

# Guanxiong Luo

PhD Candidate in Computer Science ☎ +49 17634523929 ✉ luoguanxiong@outlook.com

## Areas of Specialization

- MR image reconstruction
- Bayesian inference
- Inverse problem
- Machine learning
- Mathematical modelling
- My projects @ [ggluo.github.io](https://github.com/ggluo)
- Generative modeling
- Optimization

## Research Experiences

### Generative image priors for MRI reconstruction trained from magnitude-only images 2022, 2023

- Summary Presented a workflow to train the generic and robust generative image priors for MRI reconstruction and evaluated them
- Highlight Performed distributed training on HPC across multiple GPUs by data parallelism using **spreco** (~100k MRI images)
- Code Language: Python, Shell and C <https://github.com/ggluo/image-priors>

### Bayesian MRI reconstruction with joint uncertainty estimation using diffusion models 2021, 2022

- Summary Presented an efficient framework for sampling the posterior probability distributions for MRI reconstruction
- Highlight Developed a machine learning library **spreco** for training generative models for MRI reconstruction based on TensorFlow, which can handle a large dataset
- Code Language: Python and Shell <https://github.com/mrirecon/spreco>

### Deploy generative image priors for image reconstruction using BART 2020, 2021

- Summary Integrated neural networks into BART (a MRI reconstruction toolbox) using TensorFlow C API
- Highlight Developed a practical way to deploy deep learning models for MRI reconstruction
- Code Language: C, Python and TensorFlow [Try it with Colab!](#)

## Technical Skills

- Open source projects:** pypi: **spreco**; huggingface: **image priors**
- Development environment:** VS Code + Shell + Git on Debian
- Use often:** Python, TensorFlow, NumPy, Shell, BART, PyTorch
- Use less often:** C/C++, Matlab, R
- Other tools:** L<sup>A</sup>T<sub>E</sub>X, PyPI, SLURM, Docker

## Academic Records

### Education

- 10/2020–09/2023 PhD in Computer Science, University of Göttingen, Göttingen, Germany
- 09/2017–10/2019 M.Phil in Radiology, The University of Hong Kong, HKSAR, China
- 09/2013–07/2017 B. Eng in Biomedical Engineering, Xi'an Jiaotong University, Xi'an, China

### Award & Honor

- 2017 Postgraduate Scholarship awarded by The University of Hong Kong
- 2017 Outstanding Graduate of Class 2017 awarded by Xi'an Jiaotong University
- 2015 National Encouragement Scholarship awarded by Xi'an Jiaotong University

## Thesis

- [1] Guanxiong Luo. *Development of Advanced Generative Priors for MRI Reconstruction*, PhD thesis, University of Göttingen, 2023.
- [2] Guanxiong Luo. *The application of generative networks in MR image reconstruction*, M.Phil thesis, The University of Hong Kong, 2019.

## Journal Paper

- [1] **Guanxiong Luo**, Mengmeng Kuang, Peng Cao. *Generalized Deep Learning-based Proximal Gradient Descent for MR Reconstruction*, proceeding of 21st International Conference on Artificial Intelligence in Medicine, Portoroz, Slovenia, June 2023.
- [2] **Guanxiong Luo**, Moritz Blumenthal, Martin Heide, Martin Uecker. *Bayesian MRI Reconstruction with Joint Uncertainty Estimation Using Diffusion Priors*, Magn Reson Med. 2023;
- [3] Moritz Blumenthal, **Guanxiong Luo**, Martin Schilling, H. Christian M. Holme, Martin Uecker. *Deep, deep learning with BART*, Magn Reson Med. 2023; 89: 678- 693.
- [4] **Guanxiong Luo**, Na Zhao, Wenhao Jiang, Edward S. Hui, Peng Cao. *MRI reconstruction using deep Bayesian estimation*, Magn Reson Med. 2020; 84: 2246-2261.

## Conference Proceeding

- [1] **Guanxiong Luo**, Martin Heide, Martin Uecker. *Using data-driven Markov chains for MRI reconstruction with Joint Uncertainty Estimation*, Power Pitch Session, ISMRM 2022.
- [2] Moritz Blumenthal, **Guanxiong Luo**, Martin Schilling, Markus Haltmeier, Martin Uecker. *NLINV-Net: Self-Supervised End-2-End Learning for Reconstructing Undersampled Radial Cardiac Real-Time Data*, Oral Scientific Session, ISMRM 2022.
- [3] **Guanxiong Luo**, Moritz Blumenthal, Xiaoqing Wang, Martin Uecker. *All you need are DICOM images*, Poster Session, ISMRM 2022.
- [4] **Guanxiong Luo**, Xiaoqing Wang, Volkert Roeloffs, Zhengguo Tan, Martin Uecker. *Joint estimation of coil sensitivities and image content using a deep image prior*, Oral Scientific Session, ISMRM 2021.

## Talk

- 01/2023    About *Estimate the uncertainty for MRI reconstruction with learned Bayesian models* at Institute for Numerical and Applied Mathematics, University of Göttingen
- 07/2022    About *Data Driven Methods for Fast MRI reconstruction* at Cardiac MRI Lab, Shanghai Jiaotong University
- 05/2021    About *Using image priors with BART* at ISMRM 2021 Software Session on BART

## Teaching

- WS 2021    Teaching assistant for a course on the application of data science to smart city
- WS 2021    Tutorials for undergraduates and graduates, teaching assistant for a course on deep learning

## Service to the Profession

Reviews for IEEE Transactions on Medical Imaging, IEEE Transactions on Computational Imaging

## Other

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**Languages** Mandarin , English

**Hobbies** Soccer, Tennis, Photography, Calligraphy

**Citizenship** Chinese

Last updated: August 13, 2023