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] 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

[2] **C. Wang,** JF. Aujol, G. Gilboa, Y. Lou.* "Minimizing quotient regularization model" arXiv preprint arXiv:2308.04095

Accepted/ Published

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

[4] L. Luo, Z. Tu, J. Lu, **C. Wang**, C. Xu. "A nonlinear high-order transformations-based method for high-order tensor completion". Signal Processing, (to appear)

[5] 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.

[6] 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.

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

[8] 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.

[9] 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.

[10] 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.

[11] 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.

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

[13] 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.

[14] 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

[15] 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.

[16] **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.

[17] **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.

[18] 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.

[19] 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.

[20] **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.

[21] **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.

[22] **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.

[23] **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.

[24] 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.

[25] 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.

[26] **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.

[27] **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.

[28] **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.

[29] **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.

[30] 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

- **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, Fall 2023

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
Special Issue: Multiple Sensors Fusion for Image Recognition
Journal: Sensors

Referee Service 2019 - Present

- SIAM Journal on Imaging Sciences
- IEEE Transactions on Signal Processing
- 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
- 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 2022 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 - Present)
- Yaghoub Rahimi (UT Dallas, Oct. 2018 - Jun. 2019)
- Mujibur Chowdhury (UT Dallas, Oct. 2020 – Oct. 2021)
- Zhengfeng Lai (UC Davis, July. 2020 - July. 2022)
- Gregory Rehm (UC Davis, Jan. 2021 – Jul. 2021)

MPhil students:

- Zitian Ao (SUSTech, Sept. 2023 - Present)
- Xiaotong Wu (SUSTech, Sept. 2022 - Present)
- Junjie Yu (SUSTech, Sept. 2021 - Jun. 2023)
- Vishal Bhuvaneswari (UC Davis, Jan. 2021 – Jan. 2022)

RAs:

- Heyu Huang (SUSTech, May 2021 - Jan. 2022)
- Shengjie Niu (SUSTech, Jul. 2023 - Aug. 2023)

Undergraduate Students:

 Simin Du, Jinsong Zhou, Yulun Wu,

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

- 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 2024-01-10