Yunpeng Shi

Contact Information

Program in Applied & Computational Mathematics **Princeton University**
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Research Interests

Cryo-electron Microscopy Imaging, 3D Computer Vision, Robust Estimation, Probability Theory, Optimization, Machine Learning

Education

Ph.D. in Mathematics, University of Minnesota Aug 2020
- Advisor: Prof. Gilad Lerman
- Thesis topic: Robust Synchronization and Its Applications in 3D Computer Vision
- Minor in Computer Science

M.S. in Mathematics, University of Minnesota May 2018

B.A. in Mathematics, Honors Program, University of Minnesota May 2015
- Minor in Statistics
- Summa Cum Lauder

Positions

- **Postdoctral Research Associate**, Sep 2020 - present
  Program in Applied & Computational Mathematics (PACM), Princeton University
- **Graduate Research Assistant**, June 2019 - May 2020
  School of Mathematics, University of Minnesota
- **MnDrive Graduate Assistant**, June 2018 - May 2019
  Informatics Institute, University of Minnesota
- **Graduate Teaching Assistant**, Sep 2016 - May 2018
  School of Mathematics, University of Minnesota

Publications

1. Shaohan Li, **Y. Shi** and Gilad Lerman, Fast, Accurate and Memory Efficient Partial Permutation Synchronization. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022.
2. **Y. Shi** and Amit Singer, Ab-initio Contrast Estimation and Denoising of Cryo-EM Images. *arXiv preprint*, 2022.
3. **Y. Shi**, Shaohan Li, Tyler Maunu and Gilad Lerman, Scalable Cluster Consistency Statistics for Robust Multi-object Matching. *International Conference on 3D Vision (3DV)*, **Oral Presentation**, 2021.
4. G. Lerman and **Y. Shi**, Robust Group Synchronization via Cycle-Edge Message Passing. *Foundations of Computational Mathematics*, 2021.
5. **Y. Shi**, S. Li and G. Lerman, Robust Multi-object Matching via Iterative Reweighting of the Graph Connection Laplacian. *Conference on Neural Information Processing Systems (NeurIPS)*, 2020.
6. **Y. Shi** and G. Lerman, Message Passing Least Squares Framework and its Application to Rotation Synchronization. *International Conference on Machine Learning (ICML)*, 2020.
7. **Y. Shi** and G. Lerman, Estimation of camera locations in highly corrupted scenarios: All about that base, no shape trouble. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018.

8. G. Lerman, **Y. Shi** and T. Zhang, Exact camera location recovery by least unsquared deviations. *SIAM Journal on Imaging Sciences*, 2018.

Invited Talks

- *Ab-initio Contrast Estimation and Denoising of Cryo-EM Images*, Flatiron Institute, Online — Apr 2022
- *Joint Denoising and Contrast Estimation for Cryo-EM Images*, IDeAS Seminar, PACM, Princeton University, Princeton, NJ — Dec 2021
- *Robust Group Synchronization via Cycle-Edge Message Passing*, IDeAS Seminar, PACM, Princeton University, Princeton, NJ — Feb 2020
- *Robust Synchronization via Cycle Consistency Inference*, Probability Seminar, University of Minnesota, Minneapolis, MN — Nov 2019
- *Exact Camera Location Recovery by Least Unsquared Deviations*, Probability Seminar, University of Minnesota, Minneapolis, MN — Dec 2017

Conference Presentations

- *Joint Denoising and Contrast Estimation for Cryo-EM Images* (oral presentation), SIAM Conference on Imaging Sciences, Online — Mar 2022
- *Ab-initio Contrast Estimation and Denoising of Cryo-EM Images.* (poster presentation) 4th International Symposium on Cryo-3D Image Analysis — Mar 2022
- *Scalable Cluster Consistency Statistics for Robust Multi-object Matching. (oral presentation)* International Conference on 3D Vision (3DV) — Dec 2021
- *Robust Multi-object Matching via Iterative Reweighting of the Graph Connection Laplacian. (poster presentation)* Conference on Neural Information Processing Systems (NeurIPS) — Dec 2020
- *Message Passing Least Squares Framework and its Application to Rotation Synchronization. (poster presentation)* International Conference on Machine Learning (ICML) — July 2020
- *Estimation of camera locations in highly corrupted scenarios: All about that base, no shape trouble* (poster presentation), IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Salt Lake City, UT — Jun 2018
- *An evaluation of the effectiveness of ramp meters in reducing traffic congestions using cellular automaton* (oral presentation), National Conference on Undergraduate Research, Cheney, WA — Apr 2015

Teaching Experiences

Department of Mathematics, **Princeton University**, NJ, USA

- Instructor — Jan 2022 - May 2022
  - Math Alive — Spring 2022

School of Mathematics, **University of Minnesota**, MN, USA

- Graduate Teaching Assistant — Sep 2016 - May 2018
  - Linear Algebra with Applications to Differential Equations — Spring 2018
  - Short Calculus — Fall 2017
  - Calculus II — Spring 2017
  - Calculus I — Fall 2016

PATENT	• Corruption detection for digital three-dimensional environment reconstruction, US patent	2020
PROFESSIONAL SERVICES	• journal reviewer: IEEE Transactions on Circuits and Systems for Video Technology (IEEE-TCSVT)	
	• conference reviewer, NeurIPS 2022	
	• conference reviewer, ICML 2022	
	• conference reviewer, AISTATS 2022 (**Top Reviwer**)	
	• conference reviewer, ICLR 2022	
	• conference reviewer, NeurIPS 2021	
	• conference reviewer, AISTATS 2021	
OTHER PROFESSIONAL TRAVEL	• MSRI Summer School: Mathematics of Machine Learning, University of Washington & Microsoft Research, Seattle, WA	Aug 2019
AWARDS	• Vanky Men Fellowship, School of Mathematics, University of Minnesota	Sep 2019
	• MnDrive Graduate Research Fellowship in Robotics, Informatics Institute, University of Minnesota	June 2018
	• Outstanding Graduate in Mathematics, University of Minnesota	May 2015
	• Honorable Mention, The Mathematical Contest in Modeling (MCM)	Feb 2014
	• Top 1, Mathematical Association of America North Central Section Team Competition	Oct 2013
SKILLS	Python, MATLAB, Mathematica, R	