Chao Wang

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Southern University of Science and Technology,
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Employment & Experience

Southern University of Science and Technology **Guangdong, China**

- **Assistant Professor** at Dept. Statistic & Data Science Sep. 2021 - Present

University of California, Davis **California, USA**

- **Postdoctoral Researcher** at TETRAPODS Institute of Data Science Jul. 2020 - Present
  Advisors: Prof. Chen-Nee Chuah & Prof. Nina Amenta

University of Texas (UT) Southwestern Medical Center & UT Dallas **Texas, USA**

- **Postdoctoral Researcher** at Medical Artificial Intelligence and Automation Lab Oct. 2018 - Jun. 2020
  Advisors: Prof. Xun Jia & Prof. Yifei Lou

Education

The Chinese University of Hong Kong **Hong Kong**

- **Ph.D. in Mathematics** (GPA: 3.92/4.00) 2015 - 2018
  Advisor: Prof. Raymond H. Chan
  Dissertation: Sparse Recovery Algorithms for 3D Imaging Using Point Spread Function Engineering

Shantou University **Shantou, China**

- **M.Sc. in Applied Mathematics** (GPA: 3.84/4.00) 2012 - 2015
  Advisor: Prof. Fu-Rong Lin
  Thesis: Research on Regularization Parameter Selection Methods in Inverse Problems

Hanshan Normal University **Chaozhou, China**

- **B.Sc. in Mathematics** (GPA: 3.78/4.00) 2008 - 2012

Research Interests

Scientific Computing, Image Processing, Interdisciplinary Mathematical Modeling, Compressed Sensing, Convex and Nonconvex Optimization, Hyperspectral Imaging, Tensor Computation, Deep Learning, Numerical Linear Algebra

Grants

Investigator, NSFC (300,000 RMB) 2023-2025

- The Study of Point Spread Function-based Deep Learning Models and Algorithms for Three-dimensional Point Source Localization

Investigator, Guangdong Basic and Applied Basic Research Foundation (150,000 RMB) 2024-2026

- The Study of Single-lobe Point Spread Function-based approach for Three-dimensional Point Source Localization and Tracking

Investigator, Shenzhen Science and Technology Program (500,000 RMB) 2023-2025

- Tensor Reconstruction Models and Algorithms in Brain Imaging

Co-Investigator, Shenzhen Fundamental Research Program (1,500,000 RMB) 2023-2026

- Algorithms Study on Early Diagnosis Systems for Neurodegenerative Disease

Co-Investigator, HKRGC Grant (600,000 HKD) 2021 - 2023

- Novel Computational Methods for 3D Point Source Localization based on Point Spread Function Analytics

Core-member, National Key R&D Program of China (12,000,000 RMB) 2024-2026

- The Mathematical Issues and Their Applications in the Construction and Analysis of Brain Dynamic Imaging

Publications

Preprint (* indicates corresponding author, # indicates co-first author)

[1] T. Wang#, Z. Yan#, J. Li, X. Zhao, **C. Wang***, M. Ng. "Hyperspectral and multispectral image fusion with arbitrary resolution through self-supervised representations" arXiv preprint arXiv: 2405.17818

[2] GB. Rehm, **C. Wang**, I. Cortes-Puch, CN. Chuah, J. Adams. "Deep learning-based detection of the acute respiratory distress syndrome: what are the models learning? "arXiv preprint arXiv:2109.12323

Accepted/ Published

[3] S. Niu#, L. Lin#, J. Huang, C. Wang*. "OwMatch: conditional self-labeling with consistency for open-world semi-supervised learning". *Neural Information Processing Systems (NeurIPS)*, 2024 (to appear)

[4] **C. Wang,** JF. Aujol, G. Gilboa, Y. Lou.* "Minimizing quotient regularization model" *Inverse Problems and Imaging*. 2024 (to appear)

[5] J. Li, X. Zhao*, J. Wang, **C. Wang**, M. Wang. "Superpixel-informed implicit neural representation for multi-dimensional data". *European Conference on Computer Vision (ECCV)* 2024 (to appear)

[6] G. Li, Z, Tu, J. Lu, **C. Wang**, L. Shen. "Multi-dimensional image recovery via Self-Supervised Nonlinear Transform Based a Three-Directional Tensor Nuclear Norm" *Numerical Mathematics: Theory, Methods and Applications*, 17(3), 727-750, 2024.

