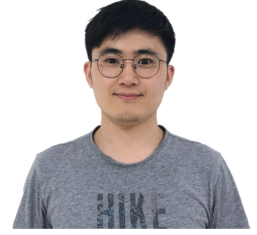# Jian Li

Male · Beijing, China · Birth: April 1992

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🏠 lijian.ac.cn · **G**oogle Scholar · ⌨ superlj666

Associate Professor · Institute of Information Engineering, CAS

CAREER

Institute of Information Engineering, CAS, Associate Professor	2023.11 - Present
Institute of Information Engineering, CAS, Tenure-track Professor	2020.09 - 2023.11

EDUCATION

University of Chinese Academy of Sciences (UCAS), Cyber Security, *Ph.D.*	2015.09 - 2020.06
Northeastern University, Software Engineering (International class), *Bachelor*	2011.09 - 2015.06

RESEARCH INTERESTS

To address the limited theoretical interpretability of large-scale machine learning algorithms, my focus lies in researching the foundational theoretical guarantees of large language models and other large-scale machine learning algorithms. I aim to enhance algorithms guided by theoretical findings, thereby reducing the gap between foundational theory and practical implementation. My research interests encompass but are not limited to:

- **LLMs and Deep Learning Theory:** theoretical studies on the unique capabilities of large language models (such as emergent abilities and grokking), as well as benign overfitting or the double descent phenomenon in deep learning.
- **Efficient LLMs：** efficient Transformers, compressed LLMs, and parameter-efficient fine-tuning (PEFT).
- **Large-scale Machine Learning:** statistical guarantees and improved algorithms for large-scale machine learning methods, including federated learning, distributed learning, random features, Nyström methods, etc.

PUBLICATIONS (⌂ GOOGLE SCHOLAR PROFILE)

* Contact author, ★ Notable publications

Journal Papers

- ★ Optimal Convergence Rates for Distributed Nyström Approximation.

  Jian Li, Yong Liu, Weiping Wang.

  Journal of Machine Learning Research (**JMLR**), 2023. **CCF-A**.

- Optimal Convergence for Agnostic Kernel Learning With Random Features.

  Jian Li, Yong Liu, Weiping Wang.

  IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**), 2023. **CCF-B**.

- Semi-supervised vector-valued learning: Improved bounds and algorithms.

  Jian Li, Yong Liu, Weiping Wang.

  Pattern Recognition (**PR**), 2023. **CCF-B**.

- Improving Differentiable Architecture Search via Self-distillation.

  Xunyu Zhu, **Jian Li***, Yong Liu, Weiping Wang.

  Neural Networks, 2023. **CCF-B**.

- ★ Convolutional Spectral Kernel Learning with Generalization Guarantees.

  Jian Li, Yong Liu, Weiping Wang.

Artificial Intelligence (**AIJ**), 2022. **CCF-A**.

- Non-IID Federated Learning with Sharper Risk Bound.

  Bojian Wei, **Jian Li***, Yong Liu, Weiping Wang.

  IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**), 2022. **CCF-B**.

Conference Papers

- ★ Optimal Convergence Rates for Agnostic Nyström Kernel Learning.

  Jian Li, Yong Liu, Weiping Wang.

  International Conference on Machine Learning (**ICML**), 2023. **CCF-A**.

- Towards Sharp Analysis for Distributed Learning with Random Features.

  Jian Li, Yong Liu.

  International Joint Conference on Artificial Intelligence (**IJCAI**), 2023. **CCF-A**.

- Towards Sharper Risk Bounds for Agnostic Multi-Objectives Learning.

  Bojian Wei, **Jian Li***, Yong Liu.

  International Joint Conference on Neural Networks (**IJCNN**), 2023. **CCF-C**.

- Data Heterogeneity Differential Privacy: From Theory to Algorithm.

  Yiling Kang, **Jian Li***, Yong Liu, Weiping Wang.

  International Conference on Computational Science (**ICCS**), 2023.

- Ridgeless Regression with Random Features.

