Yu Sun

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BIOGRAPHY

I am a postdoctoral scholar working with **Prof. Katherine L. Bouman** in the Department of Computing and Mathematical Sciences at California Institute of Technology (Caltech). My research is focused on developing principled computational imaging algorithms integrated with machine learning models. Prior to Caltech, I received my Ph.D. degree from Washington University in St. Louis (Wash U) supervised by **Prof. Ulugbek S. Kamilov**. My dissertation was the winner of the **2022 Turner Ph.D. Dissertation Award**. I have collaborated with researchers from various institutes including Barnes Jewish Hospital, Massachusetts General Hospital, Los Alamos National Laboratory, and Boston University. I am an elected member of the **IEEE SPS Technical Committee of Computational Imaging (CI TC)**.

Research Interests: Computational Imaging, Machine Learning, Computer Vision.

EDUCATION

Washington University in St. Louis, St. Louis, MO Jan. 2018 – May 2022
Ph.D. in Computer Science
Advisor: *Prof. Ulugbek Kamilov*

Washington University in St. Louis, St. Louis, MO Aug. 2015 – May 2017
M.S. in Data Analytics & Statistics

Sichuan University, Chengdu, China Sep. 2011 – Jun. 2015
B.S. in Electronic and Information Engineering
Advisor: *Prof. Qinggong Guo*

WORKING EXPERIENCE

California Institute of Technology, Pasadena, CA Jul. 2022 – Present
Postdoctoral Fellow, Computing and Mathematical Sciences Department
Advisor: *Prof. Katie Bouman*

Cedars Sinai Hospital, Los Angles, CA Aug. 2022 – July 2023
Clinical Data Research Specialist
Mentor: *Dr. David Ouyang*

Nvidia, Santa Clara, CA May 2021 – Aug. 2021
Research Intern (Learning and Perception Research)
Mentor: *Dr. Orazio Gallo*

Capacity, St. Louis, MO May 2017 – Aug. 2017
Developer Intern

AWARDS

Turner Ph.D. Dissertation Award 2022
Top in the class
Department of Computer Science
Washington University in St. Louis

Student Travel Award 2019
NeurIPS

Honor (top 15%) 2019-2021
Department of Computer Science
Washington University in St. Louis

PUBLICATIONS

Pre-print: (*'∗' indicates equal contribution*)

[a 2.] **Y. Sun**, Z. Wu, Y. Chen, B. T. Feng, and K. L. Bouman "Provable Probabilistic Imaging using Score-Based Generative Priors." **Preprint** arXiv:2310.10835.

[a 1.] Z. Wu, T. Yin, **Y. Sun**, R. Frost, A. V. D. Kouwe, A. V. Dalca, and K. L. Bouman "Learning Task-Specific Strategies for Accelerated MRI." **Preprint** arXiv:2304.12507.

Journal: (*'∗' indicates equal contribution*)

[j 14.] P. Goyes-Peñafiel, E. Vargas, C. V. Correa, **Y. Sun**, U. S. Kamilov, B. Wohlberg, and H. Arguello, "Coordinate-Based Seismic Interpolation in Irregular Land Survey: A Deep Internal Learning Approach," in **IEEE Trans. Geo. Rem. Sen.**, vol. 61, pp. 1-12, 2023.

[j 13.] R. Liu*, **Y. Sun***, J. Zhu, L. Tian, and U. S. Kamilov, "Recovery of Continuous 3D Refractive Index Maps from Discrete Intensity-Only Measurements using Neural Fields." **Nature Machine Intelligence**, vol. 4, pp. 781–791, 2022. **[Impact Factor = 27.3]**

[j 12.] W. Gan, **Y. Sun**, C. Eldeniz, J. Liu, H. An, and U. S. Kamilov, "Deformation-Compensated Learning for Image Reconstruction without Ground Truth," **IEEE Trans. Med. Imag.**, vol. 41, no. 9, pp. 2371-2384, 2022.

