systems," in *International Conference on Algorithms and Architectures for Parallel Processing (ICA3PP)*, China, 2021. (CCF-C).

    4. Zhuohang Wang, **Yunfeng Zhao**, Yong Wang, Yan Li, Zhicheng Liu, Chao Qiu, Xiaofei Wang*, Qinghua Hu, "Lightweight Model Inference on Resource-Constrained Computing Nodes in Intelligent Surveillance Systems," in *Asia Pacific Web and Web-Age Information Management (APWeb-WAIM)*, China, 2022. (CCF-C).

    5. Pengfei Li, **Yunfeng Zhao**, Liandong Chen, Kai Cheng, Chuyue Xie, Xiaofei Wang*, Qinghua Hu, "Uncertainty Measured Active Client Selection for Federated Learning in

Smart Grid," in *IEEE International Conference on Smart Internet of Things (SmartIoT)*, China, 2022. (EI).

6. Zhutao Liu, Chao Qiu, **Yunfeng Zhao**, Xiaofei Wang*, Jing Jiang, "Bat-FG: A Broad Attention Based Fine-Grained Offloading in Green Computing Power Networks," in *IEEE International Conference on Communications (ICC)*, Italy, 2023. (CCF-C).

7. Ziwei Wang, **Yunfeng Zhao**, Chao Qiu, Qiang He, Xin Wang, Xiaofei Wang and Qinghua Hu, "SocialEdge: Socialized Learning-Based Request Scheduling for Edge-Cloud Systems," in *IEEE International Conference on Distributed Computing Systems (ICDCS)*, 2023 (CCF-B).

Technical Patent

1. *"A Training Method for Lightweight Incentive Models based on Hierarchical Federated Learning",* Chinese Patent, CN202110324164.X (Patent Pending).
2. "*Incentive Methods and Systems for Hierarchical Federated Learning with End-Edge-Cloud Architecture and Complete Information*," Chinese Patent, ZL202111256017.X (Patent Authorization).
3. " *Incentive Methods and Systems for Hierarchical Federated Learning with End-Edge-Cloud Architecture and Incomplete Information*," Chinese Patent, ZL202111257828.1 (Patent Authorization).
4. "*A Socialized Learning Method for Smart Cities*," Chinese Patent, ZL202111425250.6 (Patent Authorization).
5. "*A Method based on Multi-Granularity Federated Learning*," Chinese Patent, CN202111488234.1 (Patent Pending).
6. "*Information Interaction Methods for Improving the Effectiveness of Multi-Agent Reinforcement Learning for Edge Computing*, " Chinese Patent, CN202111123522.7 (Patent Pending).
7. "*A deep reinforcement learning-based method for computing offloading and resource management in edge computing*, " Chinese Patent, CN202111121919.2 (Patent Pending).
8. "*A Lightweight Multi-Exit Point Model Building Method based on Neural Architecture Search*, " Chinese Patent, CN202210423171.X (Patent Pending).

Leadership Experience

- **Tianjin University, Minister of the Student Union,**   **2017.09- 2018.07**
  1. Successfully helped more than 10+ academic activities, involving more than 500+ participants.
  2. Organized recruitment, selection, training and development of the members of the Student Union.
- **Nanjing Agricultural University, Captain of Nanjing Yuhuatai Volunteer Union, 2014.09- 2015.07**
  1. Successfully delivered more than 100+ presentations, and served more than tens of thousands of visitors.
  2. Organize the content of the presentation, undertake staff selection, staff training and maintain daily operations.
- **Nanjing Agricultural University, Vice Minister of Technology Association, 2013.09-2016.07**
  1. Organized a number of academic events related to science, technology and entrepreneurship for university students.
  2. Held college students to participate in academic competitions, such as "Science and Technology Knowledge Contest", "Entrepreneurship and Innovation Contest" and so on.

Award

- 2022, "First Prize for Academic Scholarship" of Tianjin University
- 2022, "Top Ten" of Shenzhen International Science and Technology Finance Competition
- 2021, "Third Prize" of China Graduate Student Mathematical Modeling Competition
- 2021, "Second Prize for Academic Scholarship" of Tianjin University
- 2019, "School of Mathematics Student Role Models" of Tianjin University
- 2019, "National Scholarship"
- 2019, "Merit Student" of Tianjin University
- 2018, "Merit Student" of Tianjin University
- 2018, "First Prize for academic scholarship" of Tianjin University
- 2018, "Outstanding Volunteer" of Tianjin University
- 2017, "Outstanding Volunteer" of Tianjin University
- 2017, "First Prize for academic scholarship" of Tianjin University
- 2017, "Excellent Graduates" of Nanjing Agricultural University
- 2016, "First Prize for Merit Student" of Nanjing Agricultural University
- 2015, "Outstanding Youth League Member" of Nanjing Agricultural University
- 2015, "Outstanding Student" of College of Science, Nanjing Agricultural University
- 2015, "Outstanding Volunteer" of Nanjing Agricultural University
- 2015, "National Scholarship"
- 2015, "First Prize for Merit Student" of Nanjing Agricultural University
- 2014, "The Third Prize" of the first stage of the National Student Mathematical Modeling Network Competition
- 2014, "First Prize for Merit Student" of Nanjing Agricultural University

A dream you dream alone is only a dream. A dream you dream together is reality   —— *John Lennon*