

HONGYI LI

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RESEARCH INTERESTS

Deep learning on graphs, nonconvex optimization, uncertainty quantification in deep learning models

EDUCATION

Xidian University, Xi'an, Shaanxi, China

Aug. 2019 – Nov. 2022 (quitted)

Ph.D. student in Communications and Information Systems (GPA: 3.82/4.0, Major GPA: 3.84/4.0)

- Related Courses: Neural Networks and Fuzzy Systems, Stochastic Processes, Fundamentals of Information Theory

Emory University, Atlanta, GA, USA

Dec. 2020 - Present

Visiting scholar (remote) in Computer Science

Xidian University, Xi'an, Shaanxi, China

Aug. 2015 - Jun. 2019

B.Eng. in Telecommunications Engineering (GPA: 3.80/4.0, Major GPA: 3.76/4.0), pilot class

- Related Courses: Advanced Mathematics (I & II), Advanced Algebra, Selected Topics in Mathematical Statistics, Information Theory, Probability Theory and Mathematical Statistics, Introduction of Computer and C Language Program Design, Data Structure and Algorithm Analysis, Operating Systems
- Dissertation Title: Deep Learning Approaches to Large-Scale Nonlinear Problems and Applications in Wireless Communications

PROJECT EXPERIENCE

Uncertainty Quantification for the Explanations of Image Classification Neural Networks

Jun. 2022 - Current

Lab Research Program, Emory University (remote)

- Proposed methods to quantify both data and model uncertainties of the saliency map of image classification neural networks, in order to improve the network explainability.
- Two kinds of data uncertainty were considered: uncertainty due to the transformation of the input image, and uncertainty propagated from the output to the saliency map; model uncertainty was obtained via estimating the distribution of model parameters.
- Preliminary experiments demonstrated the effectiveness of the proposed approaches.

Accelerated gradient-free neural network training by multi-convex alternating optimization **May 2021 – Jan. 2022**

Lab Research Program, Emory University (remote)

- Proposed a novel formulation for neural network optimization named multi-convex Deep Learning Alternating Minimization (mDLAM), where the deeply nested activation functions are disentangled into separate functions innovatively coordinated by inherently convex inequality constraints.
- Provided closed-form solutions to all subproblems in mDLAM, and applied the Nesterov acceleration technique to speed up convergence, proving mDLAM higher efficiency rates.
- Extensive experiments demonstrated the effectiveness and linear convergence of our proposed mDLAM algorithm.

Model-parallel training of GA-MLPs based on ADMM framework

Mar. 2021 - Jul. 2022

Lab Research Program, Emory University (remote)

- The Graph Augmented Multi-Layer Perceptron (GA-MLP) model was split into independent layer partitions that allow the Alternating Direction Method of Multipliers (ADMM) method to achieve model parallelism.
- A novel algorithm named pdADMM-G was proposed to train the GA-MLP model, and the solutions to all subproblems produced by the algorithm are deducted. Moreover, the quantized variant coined pdADMM-G-Q is proposed to reduce the communication cost due to parallel training.
- Both algorithms were proved to converge to a (quantized) stationary point with sublinear convergence rate; experimental results on nine benchmark datasets deployed on AWS EC2 machines demonstrated the superior performance, convergence, and massive speedup of the two algorithms.

Mixed-parallel training of GCNs based on ADMM framework

Jun. 2021 - Jan. 2022

Lab Research Program, Emory University (remote)

- Proposed a distributed and parallel Graph Convolutional Network (GCN) training algorithm based on ADMM.

批注 [SG1]: I don't think you need this research interests section.

批注 [李泓仪2R1]: Sorry that I didn't explain clearly before. I would like to apply for the PhD program of Computer Science, not Master. So I think I should make my CV more academic and should keep this part.

批注 [SG3]: Your resume is too repetitive. You have these experiences which are also included in the works published area. I would suggest deleting or combining the points together.

批注 [SG4]: I tried to combine the below bullet point to this one. You don't need 4 bullets per research. 2 is enough. Especially since all your programs are research programs, it communicates that you are good at research. We get it. But what about social skills, hobbies? Clubs and leadership?

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- To alleviate the dependency of GCN layers, the proposed ADMM algorithm breaks the layers into independent blocks, which not only allowed layer-wise parallel training but also mitigated the heavy node dependency issue; partitioned a graph into communities to achieve node-wise parallel training, and kept the connections of inter-community nodes to avoid performance loss.
- Experiments on two benchmark datasets deployed on AWS EC2 machines demonstrated the performance and speedup of the proposed ADMM algorithm.

