

Qing Wu

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Research Interests

Inverse Problems in Medical Imaging

- CT Metal Artifact Reduction, Under-sampling CT, Spectral CT, MRI Super-Resolution, etc.

Applications of Unsupervised Learning for Medical Imaging

- Neural Representation, Deep Image Prior, Unrolling Networks, etc.

Education

ShanghaiTech University

2020.09 – 2025.07 (Expected)

- Ph.D. student in Electronic Science and Technology
- Major GPA: 3.78/4.00
- Advisor: Prof. Yuyao Zhang

China University of Geosciences, Wuhan

2016.09 – 2020.07

- B.Eng. in Communication Engineering

Research Experience

CT Metal Artifact Reduction

2022.12 – Present

Venue: NuerIPS 2023

- Proposed an unsupervised DL model to reduce CT metal artifacts.
- Formulated the metal artifact reduction problem as solving energy-independent densities.
- Defined a physical model to simulate the acquisition from densities to measurements.
- Our model outperforms supervised counterparts on in-domain and out-of-domain data.

Sparse-view and Motion Rigid CT

2021.12 – 2022.11

Venue: IEEE TCI, IEEE ISBI 2023

- Proposed an unsupervised DL model to handle sparse-view and rigid-motion CT jointly.
- Leveraged implicit prior by neural representation to constraint the solution space of desired images.
- Formulated the rigid motion of subjects as learnable variables (rotation and translation).
- Our solution greatly outperforms the best traditional and unsupervised reconstruction algorithms.

MRI Super-Resolution

2020.09 – 2021.11

Venue: IEEE J-BHI, MICCAI 2023

- Proposed an arbitrary-scale super-resolution (ArSSR) approach for high-resolution MRI.
- Employed neural implicit space to model the ArSSR as a sampling operator of arbitrary scales.
- Our model achieves excellent performance on simulation and clinical data.

Selected Publications

1. **Unsupervised Polychromatic Neural Representation for CT Metal Artifact Reduction** • Qing Wu, Lixuan Chen, Ce Wang, Hongjiang Wei, S Kevin Zhou, Jingyi Yu, Yuyao Zhang • *37th Conference on Neural Information Processing Systems (NeurIPS 2023)*
2. **Self-Supervised Coordinate Projection Network for Sparse-View Computed Tomography** • Qing Wu, Ruimin Feng, Hongjiang Wei, Jingyi Yu, Yuyao Zhang • *IEEE Transactions on Computational Imaging (IEEE TCI)*

3. **Joint Rigid Motion Correction and Sparse-View CT via Self-Calibrating Neural Field** • Qing Wu, Xin Li, Hongjiang Wei, Jingyi Yu, Yuyao Zhang • *IEEE 20th International Symposium on Biomedical Imaging (IEEE ISBI 2023)*
4. **An Arbitrary Scale Super-Resolution Approach for 3D MR Images via Implicit Neural Representation** • Qing Wu, Yuwei Li, Yawen Sun, Yan Zhou, Hongjiang Wei, Jingyi Yu, Yuyao Zhang • *IEEE Journal of Biomedical and Health Informatics (IEEE J-BHI)*
5. **IREM: High-Resolution Magnetic Resonance Image Reconstruction via Implicit Neural Representation** • Qing Wu, Yuwei Li, Lan Xu, Ruimin Feng, Hongjiang Wei, Qing Yang, Boliang Yu, Xiaozhao Liu, Jingyi Yu, Yuyao Zhang • *24th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2021)*
6. **An Energy-Efficient Accelerator for Medical Image Reconstruction From Implicit Neural Representation** • Chaolin Rao*, Qing Wu*, Pingqiang Zhou, Jingyi Yu, Yuyao Zhang, Xin Lou • *IEEE Transactions on Circuits and Systems I: Regular Papers (IEEE TCAS-I)*

Teaching Experience

CS270B: Advanced Digital Image Processing, Spring 2023

ShanghaiTech University

Teaching Assistant

- Delivered tutorials and quizzes
- Designed assignments and projections
- Graded final scores.

CS276: Computational Photography, Fall 2022

ShanghaiTech University

Guest Lecture

- Introduced NeRF for Medical Imaging
- Designed assignments and projections

Academic Service

- **Reviewer for Conferences:** MICCAI 2023, IEEE ISBI 2024
- **Reviewer for Journals:** IEEE J-BHI, Journal of Computational Design and Engineering
- **Volunteer:** ASSIST 2023

Skills

- **Programming Language:** Python, Matlab, C
- **Software & Framework:** Pycharm, VS Code, GitHub, \LaTeX , ITK-SNAP, Pytorch
- **Language:** Mandarin (Native Speaker), English (CET-6, ONLY enough for research)