[7] M. Chowdhury*, **C. Wang**, Y. Lou. "Poissonian Image Restoration via the L1/L2-based minimization" *Journal of Scientific Computing*, 101:17, 2024

[8] L. Luo, Z. Tu, J. Lu, **C. Wang**, C. Xu. "A nonlinear high-order transformations-based method for high-order tensor completion". *Signal Processing*, 109514, 2024.

[9] H. Zheng, Y. Lou, G. Tian, **C. Wang***. "A scale-invariant relaxation in low-rank tensor recovery with an application to tensor completion". *SIAM Journal on Imaging Sciences*, 17(1),756-783, 2024.

[10] J. Lu, J. Zhang, **C. Wang**, C. Deng. " Hyperspectral sparse fusion using adaptive total variation regularization and superpixel-based weighted nuclear norm". *Signal Processing*, 220, 109449, 2024.

[11] **C. Wang***, M. Yan, J. Yu. "Sorted L1/L2 Minimization for Sparse Signal Recovery". *Journal of Scientific Computing,* 99(32),2024.

[12] T. Wang, J. Li, M. Ng, **C. Wang***. "Nonnegative matrix functional factorization for hyperspectral unmixing with non-uniform spectral sampling". *IEEE Transactions on Geoscience and Remote Sensing* 62, 1-13, 2024.

[13] T. Wang, X. Wu, J. Li*, **C. Wang***. "Robust retrieval of material chemical states in X-ray microspectroscopy". *Optics Express*,31(25), 42524-42538,2023.

[14] L. Dai, M. Lu, **C. Wang***, S. Prasad, R. Chan*. "LocNet: Deep Learning-based Localization on Rotating Point Spread Function with Applications to Telescope Imaging". *Optics Express*, 31(24), 39341-39355, 2023.

[15] J. Zhang, J. Lu, **C. Wang**, S. Li*. "Hyperspectral and multispectral image fusion via superpixel-based weighted nuclear norm minimization". *IEEE Transactions on Geoscience and Remote Sensing*. 5521612. 2023.

[16] J. Yang, M. Ma, J. Zhang, **C. Wang***. "Noise removal using an adaptive Euler's elastica-based model." *the Visual Computing*. 1-12. 2022

[17] Z. Lai, **C. Wang#**, H. Gunawan, SC. Cheung, CN. Chuah. "Smoothed adaptive weighting for imbalanced semi-supervised learning: improve reliability against unknown distribution." *The International Conference on Machine Learning (ICML)*. 2022.

[18] D. Sprouts, Y. Gao, **C. Wang**, X. Jia, C. Shen, Y. Chi "The development of a deep reinforcement learning network for dose-volume-constrained treatment planning in prostate cancer intensity modulated radiotherapy" *Biomedical Physics & Engineering Express*. 8 (4), 045008, 2022. https://doi.org/10.1088/2057-1976/ac6d82

[19] Z. Lai, **C. Wang#**, SC. Cheung, CN. Chuah. "SaR: Self-adaptive refinement on pseudo labels for multiclass-imbalanced semi-supervised learning" *The IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) workshop*, pp. 4091-4100, 2022.

[20] **C. Wang**, M. Tao, CN. Chuah, J. Nagy, and Y. Lou*. "Minimizing L_1 over L_2 norms on the gradient." *Inverse Problems.* 39 065011, 2022.

[21] **C. Wang**, H. Jung, M. Yang, C. Shen, X. Jia*, "Simultaneous image reconstruction and element decomposition for iodine contrast agent visualization in multi-energy element-resolved cone beam CT", Frontiers in Oncology, 113, 2022.

