He Lyu

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Education

Michigan State University — *East Lansing, MI*
PhD Student in Computation Mathematics, Science and Engineering. GPA: 4.00/4.00 — *Aug. 2018 - present*
- Advisor: Dr. Rongrong Wang

Fudan University — *Shanghai, China*
MS Student in Computational Mathematics — *Sept. 2016 - Jun. 2018*

Fudan University — *Shanghai, China*
BS in Mathematics and Applied Mathematics — *Sept. 2012 - Jun. 2016*
- Minor in Economics

Research Interests

- Machine Learning
- Compressed Sensing
- Optimization

Research Experience

Michigan State University-Dept of CMSE — *East Lansing, MI*
Graduate Research Assistant — *Aug. 2018-present*
- Proposed and analyzed an adaptive quantization method for direct digital image acquisition that yields a better information conversion rate than the state-of-the-art method in cameras. Joint work with Rongrong Wang et al., manuscript under review. PPA no. 63/024,861.
- Proposed and analyzed an algorithm that extends robust principal component analysis (RPCA) to nonlinear manifolds, which can be applied to manifold denoising tasks. Joint work with Rongrong Wang et al., published at NeurIPS 2019.
- Proposed a unified framework to establish perturbation bounds for the left and right singular spaces, which greatly simplifies the proofs of some existing results as well as provides improved error bounds . Joint work with Rongrong Wang, manuscript under review.

Fudan University-Dept of Mathematics and Applied Mathematics — *Shanghai, China*
- Thesis: "A review on variance reduction based stochastic gradient descent methods". Reasearched and compared large-scale optimization algorithms based on variance reduction for stochastic gradient descent (SGD), including SVRG, SAGA, SAG, etc. — *Feb. 2016-Jun. 2016*

Presentations

Jun. 2019. *Image Reconstruction from Sigma Delta Quantization using Super-Resolution Techniques*. Poster presentation: UTD 2019 workshop(MSDAS), Dallas, TX.

Dec. 2019. *Manifold Denoising by Nonlinear Robust Principal Component Analysis*. Poster presentation: Thirty-third Conference on Neural Information Processing Systems, Vancouver, Canada.

Teaching Experience

Spring 2020 — **Numerical Linear Algebra CMSE 823**, Teaching Assistant — *MSU*

Fall 2019 — **Applied Machine Learning in the Physical and Life Sciences CMSE 890-005**, Teaching Assistant — *MSU*

Awards and Achievements

2019 **CMSE Outstanding Early Student Award**, Michigan State University

2017 **National Scholarship**, Fudan University

2017 **Second Place of Amateur Woman Group in the Ying's Cup National University Go(Weiqi) Competition**, Xi'an, China

2015 **First Prize Scholarship**, Fudan University

2014 **Third Prize in the National University Students Mathematics Modeling Contest**, Shanghai division, China

2010 **Second Place in the Shanxi Province Go Tournament**, Taiyuan,China

Software Skills

- MATLAB
- Python(PyTotch, TensorFlow)
- Latex
- C

Other Skills

- Proficient in Go(Weiqi), Amateur 5-dan Go Player

Publications

Conference paper

Lyu H, Sha, N., Qin, S., Yan, M., Xie, Y. and Wang, R., 2019. Manifold Denoising by Nonlinear Robust Principal Component Analysis. In Advances in Neural Information Processing Systems (pp. 13390-13400).

In Review

Lyu, H. and Wang, R., 2020. Sigma Delta quantization for images. arXiv preprint arXiv:2005.08487.

Lyu, H. and Wang, R., 2020. An exact sinΘ formula for matrix perturbation analysis and its applications . arXiv preprint arXiv:2011.07669.