

Linjian Ma

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RESEARCH STATEMENT

My research interests lie in the intersection of numerical algorithms, high performance computing and quantum computing. In particular, I'm now focusing on developing efficient numerical algorithms and parallel systems for tensor computations with applications in quantum algorithms, quantum simulation and data analytics. Previously, I worked on optimization and efficient compression methods of neural networks.

EDUCATION BACKGROUNDS

University of Illinois at Urbana-Champaign PhD, Computer Science, Advisor: <i>Edgar Solomonik</i> Area: Scientific Computing	August 2019 - Expected 2023 GPA: 3.95/4.0
University of California, Berkeley MEng, Computer Science, Advisor: <i>Michael Mahoney</i> Track: Data Science & Systems	August 2018 - May 2019 Major GPA: 3.94/4.0
University of Illinois at Urbana-Champaign MS, Mechanical Engineering, Advisor: <i>N.R. Aluru</i> Concentration: Computational Science and Engineering	August 2016 - May 2018 GPA: 3.97/4.0
Zhejiang University BE, Energy Engineering, Advisor: <i>Tao Wang and Zhongyang Luo</i> Graduate with Honors, Chu Kochen Honors College	August 2012 - June 2016 GPA: 3.95/4.0

EXPERIENCES

Lab for Parallel Numerical Algorithms, UIUC Research Assistant, Advisor: <i>Edgar Solomonik</i> Topic: <i>On efficient algorithms and systems for numerical tensor algebra</i>	August 2019 - Now
Lawrence Berkeley National Laboratory Research Intern, Advisor: <i>Chao Yang</i> Topic: <i>Analyzing quantum algorithms based on low-rank approximation</i>	May 2020 - August 2020
Wave Computing & Berkeley AI Research (BAIR) Machine Learning Intern Topic: <i>Compressing large scale neural networks based on second-order information</i>	May 2019 - August 2019
RiseLab, UC Berkeley Research Assistant, Advisor: <i>Michael Mahoney</i> Capstone project: <i>Second-order optimization of neural network learning</i>	August 2018 - May 2019
Beckman Institute, UIUC Research Assistant, Advisor: <i>N.R. Aluru</i> Thesis: <i>A multiscale model for the oxide ion conducting and proton conducting solid oxide cells</i>	August 2016 - December 2017

SKILLS

Programming Languages	C/C++, Python, Go, Bash, Matlab, CUDA
ML Frameworks	Pytorch, TensorFlow

PUBLICATIONS

- [1] **Linjian Ma** and Edgar Solomonik, Efficient Parallel CP Decomposition with Pairwise Perturbation and Multi-sweep Dimension Tree, *International Parallel and Distributed Processing Symposium (IPDPS'21)*, 2021. [\[link\]](#)
- [2] **Linjian Ma***, Jiayu Ye*, and Edgar Solomonik, AutoHOOT: Automatic High-Order Optimization for Tensors, *International Conference on Parallel Architectures and Compilation Techniques (PACT'20)*, 2020. [\[link\]](#)
- [3] Sheng Shen, Zhen Dong, Jiayu Ye, **Linjian Ma**, Zhewei Yao, Amir Gholami, Michael W. Mahoney, Kurt Keutzer, Q-BERT: Hessian Based Ultra Low Precision Quantization of BERT, *AAAI'20*, 2020. [\[link\]](#)
- [4] **Linjian Ma***, Gabe Montague*, Jiayu Ye*, Zhewei Yao, Amir Gholami, Kurt Keutzer, Michael W. Mahoney, Inefficiency of K-FAC for Large Batch Size Training, *AAAI'20*, 2020. [\[link\]](#)
- [5] Navjot Singh, **Linjian Ma**, Hongru Yang, Edgar Solomonik, Comparison of Accuracy and Scalability of Gauss-Newton and Alternating Least Squares for CP Decomposition, *arXiv:1910.12331*, 2019. [\[link\]](#)
- [6] **Linjian Ma** and Edgar Solomonik, Accelerating Alternating Least Squares for Tensor Decomposition by Pairwise Perturbation, *arXiv:1811.10573*, 2018. [\[link\]](#)
- [7] **Linjian Ma**, A Multiscale Model for the Oxide Ion Conducting and Proton Conducting Solid Oxide Cells, *MS thesis, University of Illinois at Urbana-Champaign*, 2018. [\[link\]](#)
- [8] **Linjian Ma**, Pikee Priya, and N. R. Aluru, A Multiscale Model for Electrochemical Reactions in LSCF Based Solid Oxide Cells, *Journal of the Electrochemical Society*, 2018. [\[link\]](#)

HONORS AND AWARDS

Kuck Computational Science & Engineering Scholarship , UIUC	2020
Computer Science Gene Golub Fellowship , UIUC	2019
Graduate with Honor , ZJU	2016
Meritorious Winner , Mathematical Contest In Modeling (MCM)	2015
National Scholarship for Undergraduate, ZJU	2014
The First Class Scholarship for Outstanding Students, ZJU	2013 - 2014
The First Prize in China Undergraduates Mathematical Contest	2013

PRESENTATIONS

Upcoming presentations	SIAM'LA 2021, SIAM'CSE 2021, IPDPS 2021
First author presentations	PACT 2020, SIAM'PP 2020, Berkeley'SCseminar 2019, USNCCM 2017
Posters	SIAM'PP 2020, AAAI 2020

SERVICES

Teaching Assistant	CS 450 Numerical Analysis (Fall 2020)
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