  Jian Li, Yong Liu, Yingying Zhang.

  International Joint Conference on Artificial Intelligence (**IJCAI**), 2022. **CCF-A**.

- Non-IID Distributed Learning with Optimal Mixture Weights.

  Jian Li, Bojian Wei, Yong Liu, Yingying Zhang.

  European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (**ECML-PKDD**), 2022. **CCF-B**.

- Sharper Utility Bounds for Differentially Private Models: Smooth and Non-smooth.

  Yilin Kang, Yong Liu, **Jian Li**, Weiping Wang.

  The Conference on Information and Knowledge Management (**CIKM**), 2022. **CCF-B**.

- ★ Federated learning for non-iid data: From theory to algorithm. 🏆 **Best student paper award.**

  Bojian Wei, **Jian Li***, Yong Liu, Weiping Wang.

  Pacific Rim International Conference on Artificial Intelligence (**PRICAI**), 2021. **CCF-C**.

- Operation-level Progressive Differentiable Architecture Search.

  Xunyu Zhu, **Jian Li***, Yong Liu, Weiping Wang.

  International Conference on Data Mining (**ICDM**), 2021. **CCF-B**.

- Automated Spectral Kernel Learning.

  Jian Li, Yong Liu, Weiping Wang.

  AAAI Conference on Artificial Intelligence (**AAAI**), 2020. **CCF-A**.

- Multi-Class Learning using Unlabeled Samples:Theory and Algorithm.

  Jian Li, Yong Liu, Rong Yin, Weiping Wang.

  International Joint Conference on Artificial Intelligence (**IJCAI**), 2019. **CCF-A**.

- Approximate Manifold Regularization: Scalable Algorithm and Generalization Analysis.

  Jian Li, Yong Liu, Rong Yin, Weiping Wang.

  International Joint Conference on Artificial Intelligence (**IJCAI**), 2019. **CCF-A**.

- ★ Multi-Class Learning: From Theory to Algorithm.

  Jian Li, Yong Liu, Rong Yin, Hua Zhang, Lizhong Ding, Weiping Wang.

  Advances in Neural Information Processing Systems (**NeurIPS**), 2018. **CCF-A**.

- Efficient Kernel Selection via Spectral Analysis.

  Jian Li, Yong Liu, Hailun Lin, Yinliang Yue, Weiping Wang.

International Joint Conference on Artificial Intelligence (**IJCAI**), 2017. **CCF-A**.

Submitted Papers

- ★ Optimal Rates for Agnostic Distributed Learning. **Second-round review.**
  <u>**Jian Li**</u>, Yong Liu, Weiping Wang.
  Submission in IEEE Transactions On Information Theory (TIT), CCF-A Journal.
- ★ On the Statistical Optimality of Newton-type Federated Learning with Non-IID Data.
  <u>**Jian Li**</u>, Yong Liu, Weiping Wang.
  Submission in Journal of Machine Learning Research (JMLR), CCF-A Journal.
- Domain Agnostic Learning: Improved Algorithms and Bounds.
  <u>**Jian Li**</u>, Yong Liu, Weiping Wang.
  Submission in IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), CCF-A Journal.
- High-dimensional analysis for Generalized Nonlinear Regression: From Asymptotics to Algorithm.
  <u>**Jian Li**</u>, Yong Liu, Weiping Wang.
  Submission in AAAI Conference on Artificial Intelligence (AAAI), CCF-A Conference.
- FedNS: A Fast Sketching Newton-type Algorithm for Federated Learning.
  <u>**Jian Li**</u>, Yong Liu, Weiping Wang.
  Submission in AAAI Conference on Artificial Intelligence (AAAI), CCF-A Conference.
- ★ A Survey on Model Compression for Large Language Models. arXiv:2308.07633.
  Xunyu Zhu, <u>**Jian Li**</u>*, Yong Liu, Can Ma, Weiping Wang.
  Submission in Transactions of the Association for Computational Linguistics (TACL), CCF-B Journal.