[22] Z. Lai*, **C. Wang#**, L. Oliveira, B. Dugger, SC. Cheung, CN. Chuah, "Joint semi-supervised and active learning for segmentation of gigapixel pathology images with cost-effective labeling," *Proceedings* of *the IEEE/CVF International Conference on Computer Vision*, 591-600, 2021.

[23] Z. Lai, **C. Wang**, Z. Hu, B. Dugger, SC. Cheung, CN. Chuah*, "A semi-supervised learning for segmentation of gigapixel histopathology images from brain tissues", International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC) , 2021.

[24] **C. Wang***, M. Tao, J. Nagy, and Y. Lou. "Limited-angle CT reconstruction via the L_1/L_2 minimization." *SIAM Journal on Imaging Sciences.* 14(2), 749–777, 2021.

[25] **C. Wang**, Y. Gonzalez, C. Shen, B. Hrycushko, and X. Jia*. "Simultaneous needle catheter selection and dwell time optimization for Preplanning of HDR Brachytherapy of Prostate Cancer", *Physics in Medicine & Biology*, (66), 055028, 2021.

[26] **C. Wang**, M. Yan, and Y. Lou*****. "Accelerated schemes for the L_1/L_2 minimization." *IEEE Transaction on Signal Processing*,68, 2660 - 2669, 2020.

[27] **C. Wang**, Y. Gonzalez, C. Shen, and X. Jia* "Simultaneous needle selection and dwell time optimization in prostate cancer high-dose-rate brachytherapy." *Medical Physics* 47 (6), E367-E367, 2020.

[28] Y. Huang, Y. Zhong, **C. Wang**, Y. Gonzalez, C. Shen, and X. Jia*. "Comprehensive calibration and evaluation of a cone-beam CT on a pre-clinical small animal radiation research platform", *Medical Physics* 47 (6), E731-E731, 2020.

[29] Y. Rahimi, **C. Wang***, H. Dong, and Y. Lou. "A scale invariant approach for sparse signal recovery." *SIAM Journal on Scientific Computing*, 41(6), A3649–A3672, 2019.

[30] **C. Wang***, G. Ballad, R.J. Plemmons, and S. Prasad "Joint 3D localization and classification of space debris using a multispectral rotating point spread function." *Applied Optics*, 58, 8598-8611, 2019.

[31] **C. Wang***, R.H. Chan, M. Nikolova, R.J. Plemmons, and S. Prasad. "Non-convex optimization for 3-dimensional point source localization using a rotating point spread function." *SIAM Journal on Imaging Sciences*, 12(1):259–286, 2019.

[32] **C. Wang***, R.J. Plemmons, S. Prasad, R.H. Chan, and M. Nikolova. "Novel sparse recovery algorithms for 3D debris localization using rotating point spread function imagery." In *Proc. 2018 AMOS Technical Conference*, Maui, HI. 2018.

[33] **C. Wang***, R.H. Chan, R.J. Plemmons, and S. Prasad, "Point spread function engineering for 3D imaging using a continuous exact L_0 penalty (CEL0) based algorithm." *International Workshop On Image Processing and Inverse Problems*. 1-12, 2018.

[34] X. Fang, F. Lin, and **C. Wang***. "Estimation of a regularization parameter for a robin inverse problem." *East Asian Journal on Applied Mathematics,* 7(2) 325-342, 2017.

Honors & Awards

- **Best Paper Awards** 2022
  IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) workshop
- **SIAM Early Career Travel Grant Award** 2020
  2020 SIAM Conference on Imaging Science (IS20)
- **SIAM Student Travel Grant Award** 2018
  2018 SIAM Conference on Imaging Science (IS18)
- **SIAM Student Chapter Certificate of Recognition** 2018
- **Best Poster Presentation Award** 2017
  4th AoE Symposium on Organelle Biogenesis and Function
- **Best Student Paper Award** 2017
  Annual Meeting of China Society for Industrial and Applied Mathematics
- **CUHK Postgraduate Studentship** 2015 - 2018
- **Second Prize of the National Post-Graduate Mathematic Contest in Modeling** 2013
- **Outstanding Graduate Student Award** at Shantou University 2013
- **Second Prize of the National Mathematics Contest**, Guangdong Division (Rank 16th) 2011
- **National Endeavor Scholarship** 2009 - 2010

