Guanxiong Luo

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Areas of Specialization

- MR image reconstruction
- Bayesian inference
- Inverse problem
- Machine learning
- Image/Signal processing
- Optimization
- Generative modeling
- Mathematical modelling
- My projects @ ggluo.github.io

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/mrirecon/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:	LaTeX, 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**, Xiaoqing Wang, Moritz Blumenthal, Martin Schilling, Erik Hans Ulrich Rauf, Raviteja Kotikalapudi, Niels Focke, Martin Uecker. *Generative Image Priors for MRI Reconstruction Trained from Magnitude-Only Images*, arXiv preprint arXiv:2308.02340, Aug 2023.

[2] **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.

[3] **Guanxiong Luo**, Moritz Blumenthal, Martin Heide, Martin Uecker. *Bayesian MRI Reconstruction with Joint Uncertainty Estimation Using Diffusion Priors*, Magn Reson Med. 2023; 90: 295-311.

[4] Moritz Blumenthal, **Guanxiong Luo**, Martin Schilling, H. Christian M. Holme, Martin Uecker *Deep, deep learning with BART*, Magn Reson Med. 2023; 89: 678- 693.

[5] **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

09/2023	About *Bayesian MRI reconstruction with joint uncertainty estimation using diffusion priors* at 11th Applied Inverse Problems Conference, Göttingen, Germany
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

Languages Mandarin , English
Hobbies Soccer, Tennis, Photography, Calligraphy
Citizenship Chinese

Last updated: August 23, 2023