Mingqing Xiao

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Education

School of Electronics Engineering and Computer Science, **Beijing, China**

Peking University (PKU) ***Sep 2016-present***

- Major in computer science
- Overall GPA: 3.73/4.0 (88/100, Top 10%), Major GPA: 3.74/4.0 (88/100, Top 10%)
- Representative courses: Mathematical Analysis: 95/100, Probability Theory and Statistics(A): 94/100, Set Theory and Graph Theory: 95/100, Algebraic Structure and Combinatorial Mathematics: 97/100, Data Structure and Algorithm(A): 90/100, Algorithm Design and Analysis: 90/100, Java Programming: 94/100, Convex Analysis and Optimization Methods: 88/100, Introduction to Parallel and Distributed Computing: 95/100

School of Psychological and Cognitive Sciences, **Beijing, China**

Peking University (PKU) ***Sep 2017-present***

- Secondary major, Major GPA: 3.76/4.0 (89/100)
- Representative courses: Functional Anatomy of Central Nervous System: 93/100, General Psychology: 92/100, Experimental Psychology: 88/100

Publications

Mingqing Xiao, Adam Kortylewski, Ruihai Wu, Siyuan Qiao, Wei Shen, Alan Yuille, *TDAPNet: Prototype Network with Recurrent Top-Down Attention for Robust Object Classification under Partial Occlusion*, arXiv preprint arXiv:1909.03879

Jia Li, **Mingqing Xiao**, Cong Fang, Yue Dai, Chao Xu, and Zhouchen Lin, *Training Deep Neural Networks by Lifted Proximal Operator Machines*, submitted to IEEE Trans. Pattern Analysis and Machine Intelligence.

Research Interests

My research interests lie in machine learning and the intersection between machine learning and cognitive science, with emphasis on optimization and computer vision.

Research Experience

Prototype-based robust object classification under partial occlusion Baltimore, MD, USA

Supervisor: Prof. Alan Yuille, Johns Hopkins University *June 2019-Sep 2019*

- Tackle vulnerability of deep neural networks in occlusion conditions by introducing prototypes, partial matching and top-down attention regulation.
- Learn feature activation prototypes and do partial matching between features and prototypes by estimated attention based on feature dictionary and activation scale.
- Propose top-down attention regulation in convolution layers to reduce the contamination by occlusion with inspiration from neuroscience research.
- **In submission to AAAI 2020 (first author)**.

Extension of Lifted Proximal Operator Machines Beijing, China

Supervisor: Prof. Zhouchen Lin, Peking University *Feb 2019-June 2019*

- Derive and implement Lifted Proximal Operator Machines (LPOM) for recurrent neural network and binary neural network.
- Introduce auxiliary variables for optimization of neural network and theoretically formulate the expressions for updating all the variables with convergence proof.

- Apply fix-point algorithm, Newton's method, APG algorithm, gradient descent algorithm to solve the sub optimization problems and implement them in matlab and C++.

Parallel Lifted Proximal Operator Machines Beijing, China
Supervisor: Prof. Zhouchen Lin, Peking University *Oct 2018-Feb 2019*

- Parallelize Lifted Proximal Operator Machines (LPOM), a newly proposed optimization method to train neural networks without gradient.
- Derive the asynchronous parallel algorithm based on asynchronous block coordinate descent algorithm and identify the problem of slow convergence rate.
- Propose and implement a novel parallel algorithm, which achieves satisfactory speedup over serial LPOM without degradation in performance and outperforms SGD and its variants with faster convergence and lower errors on auto-encoder training.
- **In submission to TPAMI** as part of the work (second author).

New Tensor Decomposition Beijing, China
Supervisor: Prof. Zhouchen Lin, Peking University *May 2018-July 2018*

- To generalize LDU matrix decomposition to tensor.
- Conduct comprehensive literature review about tensor decomposition methods.
- Propose new definitions of tensor forms and operations.
- Produce a preliminary tensor decomposition form through mathematical derivation.

Project Experience

Course projects: *Sep 2017-June 2019*

- Parallelizing shortest single source path problem
- Implementing an automatic-differentiation computation graph
- Implementing a compiler for miniC (a simplified C)
- Operating system project: developing a course lab regarding stack overflow attack under canary protection (for students taking course: Introduction to computer system)
- Developing a smart contract on Ethereum (blockchain)
- Developing a 3D sandbox game by JAVA
- Tackling captcha recognition problem through ResNet
- Designing and carrying out a psychology experiment on memory: the impact of self-construal on collaborative inhibition

Teaching Experience

- Teaching assistant of Algorithm Design and Analysis, 2019.

Honors & Awards

- Merit Student of Peking University (Top 10%). 2018
- Award of Academic Excellents of Peking University (Top 15%). 2017
- "May 4th" Scholarship of Peking University (Top 15%). 2017
- First prize of the China Undergraduate Mathematical Contest in Modeling in Beijing. 2017 & 2018.
- Honor prize of American College Mathematical Modeling Competition. 2018.
- Second prize of the Chinese Mathematics Competitions. 2017.
- Third prize of the Programming Contest of Peking University. 2017 & 2018.

Skills

- TOEFL: 105 (Reading 27/ Listening 30/ Speaking 23/ Writing 25).
- GRE: Verbal 155, Quantitative 169, AW 4.0.
- Programming language: C, C++, python, matlab, Java, lisp (proficient in C++).
- Machine learning library: Tensorflow, PyTorch, mkl.