PUBLICATIONS & ACADEMIC SERVICES

- Junxiang Wang, **Hongyi Li (first-coauthor)**, Zheng Chai, Yongchao Wang, Yue Cheng, and Liang Zhao. Towards Quantized Model Parallelism for Graph-Augmented MLPs Based on Gradient-Free ADMM Framework. IEEE Transactions on Neural Networks and Learning Systems (TNNLS), (Impact Factor: 14.255), accepted.
- Junxiang Wang, **Hongyi Li**, and Liang Zhao. Accelerated Gradient-free Neural Network Training by Multi-convex Alternating Optimization. Neurocomputing, (Impact Factor: 5.779), 2022, 487: 130-143.
- Hongyi Li**, Junxiang Wang, Yongchao Wang, Yue Cheng, and Liang Zhao. Community-based Layerwise Distributed Training of Graph Convolutional Networks. NeurIPS 2021 Workshop on Optimization for Machine Learning (OPT 2021), accepted.
- Junxiang Wang, **Hongyi Li**, Yongchao Wang, and Liang Zhao. Accelerated Gradient-free Neural Network Training by Multi-convex Alternating Optimization. Workshop on "Beyond first-order methods in ML systems" of the 38th International Conference on Machine Learning, accepted.
- Hongyi Li**, Junxiang Wang, and Yongchao Wang. Improved Massive MIMO Detection Using Edge Graph Neural Network, preprint.
- PC member: OPT for Machine Learning NeurIPS Workshop 2022.
- External reviewers: NeurIPS'22, KDD'22, ICDM'22, ICLR'22, KDD'21, NeurIPS'21, etc.

TEACHING EXPERIENCE

- Xidian University** – *TA of Introduction to Electric and Electronic Engineering* **Sept. 2020 - Dec. 2020**
- Gave tutorials of fundamentals of analog and digital signal systems to a class of 95 students in English
 - Led weekly office hours discussing class topics and graded assignments and test papers

HONORS, AWARDS & EXTRACURRICULARS

- Valedictorian, Xidian University, 2019
- The First Prize for National English Competition for College Students (Top 0.5%), 2018
- The Second Prize for FLTRP National English Writing Competition for College Students (Top 0.03%), 2017
- China National Endeavor Scholarship (Top 5%), 2016
- Academic English Communication and Writing Skills Program, University of Cambridge (Online), 2022
- Team Leader of Future Elite Development Program, Harvard University, 2018
- Volunteer of the 13th Meeting of the International Committee on Global Navigation Satellite System, 2018
- Chair of Xidian Toastmaster English Club, Xidian University, 2017

PROFESSIONAL SKILLS & INTERESTS

- Programming Languages: Python (Pytorch, Tensorflow, PaddlePaddle, Pytorch Geometric), MATLAB, C
- Cloud Computing Servers: AWS, Chameleoncloud
- Operating Systems: Windows, Linux
- Certificates: TOEFL: 107/120 (Speaking: 22/30)
- Interests: Calligraphy, Singing, Hiking, Roller Skating, Badminton

批注 [SG5]: I would just delete this, and then mention above in your experience that your selected works were published.

批注 [李泓仪6R5]: I would prefer to delete the papers in the PROJECT EXPERIENCE and keep this part, as this list is much comprehensive.

批注 [SG7]: This does have to be its own heading and honestly I would probably delete.

批注 [李泓仪8R7]: I mentioned this part because I want to show that my professional skills are approved by the committee of top-tier conferences. So can we please keep this part? And I merged it with PUBLICATIONS to save space.

批注 [SG9]: Do you have any leadership or extracurricular activities? Your technical skills look great but from reading this I would think you are really boring and all you do is study, and maybe you are not a sociable person. Which is not something great. You have to show that you are a balanced individual with expertise in comp sci (this you have established).

批注 [李泓仪10R9]: Yes, I was the chair of Xidian Toastmaster English Club and I also joined two summer programs organized by Harvard and Cambridge, respectively. I have added them in the heading HONORS, AWARDS & EXTRACURRICULARS

批注 [SG11]: Impressive, but honestly kind of a waste of space. Just pick the most important ones. And put it in your education. Like Valedictorian. Or some top scholarship.

批注 [李泓仪12R11]: I deleted the less important ones.

批注 [SG13]: Please add more interests. Interests are very important for the admissions committee to get to know you so that they feel you are not just a robot but an actual human.

批注 [李泓仪14R13]: I added some.