

MORAN XU

School of Computer Science and Engineering,
Washington University in St. Louis
e: moranxu@wustl.edu

EDUCATION

Washington University in St. Louis

PhD. in Computer Science

St. Louis, USA

Sep. 2021 – Jun. 2026 (expected)

Southeast University

MSE in Computer Technology

Nanjing, China

Sep. 2017 – Jun. 2020

- GPA: 3.7/4.0, major: Imaging science and technology, Computer vision
- Selected courses: Artificial Intelligence, Algorithms, Random Signal Processing, Digital Image Processing (95/100), Imaging Theory and Method (95/100), Image Analysis & Understanding (95/100), etc

Université de Rennes

MSE in Signal Image Embedded System Automation (Dual Degree, expected)

Rennes, France

Sep. 2017 – Jun. 2020

- Selected courses: Edge Detection, Machine Learning, Signal Processing

Southeast University

B.E. in Information Engineering

Nanjing, China

Sep. 2012 – Jun. 2016

- Admitted on basis of performance on national college admissions exam (top **0.2%** in Jiangsu province)
- Selected courses: Geometry & Algebra, Principle of Electronic Measurement, Mathematical Analysis for Engineering, Probability Statistics & Stochastic Processes, etc

PUBLICATIONS AND PREPRINTS

1. **Xu M**, Hu D, Wu W, et al. Deep Iteration Assisted by Multi-level Obey-pixel Network Discriminator (DIAMOND) for Medical Image Recovery[J]. arXiv preprint arXiv:2102.06102, 2021.[[pdf](#)]
2. **Xu M**, Hu D, Luo F, et al. Limited angle X ray CT reconstruction using image gradient ℓ_0 norm with dictionary learning[J]. IEEE Transactions on Radiation and Plasma Medical Sciences, 2020. [[pdf](#)]
3. **Xu, M.**, Hu, D., & Wu, W. (2019, September). ℓ_0 DL: Joint Image Gradient ℓ_0 -norm With Dictionary Learning for Limited-angle CT. In Proceedings of the 10th ACM International Conference on Bioinformatics, Computational Biology and Health Informatics (pp. 538-538). ACM. [[pdf](#)]
4. D. Hu, W. Wu, **M. Xu** et al., "SISTER: Spectral-Image Similarity-Based Tensor With Enhanced-Sparsity Reconstruction for Sparse-View Multi-Energy CT," in IEEE Transactions on Computational Imaging, vol. 6, pp. 477-490, 2020, doi: 10.1109/TCI.2019.2956886. [[pdf](#)]

RESEARCH EXPERIENCE

Gap-year Research

Deep Iteration Assisted by Multi-level Obey-pixel Network Discriminator for Medical Image Recovery

Oct. 2020 – Feb. 2021

- Big picture: Propose a general strategy to deal with image repair problems by combining **generative adversarial network** and **residual iteration network**
- Build generative adversarial network (GAN) using **modified WGAN-GP** training to recover image structure and fine details
- **Deep iteration module** combines pre-trained deep network, compressed sensing, iterative learning and residual learning algorithms to improve image quality through ADMM optimization
- Submitted to *Arxiv* preprints and **IEEE Transactions on Neural Networks and Learning Systems**

Washington University in St. Louis (the McKelvey School of Engineering)

Visiting student in the Computational Imaging Group (CIG)

St. Louis, USA

Jul. 2019 – Sep. 2019

Advised by Professor Ulugbek S. Kamilov, Director of CIG

Block Coordinate Algorithm to Speed-up Regularization by Denoising (RED)

- Big picture: image reconstruction combining iterative algorithm with neural networks, based on which a speeding up method was proposed
- Used block coordinate algorithms to significantly speed-up the rate of RED image reconstruction with little gradient loss; results were recorded in a paper that has been accepted by *NeuralPS-2019*

- Determined a relationship between **CT** image blocks and their corresponding projections, which was subsequently used to define a block coordinate algorithm
- Wrote and implemented the block coordinate algorithm.
- Received a **return offer** (PhD in CS) from Washington University in St. Louis

Southeast University (School of Computer Science and Engineering)

Nanjing, China

Research Assistant to Professor Xudong Bao and Dr. Weiwen Wu

Sep. 2018 – Sep. 2019

Limited-angle Fan-beam CT Reconstruction (National Natural Science Foundation of China)

- Big picture: predicting and restoring totally lost areas in projection domain, which are caused by incorrect operations on scanners
- Employed **dictionary learning** and **ℓ_0 -norm** to reduce noise and to recover image structures; a journal paper discussing the method has been accepted by *IEEE Transactions on Radiation and Plasma Medical Sciences*

Limited-angle Cone-beam CT Reconstruction

- Big Picture: predicting and restoring totally lost areas in 3d cone-beam projection domain using deep learning method
- **Graduation thesis**: equipped step-to-step neural networks based on dimension-progressive **WGAN-GP** and **U-Net** to recover details and to suppress artifacts when reconstructing images

Southeast University (School of Computer Science and Engineering)

Nanjing, China

Research Assistant to Professor Yang Chen, Senior Member, IEEE

Sep. 2018 – Sep. 2019

Sparse-view Multi-energy computed tomography (MCT) reconstruction (National Natural Science Foundation of China)

- Big picture: predicting and restoring loss information in projection domain because of restrained number of scan views
- Used newly-designed multi-energy CT scanners to generate dataset; a paper describing this method was accepted by *IEEE Transactions on Computational Imaging*
- Exploited a **non-local feature similarity** in the spatial-spectral domain by clustering similar spatial-spectral patches within non-local windows to a 4th-order tensor group; In order to make independent the quality of the reconstructed image from the quality of the training sets as in dictionary learning based methods, a **tensor decomposition strategy** was employed in our model
- Because fixing the regularization parameter for all energy channels may not be the optimal scheme, we introduced an **adaptive weight coefficient update** for each spectral channel

SELECTED AWARDS AND HONORS

- | | |
|--|------|
| • Education Foundation Scholarship | 2020 |
| • SEU Visiting Scholar (6/128 in CSE school) to attend Summer International Internship | |
| Recipient of visiting scholarship from Southeast University (top 5% of CSE school) | 2019 |
| • FM Radio with a PC controlling system, School Outstanding Project | 2014 |
| • TI Cup 2013 National Undergraduate Electronics Design Test, School Third Prize | 2013 |
| • Mathematical Contest in Modeling, School Outstanding | 2013 |

WORK EXPERIENCE

Shengshi Science and Technology, Co., Ltd.

Hangzhou, China

Imaging Algorithm Engineer

Mar 24th 2021 - May 12th 2021

- Work on cardiac coronary artery **center line extraction** and vessel vascular reconstruction

Southeast University & Union Std.

Nanjing & Nantong, China

Ultrasonic Imaging Software Engineer

Aug 2017 - Mar 2019

- Developed a complex visual software called “MineViewer” that uses ultrasonic imaging, DirectX, and MFC to detect flaws in bridges and railways; the software will be used to find flaws on the **Hong Kong-Zhuhai-Macao Bridge**
- Oversaw the **data exchanging**, **data structure**, **imaging algorithms**, and **user interaction** aspects of the system

Southeast University

Nanjing, China

Teaching Assistant in the School of Computer Science and Engineering

Apr 2018 - Jun 2018

- Tutored and advised undergraduates in the Computer Organization and Assembly Language courses
- Tutored in CPU and operating system simulation experiments

ADDITIONAL INFORMATION

Computer and Language Skills

- Skilled in Python, Pytorch, Tensorflow, Matlab and C++,
- Proficient in Spyder, VSCode