[j 11.] **Y. Sun**, J. Liu, M. Xie, B. Wohlberg, and U. S. Kamilov, "CoIL: Coordinate-based Internal Learning for Tomographic Imaging." **IEEE Trans. Comput. Imag**, vol. 7, pp. 1400-1412, 2021

[j 10.] J. Liu, **Y. Sun**, W. Gan, X. Xu, B. Wohlberg, and U. S. Kamilov, "SGD-Net: Efficient Model-Based Deep Learning with Theoretical Guarantees." **IEEE Trans. Comput. Imag.**, vol. 7, pp. 598-610, June 2021

[j 9.] **Y. Sun***, Z. Wu*, X. Xu*, B. Wohlberg, and U. S. Kamilov, "Scalable Plug-and-Play ADMM with Convergence Guarantees." **IEEE Trans. Comput. Imag.**, vol. 7, pp. 849-863, July 2021.

[j 8.] M. Torop, S. Kothapalli, **Y. Sun**, J. Liu, S. Kahali, D. A. Yablonskiy, and U. S. Kamilov, "Deep learning using a biophysical model for Robust and Accelerated Reconstruction (RoAR) of quantitative and artifact-free R2* images." **Magn. Reson. Med.**, vol. 84, pp. 2932-2942, 2020.

[j 7.] X. Xu, **Y. Sun**, J. Liu, B. Wohlberg, and U. S. Kamilov, "Provable Convergence of Plug-and-Play Priors with MMSE denoisers." **IEEE Signal Process. Lett.**, vol. 27, pp. 1280-1284, 2020.

[j 6.] G. Song, **Y. Sun**, J. Liu, and U. S. Kamilov, "A New Recurrent Plug-and-Play Prior Based on the Multiple Self-Similarity Network." **IEEE Signal Process. Lett.**, vol. 27, pp. 451-455, 2020.

[j 5.] J. Liu, **Y. Sun**, C. Eldeniz, W. Gan, H. An, and U. S. Kamilov, "RARE: Image Reconstruction using Deep Priors Learned without Ground Truth." **IEEE J. Sel. Topics Signal Process.**, vol. 14, no. 6, pp. 1088-1099, 2020.

[j 4.] Z. Wu, **Y. Sun**, A. Matlock, J. Liu, L. Tian, and U. S. Kamilov, "SIMBA: Scalable Inversion in Optical Tomography using Deep Denoising Priors." **IEEE J. Sel. Topics Signal Process.**, vol. 14, no. 6, pp. 1163-1175, 2020.

[j 3.] **Y. Sun***, J. Liu*, and U. S. Kamilov, "Block Coordinate Regularization by Denoising," **IEEE Trans. Comput. Imag.**, vol. 6, pp. 908-921, 2020.

[j 2.] **Y. Sun**, B. Wohlberg, and U. S. Kamilov, "An Online Plug-and-Play Algorithm for Regularized Image Reconstruction." **IEEE Trans. Comput. Imag.**, vol.5, no.3, pp.395-408, September 2019.

[j 1.] **Y. Sun**, Z. Xia, and U. S. Kamilov, "Efficient and accurate inversion of multiple scattering with deep learning," **Optics Express**, vol.26, no.11, pp.14678-14688, May 2018.

Conference: (*'∗' indicates equal contribution*)

[c 13.] W. Shangguan*, **Y. Sun***, W. Gan, and U. S. Kamilov, "Learning Cross-Video Neural Representations for High-Quality Frame Interpolation." European Conference on Computer Vision **(ECCV)**, Tel Aviv, Israel, October 23-27, pp. 511-528. **[Acceptance rate: 1492/5803 = 26%]**

[c 12.] M. Xie*, J. Liu*, **Y. Sun**, B. Wohlberg, U. S. Kamilov "Joint Reconstruction and Calibration using Regularization by Denoising." Proc. IEEE Int. Conf. Comp. Vis. Workshops (**ICCVW 2021**), 2021

[c 11.] J. Liu, **Y. Sun**, W. Gan, X. Xu, B. Wohlberg, and U. S. Kamilov, "Stochastic Deep Unfolding for Imaging Inverse Problems," Proc. IEEE Int. Conf. Acoustics, Speech and Signal Process (**ICASSP 2021**), Toronto, Canada, June 6-11, pp. 1395-1399.

