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 (Level-A) : 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, Introduction to Stochastic Processes: 95/100, Convex Analysis and Optimization Methods: 88/100

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

Peking University (PKU)   *Sep 2017-present*

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

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 occlusion-robust vision system (In progress)   Baltimore, MD, USA
Supervisor: Prof. Alan Yuille, Johns Hopkins University   *June 2019-present*

- Tackle vulnerability of deep neural networks in occlusion conditions by prototype learning.
- Learn object prototype exemplars from features of deep neural networks by locating the center of objects and learning metric.
- Do partial matching under occlusion conditions through key points.

Normalization in training deep neural networks (In progress)   Baltimore, MD, USA
Supervisor: Prof. Alan Yuille, Johns Hopkins University   *June 2019-present*

- Analyze how normalizations like batch normalization and spectral normalization help training
- Propose new general initialization methods that provide appropriate distribution for input of layers to replace batch normalizations from the perspective of internal covariant shift
- Propose new normalization method to further improve the training from the perspective of smoothing the landscape.

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), a newly proposed optimization method to train neural networks without gradient, 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 batch 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
- ➢ Huawei Scholarship 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.