Teaching

Southern University of Science and Technology **Shenzhen, China**

- **Instructor**, Department of Statistics and Data Science 2022 – Present
  - STA201 Operational Research and Optimization, 2022- Present
  - STA5013 Statistical & Mathematical Image Processing, 2023- Present

The Chinese University of Hong Kong **Hong Kong**

- **Teaching Assistant**, Department of Mathematics 2015 - 2018
  - MATH4230 Optimization Theory, Spring 2018
  - MATH3215A Operations Research, Fall 2017
  - MATH2221 Mathematical Laboratory, Spring 2017
  - MATH3215 Operations Research, Spring 2017
  - MATH2010 Advanced Calculus I, Spring 2016
  - MATH3210 Linear Programming, Fall 2015

Shantou University **Shantou, China**

- **Teaching Assistant**, Department of Mathematics 2013
  - MAT1002B Linear Algebra and Analytic Geometry, Fall 2013

Professional Activities

Co-Editor 2023 - 2024

Special Issue: Multiple Sensors Fusion for Image Recognition

Journal: Sensors

Referee Service 2019 - Present

- SIAM Journal on Imaging Sciences
- IEEE Transactions on Signal Processing
- Mathematical Programming

- IEEE Transactions on Geoscience and Remote Sensing (TGRS)
- Optics Express
- IEEE Internet of Things Journal
- Inverse Problems and Imaging (IPI)
- TEST, Springer
- Journal of Mathematical Imaging and Vision
- Journal of Scientific Computing (JSC)
- Journal of Microscopy
- Machine Learning
- Research in the Mathematical Sciences (RMSB)
- Calcolo
- CVPR
- Infrared Physics and Technology
- Advances in Computational Mathematics
- Frontiers
- Computational and Applied Mathematics
- Signal Processing
- Journal of Computational and Applied Mathematics
- IET Image Processing
- Journal of Nonlinear and Variational Analysis
- International Journal of Digital Earth

Conference Organization

- Min-symposium in International Congress on Industrial and Applied Mathematics (ICIAM) Aug. 2023
- Min-symposium in SIAM Conference on Imaging Science (IS22) Mar. 2022
- AI & Biomedical Imaging Workshop at UC Davis, online Jan. - Mar. 2021

Mentorship (Ph.D. /MPhil /RA student project advisor) 2018 - Present

PhD students:

- Yunshan Li (SUSTech, Sept. 2023 - Present)
- Ting Wang (SUSTech, Sept. 2022 - Present)
- Huiwen Zheng (SUSTech, May 2022 - Jun. 2024)

MPhil students:

- Yicheng Wu (SUSTech, Sept. 2024 - Present)
- Zitian Ao (SUSTech, Sept. 2023 - Present)
- Xiaotong Wu (SUSTech, Sept. 2022 - Jun. 2024)
- Junjie Yu (SUSTech, Sept. 2021 - Jun. 2023)

Ras and visiting students:

- Zhenlin Luo (NUS, Aug. 2024 - Present)
- Rongkun Zhu (Xidian U, Jun. 2024 - Jul. 2024)
- Ruiwan Wen (Hainan U, Jun. 2024 - Jul. 2024)
- Wang Ma (RPI, Jun. 2024 - Jul. 2024)
- Shengjie Niu (HK PolyU, Jun. 2023 - Jul. 2023)

Member of Shenzhen Health Economy Academy Health Statistic Committee 2021 - 2026

Student Chapter Representative Jul. 2017

- SIAM Chapter Meeting with SIAM Leadership at SIAM Annual Meeting in Pittsburgh, PA, USA

Research Exchange & Visiting

- Research Associate Aug. - Sep. 2018 & Jun. - Jul. 2017
  - Department of Computer Science Wake Forest University, USA
  - Advisor: Prof. Robert Plemmons
- Research Assistant Jun. 2015
  - Department of Mathematics at CUHK, Hong Kong

