



THE UNIVERSITY of EDINBURGH



Deep
Inverse



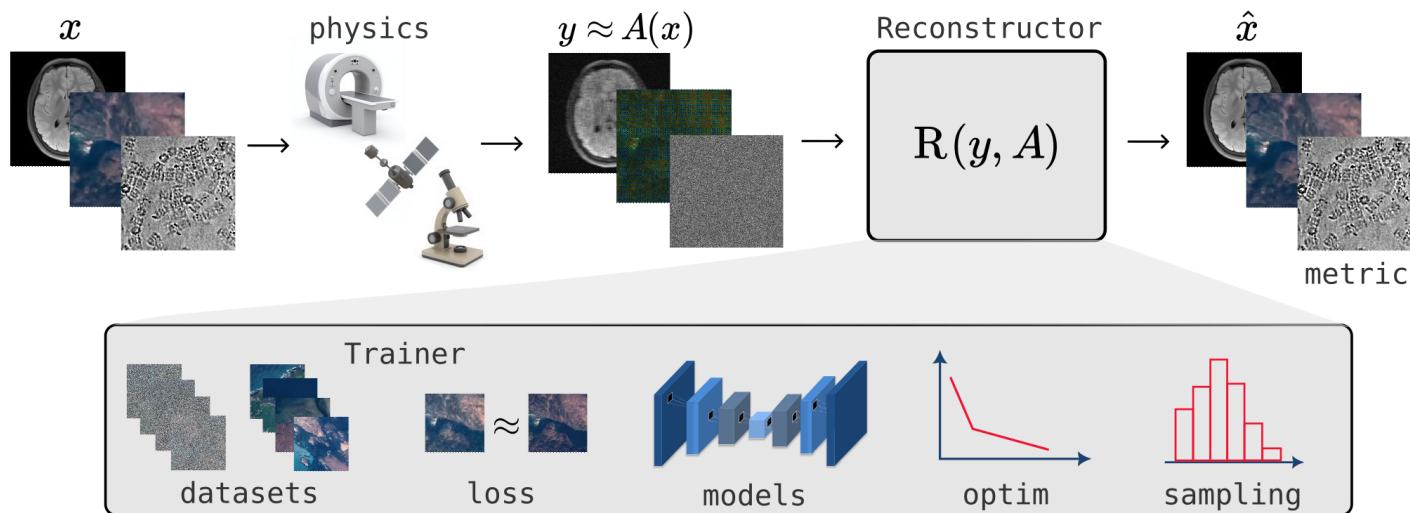
BLUR LABS

Andrew Wang

10th March 2026

Get started with DeepInverse for image reconstruction
with deep learning

DeepInverse – the PyTorch library for imaging with deep learning







 > [Examples](#) > [Basics](#) > [5 minute quickstart tutorial](#)

5 minute quickstart tutorial

Follow this example to get started with DeepInverse in under 5 minutes.

Contents

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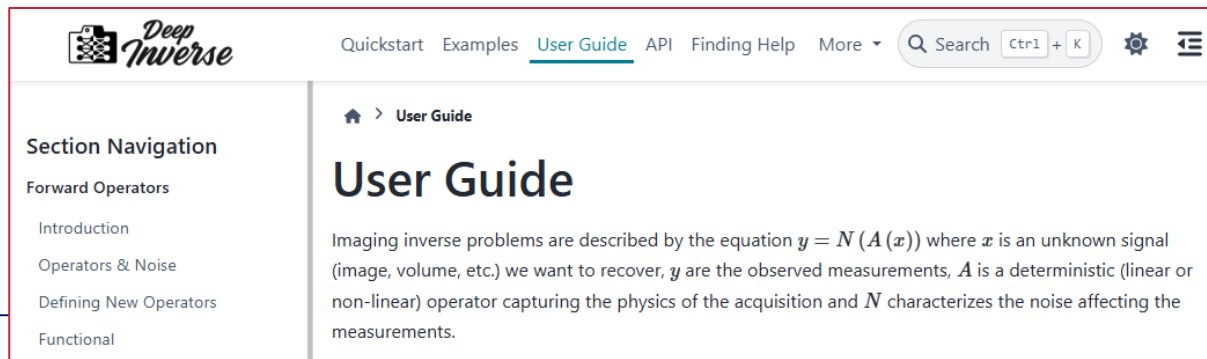
Why DeepInverse?

1. **Accelerate research:** efficient testing, deployment and transfer of state-of-the-art ideas across imaging domains (scientific, medical, computer vision...)
2. **Adoption of DL in inverse problems:** lower the entrance bar to new researchers and practitioners
3. **Reproducibility:** a common definition of imaging operators and reconstruction methods.