[c 10.] **Y. Sun**, J. Liu, Y. Sun, B. Wohlberg, and U. S. Kamilov, "Async-RED: A Provably Convergent Asynchronous Block Parallel Stochastic Method using Deep Denoising Priors." International Conference on Learning Representations **(ICLR 2021)**. **[Spotlight: 114/2997 = 4%]**

[c 9.] W. Gan, **Y. Sun**, C. Eldeniz, H. An and U. S. Kamilov, "Deep Image Reconstruction using Unregistered Measurements without Groundtruth." Proc. Int. Symp. Biomedical Imaging 2021 (**ISBI 2021**), Nice, France, April 13-16, pp. 1531-1534.

[c 8.] X. Xu, J. Liu, **Y. Sun**, B. Wohlberg, and U. S. Kamilov, "Boosting the Performance of Plug-and-Play Priors via Denoiser Scaling," Proc. 54th Asilomar Conf. Signals, Systems, & Computers (**ACSSC 2020**), Pacific Grove, CA, November 1–5, pp. 1305-1312.

[c 7.] Z. Wu, **Y. Sun**, J. Liu, and U. S. Kamilov, "Online Regularization by Denoising with Application to Phase Retrival," Workshop on Learning for Computational Imaging, **ICCVW 2019**, pp. 3887-3895.

[c 6.] J. Liu, **Y. Sun**, X. Xu, and U. S. Kamilov, "Image Restoration using Total Variation Regularized Deep Image Prior," Proc. IEEE Int. Conf. Acoustics, Speech and Signal Process. (**ICASSP 2019**), pp.7715-7719.

[c 5.] J. Liu, **Y. Sun**, and U. S. Kamilov, "Infusing Learned Priors into Model-Based Multispectral Imaging," IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (**CAMSAP 2019**).

[c 4.] **Y. Sun**, J. Liu, and U. S. Kamilov, "Block Coordinate Regularization by Denoising," Proc. Ann. Conf. Neural Information Processing Systems (**NeurIPS 2019**), pp. 382–392. **[Acceptance rate: 1428/6743 = 21%]**

[c 3.] **Y. Sun**, B. Wohlberg, and U. S. Kamilov, "Plug-In Stochastic Gradient Method," Proc. International Biomedical and Astronomical Signal Processing Frontiers Workshop (**BASP 2019**), p.75.

[c 2.] **Y. Sun**, S. Xu, Y. Li, L. Tian, B. Wohlberg, and U. S. Kamilov, "Regularized Fourier Ptychography using an Online Plug-and-Play Algorithm," Proc. IEEE Int. Conf. Acoustics, Speech and Signal Process. (**ICASSP 2019**), pp.7665-7669. **[Oral]**

[c 1.] **Y. Sun** and U. S. Kamilov, "Stability of Scattering Decoder For Nonlinear Diffractive Imaging," Proc. 4th International Traveling Workshop on Interactions between Sparse models and Technology (**iTWIST 2018**), p.31. **[Oral]**

PRESENTATIONS & TALKS

Conference Presentations:

[p 5.] 'Learning Cross-Video Neural Representations for High-Quality Frame Interpolation.' Virtual, ECCV 2022.

[p 4.] 'SIMBA: Scalable Inversion in Optical Tomography using Deep Denoising Priors.' Virtual, ICIP 2021.

[p 3.] 'Async-RED: A Provably Convergent Asynchronous Block Parallel Stochastic Method using Deep Denoising Priors.' Virtual, ICLR 2021.

[p 2.] 'Block-coordinate Regularization by Desnoising.' Vancouver, Canada, Dec. 8-14, NeurIPS 2019.

[p 1.] 'Stability of Scattering Decoder for Nonlinear Diffractive Imaging.' Marseille, France, Nov. 21-23, iTWIST 2018.