PROJECTS

China Postdoctoral Science Foundation (No. 2023T160680), ￥**180,000**   2023.07 - 2024.03
Title: Research on Deep Differentiable Gaussian Processes for Structured Prediction

National Key R&D Program of China (2022YFB3105302.2), ￥**1,200,000**   2022.12 - 2025.11
Title: Aggregation and Collaborative Techniques for Cross-platforms Heterogenous Data

- Research on Cross-Platform Data Security Sharing Technology
- Research on Human-Machine Collaboration Annotation Technology Based on Important Tags Discovery
- Research on Heterogeneous Data Fusion Technology Based on Constraints on Different Feature Distributions

National Natural Science Foundation of China (No. 62106257), ￥**300,000**   2022.01 - 2024.12
Title: Large Scale Structured Prediction with Automated Spectral Kernel Learning

Special Research Assistant Project of CAS, ￥**800,000**   2020.09 - 2022.09
Title: Large-scale Few-shot Automated Machine Learning

Talent Program Class A of Institute of Information Engineering, CAS   2023.11 - 2026.09
Talent Program Class B of Institute of Information Engineering, CAS   2020.09 - 2023.11

PATENTS

Neural Network Architecture Search Method, Device, Computer Equipment, and Storage Medium   2020
<u>**Jian Li**</u>, Yong Liu, Liubin Wang, Yiguo Yang, Juhong Wang
Application Number (CN): 202011567991.3

A Federated Learning Method and System Based on Attention Mechanism 2023

<u>Jian Li</u>, Jiaoyang Li, Bojian Wei, Yong Liu, Weiping Wang

Application Number (CN): 202311073645.3

A Vertical Domain Large Model Method and System Based on Knowledge Distillation and Prompt Engineering 2023

<u>Jian Li</u>, Jiaoyang Li, Zheng Lin, Yong Liu, Weiping Wang

Application number (CN): 202311073641.5

A Large-Scale Ontology Merging Method that Integrates Representation Learning and Divide-and-Conquer Strategy Granted date: April 8, 2022

Hailun Lin, Yong Liu, <u>Jian Li</u>, Weiping Wang

Granted number (CN): CN110059194A

STUDENTS

Yilin Kang, Ph.D. student, Differential Privacy 2020.09 - 2023.06

Publications: Computers & Security, CIKM 2022, ICCS 2023

Post-graduation: Researcher in Purple Mountain Laboratories

Bojian Wei, Master student, Federated Learning 2020.09 - 2022.06

Publications: PRICAI 2021 (**Best student paper award**), ECML-PKDD 2022, IJCNN 2023, TNNLS

Post-graduation: Management Trainee in Bank of China Head Office

Xunyu Zhu, Ph.D. student, Neural Architecture Search & Compression of LLMs 2020.09 - Present

Publications: ICDM 2021, Neural Networks

Boxuan Che, Ph.D. student, Efficient Graph Neural Networks 2022.09 - Present

Xuning Zhang, Master student, Optimization on Federated Learning 2022.09 - Present

Undergraduate Thesis: Research on Federated Learning for Heterogeneous Data.

Excellent Bachelor's Thesis in Wuhan University in 2023.

HONORS AND AWARDS

PRICAI 2021 best student paper award	2021
Outstanding Graduate of Institute of Information Engineering, CAS	2021
Outstanding Graduate of Beijing	2020
Outstanding Graduate of University of Chinese Academy of Sciences (UCAS)	2020
National Scholarship for Doctoral student	2019
ZhuLiYueHua Scholarship for Excellent Doctoral Student	2019
Presidential Scholarship of Chinese Academy of Sciences (CAS)	2019
National Scholarship for Doctoral students	2018
Presidential Scholarship of Institute of Information Engineering, CAS	2018

ACADEMIC SERVICE

- Mathematics Guest Editor
- Program committee of Conference: ICML, NeurIPS, ICLR, AAAI, IJCAI, ECAI, etc.
- Reviewers of Journals: TPAMI, JMLR, Pattern Recognition, etc.