+ disseminate research

Documentation

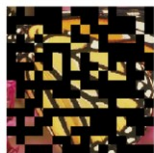
- Quickstart and in-depth **examples** for all levels of user
- Comprehensive **user guide**
- Well **documented**, pytested and PEP8-compliant code
- Won the 2024 French Open Source Software for Science Award for documentation



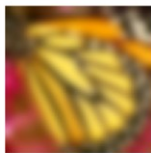
Library tour: `deepinv.physics`

+ blind physics

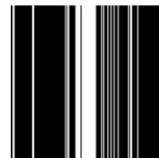
$$y = \text{physics}(x)$$



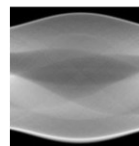
Inpainting



Blur



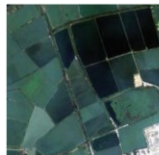
MRI



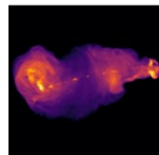
CT



Denoising



Remote sensing



Astronomy

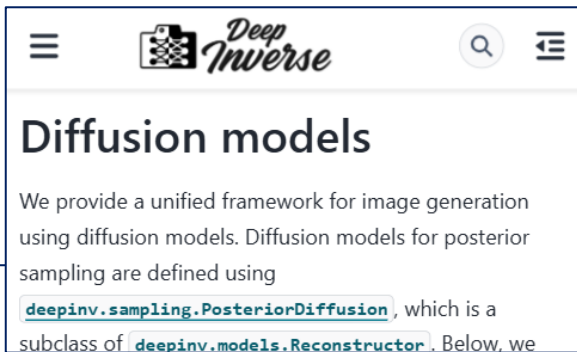
**+ many
more!**

multicoil MRI,
2D+t, 3D...

Library tour: `deepinv.models`

```
x_hat = model(y, physics)
```

1. **Optimization:** hand-crafted, plug-and-play, unfolded, DEQ...
2. **Sampling:** diffusion, Langevin MCMC...
3. **Other:** feedforward foundational models, GANs, deep image prior...



The screenshot shows the 'Deep Inverse' website interface. The header includes a menu icon, the 'Deep Inverse' logo, a search icon, and a list icon. The main content area is titled 'Diffusion models'. Below the title, the text reads: 'We provide a unified framework for image generation using diffusion models. Diffusion models for posterior sampling are defined using `deepinv.sampling.PosteriorDiffusion`, which is a subclass of `deepinv.models.Reconstructor`. Below, we

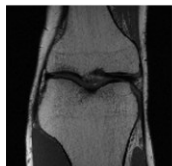


The screenshot shows the 'Deep Inverse' website interface. The header includes a menu icon, the 'Deep Inverse' logo, a search icon, and a list icon. The main content area is titled 'Markov Chain Monte Carlo'. Below the title, the text reads: 'Markov Chain Monte Carlo (MCMC) methods build a chain of samples which aim at sampling the negative-log-posterior distribution:

