




Guanxiong Luo, PhD in Computer Science

☎ +49 17634523929  guanxiong-luo  ggluo  Blog ✉ luoguanxiong@outlook.com

Areas of Specialization

- Machine learning
- Generative modeling
- MRI physics
- Bayesian inference
- Inverse problems
- My projects @ ggluo.github.io
- Computational imaging
- Image/Signal processing

Employment

01/2020–present Research Scientist at University Medical Center Göttingen, Germany
09/2017–11/2019 Research Assistant at LKS Faculty of Medicine, University of Hong Kong

Research Experiences

Autoregressive image diffusion: generating infinite sequence frame by frame 2023, 2024

1. Proposed a model to generate infinite sequence data, which is applicable to many downstream tasks.

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

1. Presented a workflow to train the generic and robust generative image priors for MRI reconstruction.
2. Evaluated trained priors in many reconstruction scenarios using different k-space acquisition patterns.
3. Performed distributed training on HPC across multiple GPUs by data parallelism (~100k MRI images).

🔗 Code: <https://github.com/mrirecon/image-priors> 🔗 Project page

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

1. Presented an Bayesian framework for sampling posterior probability for MRI reconstruction.
2. Samples are drawn from the posterior using diffusion models, then the minimum mean square error estimate and uncertainty maps are computed from the samples.

🔗 Code: <https://github.com/mrirecon/spreco> 🔗 Project page

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

1. Integrated deep learning models into BART (a MRI reconstruction toolbox) using Tensorflow C API.
2. Developed a command line tool to convert models implemented with Tensorflow/Pytorch/JAX and deploy them using TensorRT as backend for inference. 🔗 Code: [C++/C TRT](#) [BART-TRT](#)

Technical Skills

Open source projects: pypi: **spreco**; huggingface: **image priors**; git: **bart-trt, c++/c-trt**
Development environment: VS Code + Shell + Git on Debian
Use often: Python, TensorFlow, C, [BART](#), JAX, PyTorch, TensorRT
Use less often: C++, Matlab, R
Other tools: Pulse Sequence Programming, \LaTeX , PyPI, SLURM, Docker

Academic Records

Education

10/2020–12/2023 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

2023 PhD Graduated with Magna cum Laude, University of Göttingen
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
2015 Meritorious Winner in American Mathematical Contest in Modeling (MCM)

Thesis

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

Papers

- [1] **G. Luo**, S. Huang, M. Uecker. *Autoregressive Image Diffusion: Generating Image Sequence and Application in MRI*, arXiv:2405.14327
- [2] S. Huang, **G. Luo***, X. Wang, et al. *Noise Level Adaptive Diffusion Model for Robust Reconstruction of Accelerated MRI*, arXiv:2403.05245 (*equal contribution)
- [3] Z. Wang, **G. Luo**, Y. Li, et al. *Using a Deep Learning Prior for Accelerating Hyperpolarized ¹³C Magnetic Resonance Spectroscopic Imaging on Synthetic Cancer Datasets*, MRM 2024
- [4] **G. Luo**, X. Wang, M. Blumenthal, et al. *Generative Image Priors for MRI Reconstruction Trained from Magnitude-Only Images*, arXiv:2308.02340
- [5] **G. Luo**, M. Blumenthal, M. Heide, et al. *Bayesian MRI Reconstruction with Joint Uncertainty Estimation Using Diffusion Priors*, MRM 2023.
- [6] M. Blumenthal, **G. Luo**, M. Schilling, H. C. M. Holme, et al. *Deep, deep learning with BART*, MRM 2023.
- [7] **G. Luo**, N. Zhao, W. Jiang, et al. *MRI reconstruction using deep Bayesian estimation*, MRM 2020.

Proceedings

- [1] **G. Luo**, M. Blumenthal, M. Heide, et al. *MRI Reconstruction Via Data-Driven Markov Chains With Joint Uncertainty Estimation: Extended Analysis*, Oral Session, ISMRM 2023.
- [2] **G. Luo**, M. Kuang, P. Cao. *Generalized Deep Learning-based Proximal Gradient Descent for MR Reconstruction*, Portoroz, Slovenia, AIME 2023.
- [3] **G. Luo**, M. Heide, M. Uecker. *Using data-driven Markov chains for MRI reconstruction with Joint Uncertainty Estimation*, Power Pitch Session, ISMRM 2022.
- [4] M. Blumenthal, **G. Luo**, M. Schilling, et al. *NLINV-Net: Self-Supervised End-2-End Learning for Reconstructing Undersampled Radial Cardiac Real-Time Data*, Oral Session, ISMRM 2022.
- [5] **G. Luo**, M. Blumenthal, X. Wang, et al. *All you need are DICOM images*, Poster Session, ISMRM 2022.
- [6] **G. Luo**, X. Wang, V. Roeloffs, et al. *Joint estimation of coil sensitivities and image content using a deep image prior*, Oral Session, ISMRM 2021.
- [7] **G. Luo**, P. Cao. *MRI Reconstruction Using Deep Bayesian Inference*, Oral Session, ISMRM 2020.

Talks

- 09/2023 About *Bayesian MRI reconstruction with joint uncertainty estimation using diffusion priors* at 11th Applied Inverse Problems Conference, Göttingen
- 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, SJTU
- 09/2021 About *Bayesian Image Reconstruction with Learned Prior* at Workshop on MRI Acquisition & Reconstruction, MGH Harvard
- 05/2021 About *Using image priors with BART* at ISMRM 2021 Software Session on BART

Teaching

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

Service to the Profession

Reviews for NeurIPS(2024), IEEE TMI, IEEE TCI, Artificial Intelligence in Medicine, ISMRM

Other

Languages Mandarin, English

Hobbies Soccer, Tennis, Photography, Calligraphy

Citizenship Chinese

Last updated: May 24, 2024