Invited Talks:

[t 6.] Invited speaker at CVPR CCD Workshop, June 2022. Topic: '3D Tomographic Microscopy using Neural Fields'

[t 5.] Invited speaker at Rice University Imaging & vision seminar, July 2022. Topic: 'Integrating physical and learning models for computational imaging'

[t 4.] Invited talk at Stanford Computational Imaging Lab, Jan 2022. Topic: 'Integrating physical and learning models for computational imaging'

[t 3.] invited talk at Boston University Computational Imaging Systems Lab, Dec 2021. Topic: 'Integrating physical and learning models for computational imaging'

[t 2.] Invited talk on at CMU Image Science Lab, Dec 2021. Topic: 'Integrating physical and learning models for computational imaging'

[t 1.] Invited talk at Caltech Computational Cameras Group, Oct 2021. Topic: 'Integrating physical and learning models for computational imaging'

PROFESSIONAL SERVICES

- **Professional societies:**
  - IEEE Signal Processing Society, Member 2022-present
  - IEEE Signal Processing Society, Student Member 2018-2022
- **Technical committees:**
  - IEEE SPS Technical Committee of Computational Imaging (CI TC), Elected Member 2023-present
- **Journal Editor:**
  - IEEE Open Journal of Signal Processing, Consultant Associate Editor 2022-present
- **Journal Reviewer:**
  - OSA **Optica**
  - SIAM Journal on Imaging Sciences (**SIIMS**)
  - IEEE Transaction on Pattern Analysis and Machine Intelligence (**TPAMI**)
  - IEEE Journal of Selected Topics in Signal Processing (**JSTSP**)
  - IEEE Transaction on Computational Imaging (**TCI**)
  - IEEE Transaction on Signal Processing (**TSP**)
  - IEEE Transaction on Image Processing (**TIP**)
  - IEEE Signal Processing Letters (**SPL**)
  - Signal Processing (**SP**)
  - Applied Mathematics and Computation (**AMC**)
  - Digital Signal Process (**DSP**)
  - SPIE Journal on Electronic Imaging (**JEI**)

- **Conference Reviewer/PC:**
  - International Conference on Learning Representations (**ICLR**) since 2021
  - International Conference on Machine Learning (**ICML**) since 2022
  - Neural Information Processing Systems (**NeurIPS**) since 2020
  - Computer Vision and Pattern Recognition (**CVPR**) since 2022
  - International Joint Conference on Artificial Intelligence (**IJCAI**) since 2020
  - IEEE International Conference on Acoustics, Speech and Signal Processing (**ICASSP**) since 2020

TEACHING EXPERIENCE

As Guest Lecturer:

- Introduction to Machine Learning, Shanghai Jiao Tong University (SJTU).

As Course Teaching Assistant:

- CSE 585T Sparse Model for Imaging, Wash U. 2018 Fall
- ESE 415 Optimization, Wash U. 2018–2020 Spring
- CSE 427S Cloud Computing and Big Data Application, Wash U. 2016–2017 Fall & Spring

SUPERVISED STUDENTS

Current Students at Caltech (Co-advised with Prof. Bouman):

- Zihui Wu (Ph.D. CMS)
- Heriniaina Rajaoberison (Ph.D. CMS)

Past Students at Wash U. (Co-advised with Prof. Kamilov):

- Wentao Shangguan (M.S. CSE), *Now Ph.D student at Boston U.*
- Renhao Liu (B.S./M.S. CSE), *Now at Google Inc.*
- Mingyang Xie (B.S. CSE, 2021), *Now Ph.D student at U. Maryland*
- Yiran Sun (M.S., 2021), *Now Ph.D student at Rice U.*
- Weijie Gan (M.S. CSE, 2020, Co-supervised with Xiaojian Xu), *Now Ph.D. student at Wash U.*
- Zihui Wu (B.S. CSE, 2020), *Now Ph.D. student at Caltech*
- Max Torop (M.S. CSE, 2020), *Now Ph.D. student at Northeastern U.*
- Shiqi Xu (M.S. ESE, 2019), *Now Ph.D. student at Duke U.*
- Jiaming Liu (M.S. ESE, 2018), *Now Ph.D. student at Wash U.*
- Zach Pewitt (M.S. ESE, 2018), *Now at Boeing*
- Josehp Han (M.S. ESE, 2018), *Now at Deloitte*
- Jialong Zhang (M.S. ESE, 2018), *Now at Schlumberger*
- Fangying Zhai (M.S. ESE, 2018)
- Chunyuan Li (M.S. CSE, 2018)