LISANG DING

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RESEARCH INTERESTS

Machine Learning Optimization Theory: Designing theoretically provable algorithms for optimization problems arising in machine learning contexts. Focusing on decentralized optimization and mixed-model optimization.
Mean-Field Physical Models: Engaging in the computation of mean-field physical models, exploring their theoretical properties. Applying mean-field theory to neural network analysis.
Practical Machine Learning Optimization Algorithms: Developing machine learning algorithms to accelerate stochastic gradient-based training processes. Conducting empirical experiments on large-scale neural network training and performing theoretical analysis to verify algorithm efficiency.

EDUCATION

University of California, Los Angeles Sept 2020 - June 2025 (expected)
Ph.D. student in mathematics
Advisor: Stanley Osher, Wotao Yin; GPA:3.99/4.00

Zhejiang University Sept 2016 - June 2020
Bachelor of Science (Honors) - Mathematics and Applied Mathematics
GPA:4.60/5.00; Ranking: 1/122
Ranked 1st for academic years 2016-2017, 2017-2018, 2018-2019

EXPERIENCE

Alibaba Group (U.S.) June 2024 - Sept 2024
Research intern, DAMO Academy
Project: Ensemble Language model training.

- Working on ensemble training with multiple BERT models, utilizing a router mechanism to connect and coordinate between the language models.

Alibaba Group (U.S.) June 2023 - Sept 2023
Research intern, DAMO Academy
Project: Transformer architecture.

- Develop mathematical reasoning to analyze the transformer rank collapse phenomenon.
- Design new transformer architectures based on this mathematical insight.
- Train the transformers on both visual and language tasks.

Alibaba Group (U.S.) June 2022 - Sept 2022
Research intern, DAMO Academy
Project: Symbolic Learning to optimize.

- Developing a white-box symbolic search neural network.
- Successfully identified efficient algorithms that perform well on optimization problems, comparable to or exceeding the performance of learned black-box optimization algorithms.

SKILLS

Programming Python, MATLAB, JAVA, R, C
Languages English, Chinese

PUBLICATIONS

Lisang Ding, Ziang Chen, Xinshang Wang, and Wotao Yin, "Efficient Algorithms for Sum-of-Minimum Optimization." *International Conference on Machine Learning (ICML) 2024.*

Lisang Ding, Kexin Jin, Bicheng Ying, Kun Yuan, Wotao Yin, "DSGD-CECA: Decentralized SGD with Communication-Optimal Exact Consensus Algorithm." *International Conference on Machine Learning (ICML) 2023.*

Lisang Ding, Wuchen Li, Stanley Osher, Wotao Yin, "A mean field game inverse problem." *Journal of Scientific Computing 92.1 (2022): 7.*

TALKS

Efficient Algorithms for Sum-of-Minimum Optimization, SIAM Conference on Mathematics of Data Science Oct 2024
Efficient Algorithms for Sum-of-Minimum Optimization, SOCAMS, University of California, San Diego Apr 2024

AWARDS

SIAM Conference on Mathematics of Data Science Travel Awards 2024
Summer Mentored Research Fellowship 2021
Outstanding Graduates of Zhejiang Province (Top 2%) 2020
First Prize in 10th National University Student Mathematics Competition (TOP 0.1%) 2019
Cen Kefa First-Class Scholarship (TOP 5%) 2019
Zhejiang Government Scholarship 2018
National Scholarship in Zhejiang University (Top 2%) 2017
First-Class Scholarship for Outstanding Students, three times 2017, 2018, 2019

TEACHING

Math 170E Introduction to Probability and Statistics 2024 Fall
Math 142 Mathematical Modeling 2024 Spring
Math 163 Optimization 2022 Spring
Math 151A Applied Numerical Methods 2022 Winter
Math 33A Linear Algebra and Applications 2021 Fall
Math 151A Applied Numerical Methods 2021 Fall

DIRECTED UNDERGRADUATE STUDENTS

Katherine Ying Zhou (UCLA). Topic: Large-Scale Convex Optimization
Gary Jiawei Miao (UCLA). Topic: Machine Learning and Large Language Models
Yukuan Wei (UCLA). Topic: Large Language Models and Reinforcement Learning

JOURNAL REVIEW

SIAM Journal on Imaging Sciences