Library tour: `deepinv.training`

1. State-of-the-art **loss functions**: supervised + self-supervised
2. Modular **Trainer** class

Library tour: `deepinv.datasets`



fastmri



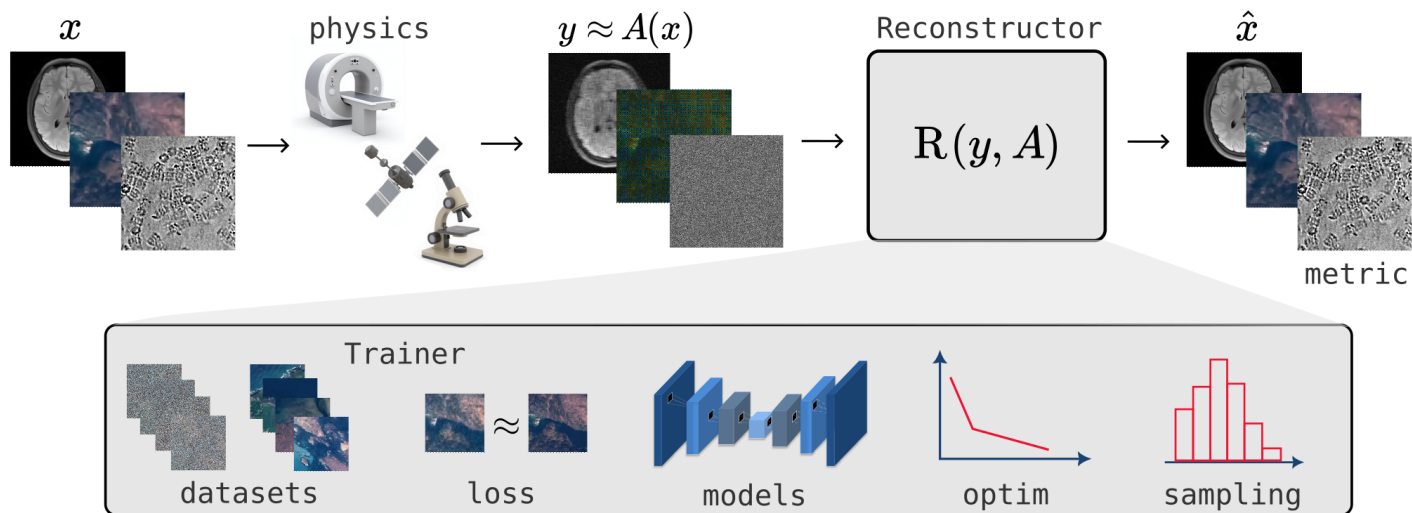
lidc-idri



satellite

**+ many
more!**

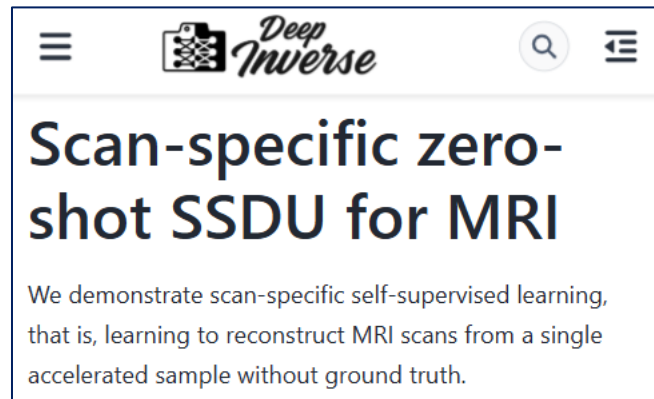
Workflows



Example 1: accelerated MRI with scan-specific self-supervised learning

[open in deepinv](#) 

- Train a model on a single accelerated brain MRI scan [1]
- ...without fully-sampled ground truth [2, 3]
- ...using DeepInverse



[1] Zbontar et al., “fastMRI: An Open Dataset and Benchmarks for Accelerated MRI”, 2018

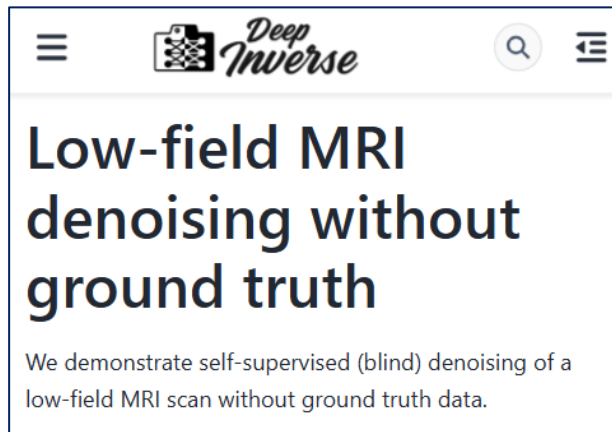
[2] Millard C. & Chiew M., “A theoretical framework for self-supervised MR image reconstruction using sub-sampling via variable density Noisier2Noise”, IEEE TCI 2023

[3] Wang A. & Davies M., "Benchmarking Self-Supervised Learning Methods for Accelerated MRI Reconstruction", arXiv 2025

Example 2: low-field MRI denoising by fine-tuning foundation models

[open in deepinv](#) 

- Fine-tune a foundation model [4]
- ...on clinical 0.3T brain MRI data [5]
- ...without fully-sampled ground truth [6]



[4] Terris et al., “Reconstruct Anything Model: a lightweight foundation model for computational imaging”, ICLR 2026

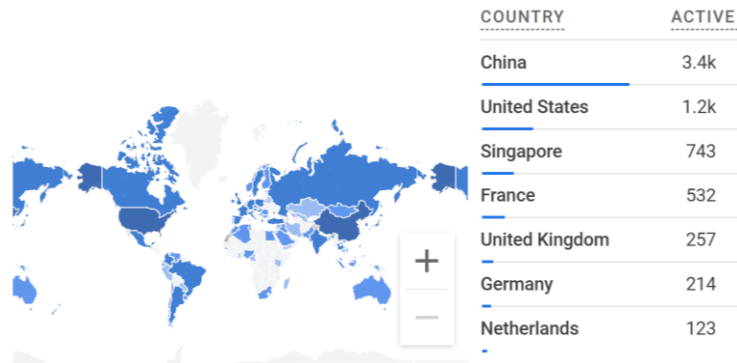
[5] Lyu et al., “M4Raw: A multi-contrast, multi-repetition, multi-channel MRI k-space dataset for low-field MRI research”, Scientific Data, 2023

[6] Monroy et al., “Generalized Recorrputed-to-Recorrputed: Self-Supervised Learning Beyond Gaussian Noise”, CVPR 2025

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- International community of developers
- International user base: Europe, UK, China, USA...
- Regular international tutorials and hackathons





Contributing

Quickstart Examples User Guide API Finding Help More ▾

Q Search

 > Contributing to DeepInverse

Contributing to DeepInverse

DeepInverse is a community-driven project and welcomes contributions of all forms. We are building a comprehensive library of inverse problems and deep learning, and we need your help to get there!

View our active list of contributors [here](#). We acknowledge all contributors! Significant contributions will also be taken into account when deciding on the authorship of future publications.

☰ On this page

Finding Issues to Work On

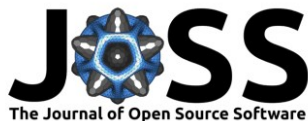
How to Contribute

Docstring Guidelines

Contributing new datasets

Maintainers commands

Read more



DeepInverse: A Python package for solving imaging inverse problems with deep learning

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