

Linjian Ma

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RESEARCH STATEMENT

My research interests lie in the intersection of numerical algorithms, high performance computing, quantum simulation and machine learning. In particular, I'm now focusing on developing efficient algorithms for tensor networks with applications in data analytics and quantum simulation. In addition, I'm also working 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 2024
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 Ranking: 1/155

EXPERIENCES

Lab for Parallel Numerical Algorithms, UIUC Research Assistant, Advisor: <i>Edgar Solomonik</i> Topic: <i>Tensor decomposition, automatic tensor differentiation and their applications</i>	August 2019 - Now
Wave Computing & Berkeley AI Research (BAIR) Machine Learning Intern, Advisor: <i>Sylvain Flamant</i> 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
Lab for Parallel Numerical Algorithms, UIUC Research Intern, Advisor: <i>Edgar Solomonik</i> Topic: <i>Pairwise perturbation and multigrid in alternating least squares for tensor decomposition</i>	May 2018 - July 2018
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

PUBLICATIONS

- [1] 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, *arXiv:1909.05840 [cs.CL]*, September, 2019. [\[link\]](#)

- [2] **Linjian Ma***, Gabe Montague*, Jiayu Ye*, Zhewei Yao, Amir Gholami, Kurt Keutzer, Michael W. Mahoney, Inefficiency of K-FAC for Large Batch Size Training, *arXiv:1903.06237 [cs.LG]*, March, 2019. [\[link\]](#)
- [3] **Linjian Ma** and Edgar Solomonik, Accelerating Alternating Least Squares for Tensor Decomposition by Pairwise Perturbation, *arXiv:1811.10573 [math.NA]*, November, 2018. [\[link\]](#)
- [4] **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, 165: F1232-F1241. [\[link\]](#)

PRESENTATIONS

- [1] **Linjian Ma** and Edgar Solomonik, Accelerating Alternating Least Squares for Tensor Decomposition by Pairwise Perturbation, *Scientific Computing Seminar*, 6th March, 2019, Berkeley, CA.
- [2] **Linjian Ma** and N.R. Aluru, A Multiscale Model for the Reactive Mechanisms in Proton/Oxide Ion Conducting Solid Oxide Cells, *PIRE Monthly Meeting*, 31st August, 2017, Champaign, IL.
- [3] **Linjian Ma** and N.R. Aluru, A Multiscale Model for the Oxygen Reduction and Oxidation Reactions in LSCF Based Solid Oxide Cells, *14th US National Congress on Computational Mechanics*, 19th July, 2017, Montreal, Canada.

HONORS AND AWARDS

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

SKILLS

Programming Languages	C/C++, Python, SQL, Bash, MATLAB, CUDA
ML Frameworks	Pytorch, Tensorflow

SELECTED COURSEWORK

UIUC	<i>Applied Physics</i> : Intermediate Heat Transfer, Thermal & Statistical Physics, Molecular Electronic Structure, Mathematical Methods II <i>Computational Science</i> : Finite Element Analysis, Computational Mechanics, Numerical Fluid Dynamics, Atomic Scale Simulations, Numerical Analysis <i>Computer Science</i> : Parallel Programming, Computer System Organization, Algorithm, Distributed Systems, Parallel Numerical Algorithms
UC Berkeley	<i>ML</i> : Introduction to Machine Learning, Convex Optimization, Understanding Deep Neural Networks, Principles of Data Science
Zhejiang University	<i>Applied Math</i> : Mathematical Analysis(honor), Ordinary/Partial Differential Equations, Probability and Statistics <i>Applied Physics</i> : Physics(honor), General Chemistry, Fluid Dynamics, Mechanics, Thermodynamics, Heat Transfer, Electromagnetic Fields & Waves <i>Computer Science</i> : Discrete Mathematics, C Programming Language, Computational Methods