# Linjian Ma

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github/Linkedin: linjianma

## RESEARCH STATEMENT

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

## EDUCATION BACKGROUNDS

**University of Illinois at Urbana-Champaign**　　　　　　　August 2019 - Expected 2024
PhD, Computer Science, Advisor: *Edgar Solomonik*
Area: Scientific Computing

**University of California, Berkeley**　　　　　　　　　　　August 2018 - May 2019
MEng, Computer Science, Advisor: *Michael Mahoney*　　　　　Major GPA: 3.94/4.0
Track: Data Science & Systems

**University of Illinois at Urbana-Champaign**　　　　　　　August 2016 - May 2018
MS, Mechanical Engineering, Advisor: *N.R. Aluru*　　　　　　GPA: 3.97/4.0
Concentration: Computational Science and Engineering

**Zhejiang University**　　　　　　　　　　　　　　　　　August 2012 - June 2016
BE, Energy Engineering, Advisor: *Tao Wang and Zhongyang Luo*　　GPA: 3.95/4.0
Graduate with Honors, Chu Kochen Honors College　　　　　　　Ranking: 1/155

## EXPERIENCES

**Lab for Parallel Numerical Algorithms, UIUC**　　　　　　　August 2019 - Now
Research Assistant, Advisor: *Edgar Solomonik*
Topic: *System and algorithm co-design for numerical tensor algebra*

**Lawrence Berkeley National Laboratory**　　　　　　　　　May 2020 - August 2020
Research Intern, Advisor: *Chao Yang*
Topic: *Fast algorithms for tensor eigenvalue solver in quantum many-body problems*

**Wave Computing & Berkeley AI Research (BAIR)**　　　　　　May 2019 - August 2019
Machine Learning Intern
Topic: *Compressing large scale neural networks based on second order information*

**RiseLab, UC Berkeley**　　　　　　　　　　　　　　　　　August 2018 - May 2019
Research Assistant, Advisor: *Michael Mahoney*
Capstone project: *Second order optimization of neural network learning*

**Beckman Institute, UIUC**　　　　　　　　　　　　　　　August 2016 - December 2017
Research Assistant, Advisor: *N.R. Aluru*
Thesis: *A multiscale model for the oxide ion conducting and proton conducting solid oxide cells*

## SKILLS

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| **Programming Languages** | C/C++, Python, Go, Bash, Matlab, CUDA |
| **ML Frameworks** | Pytorch, Tensorflow |

## PUBLICATIONS

[1] **Linjian Ma**\*, Jiayu Ye\*, and Edgar Solomonik, AutoHOOT: Automatic High-Order Optimization for Tensors, *arXiv:2005.04540*, 2020. [link]

[2] 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]

[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 2020*, 2019. [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 2020*, 2019. [link]

[5] **Linjian Ma** and Edgar Solomonik, Accelerating Alternating Least Squares for Tensor Decomposition by Pairwise Perturbation, *arXiv:1811.10573*, 2018. [link]

[6] **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]

[7] **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]

## PRESENTATIONS

[1] **Linjian Ma** and Edgar Solomonik, Accelerating Alternating Least Squares for Tensor Decomposition by Pairwise Perturbation, *Scientific Computing Seminar*, 26th September, 2019, Champaign, IL.

[2] **Linjian Ma** and Edgar Solomonik, Accelerating Alternating Least Squares for Tensor Decomposition by Pairwise Perturbation, *Scientific Computing Seminar*, 6th March, 2019, Berkeley, CA.

[3] **Linjian Ma** and N.R. Aluru, A Multiscale Model for the Reactive Mechanisms in Proton/Oxide Ion Conducting Solid Oxide Cells, *PIRE Monthly Meething*, 31st August, 2017, Champaign, IL.

[4] **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

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| **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 |