- Advisor: Professor Raymond H. Chan
- Visiting Scholar 2013 - 2018
  - University of Bologna, Bologna, Italy (May - Jun. 2018)
  - Berlin Mathematical Society, Berlin, Germany (Jul. - Aug. 2016)
  - The Chinese Academy of Sciences, Beijing, China (Jul. - Aug. 2013)

Treasurer 2017-2018

- Student Chapter of SIAM, The Chinese University of Hong Kong

Presentations

- CSIAM Annual Meeting, Nanjing Oct. 2024
- SIAM Annual Meeting (AN24), Spokane, US Jul. 2024
- SIAM Conference on Image Science (IS24), Atlanta, US May 2024
- Workshop on Data Science and Scientific Computing, HKBU Dec. 2023
- CSIAM Annual Meeting, Kuiming Oct. 2023
- International Congress on Industrial and Applied Mathematics (ICIAM2023), Tokyo, Japan Aug. 2023
- Invited Talk, Jiangxi Normal University, Nanchang, May 2023
- Invited Talk, Nanchang Insitute of Technology, Nanchang May 2023
- Invited Talk, International Conference on Image Processing and Artificial Intelligence, Online, Dec. 2022
- Invited Talk, International Conference on Frontier of Statistics & Data Science, SUSTech Dec. 2022
- Invited Talk, CSIAM Annual Meeting, online Nov. 2022
- Invited Talk, Nanjing University, online Jun. 2022
- AI for Medical Imaging Workshop, Zhejiang Normal University, online May 2022
- SIAM Conference on Image Science (IS22), online Mar. 2022
- Invited Talk, Shenzhen Institute of Advanced Technology, Chinese Academy of Science Sept. 2021
- Invited Talk, Frontiers in Biomedical Imaging Seminar Series, UCD BME, online Nov. 2020
- Invited Talk, Machine Learning Working Group, UCD Health, online Oct. 2020
- Invited Talk, Mathematics of Data and Decisions at Davis, UCD Math, online Oct. 2020
- Joint AAPM & COMP Virtual Meeting, online Jul. 2020
- SIAM Conference on Image Science (IS20), online Jul. 2020
- SIAM Conference on Computational Science and Engineering (CSE19) , WA, USA Feb. 2019
- 2019 Georgia Scientific Computing Symposium, Georgia Institute of Technology, GA, USA Feb. 2019
- Scientific Computing Seminar, Emory University, GA, USA Feb. 2019
- Advanced Maui Optical and Space (AMOS) Surveillance Technologies Conference, HI, USA Sep. 2018
- Invited Talk, Wake Forest University, NC, USA Aug. 2018
- Invited Talk, Shantou University, Shantou, China Jul. 2018
- SIAM Conference on Image Science (IS18), Bologna, Italy Jun. 2018
- SIAM Conference on Applied Linear Algebra (ALA18), HKBU, HK May 2018
- International Workshop on Image Processing and Inverse Problems, CSRC, Beijing, China Apr. 2018
- 4th AoE Symposium on Organelle Biogenesis and Function, CUHK, Hong Kong Dec. 2017
- International Conf. & AoE Symposium on Organelle Biogenesis and Function, CUHK, HK Sep. 2017
- 15th Annual Meeting of China SIAM, Qingdao, China Oct. 2017
- 2017 Imaging Science Camp at SUST, Shenzhen, China Mar. 2017
- East Asian Section of SIAM Conference (EASIAM), Macau Jun. 2016

- 2014 Imaging Science Camp at SYSU, Guangzhou, China May 2014

Skills

Programming:

- MATLAB (Proficient), Python (Competent), Mathematica (Competent), C/C++ (Competent)

Software/API:

- TensorFlow, Keras, MS Office, LaTeX

Language:

- English (Fluent), Cantonese Chinese (Native), Mandarin Chinese (Fluent), Teochew Chinese (Native)

Last updated on 2024-09-20