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 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: *Tensor decomposition, automatic tensor differentiation and their applications*

Wave Computing & Berkeley AI Research (BAIR) May 2019 - August 2019
Machine Learning Intern, Advisor: *Sylvain Flamant*
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*

Lab for Parallel Numerical Algorithms, UIUC May 2018 - July 2018
Research Intern, Advisor: *Edgar Solomonik*
Topic: *Pairwise perturbation and multigrid in alternating least squares for tensor decomposition*

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

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

PUBLICATIONS

[1] 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 [math.NA],* October, 2019. [link]

[2] 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]

[3] **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]

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

[5] **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*, 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

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