François **ROZET**

PhD student · Machine learning · Developer

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Education

PhD in Deep Learning

Sep 2021 – Present University of Liège Belgium

I currently pursue a PhD degree in the field of deep learning under the supervision of Prof. Gilles LOUPPE. My research consists in developing and applying deep learning methods to Bayesian inference problems in large-scale dynamical systems (oceans, atmospheres, molecules, ...). My work lies at the intersection of many subjects, most notably generative modeling, inverse problems and density estimation.

MSc in Data Science and Engineering

Sep 2019 – Jul 2021 University of Liège Belgium

My Master's degree program was built around data technologies, artificial intelligence and their mathematical and computational foundations. I graduated *summa cum laude* with the congratulations of the examination committee (top 1%) and received two awards for my Master's thesis, titled "Arbitrary Marginal Neural Ratio Estimation for Likelihood-free Inference".

Work

Research Internship

Sep 2024 – Jan 2025 Flatiron Institute New York, USA

The goal of this internship was to improve and accelerate physics simulations using deep learning methods, including latent representation techniques and generative models. The associated publication is currently under peer review.

Publications

[1] Ruben Ohana *et al.* "The Well: a Large-Scale Collection of Diverse Physics Simulations for Machine Learning" in *Advances in Neural Information Processing Systems*, 2024. URL: https://openreview.net/forum?id=00Sx577BT3

[2] ***François Rozet***, Gérôme Andry, François Lanusse, and Gilles Louppe. "Learning Diffusion Priors from Observations by Expectation Maximization" in *Advances in Neural Information Processing Systems*, 2024. URL: https://openreview.net/forum?id=7v88Fh6iSM

[3] ***François Rozet*** and Gilles Louppe. "Score-based Data Assimilation" in *Advances in Neural Information Processing Systems*, 2023. URL: https://openreview.net/forum?id=VUvLSnMZdX

[4] ***François Rozet*** and Gilles Louppe. "Score-based Data Assimilation for a Two-Layer Quasi-Geostrophic Model" in *Machine Learning and the Physical Sciences Workshop (NeurIPS)*, 2023. URL: http://arxiv.org/abs/2310.01853

[5] Malavika Vasist, ***François Rozet***, Olivier Absil, Paul Mollière, Evert Nasedkin, and Gilles Louppe. "Neural posterior estimation for exoplanetary atmospheric retrieval" in *Astronomy & Astrophysics*, 2023.

[6] Arnaud Delaunoy, Joeri Hermans, ***François Rozet***, Antoine Wehenkel, and Gilles Louppe. "Towards Reliable Simulation-Based Inference with Balanced Neural Ratio Estimation" in *Advances in Neural Information Processing Systems*, 2022. URL: https://openreview.net/forum?id=o762mMj4XK

[7] Joeri Hermans, Arnaud Delaunoy, ***François Rozet***, Antoine Wehenkel, Volodimir Begy, and Gilles Louppe. "A Trust Crisis In Simulation-Based Inference? Your Posterior Approximations Can Be Unfaithful" in *Transactions on Machine Learning Research*, 2022. URL: https://openreview.net/forum?id=LHAbHkt6Aq

[8] ***François Rozet*** and Gilles Louppe. "Arbitrary Marginal Neural Ratio Estimation for Simulation-based Inference" in *Machine Learning and the Physical Sciences Workshop (NeurIPS)*, 2021. URL: http://arxiv.org/abs/2110.00449

Talks

- *Learning Diffusion Priors from Observations by Expectation Maximization* – Tübingen AI Center (Jul 2024)
- *Diffusion Models meet Data Assimilation* – ENGIE (Jul 2024)
- *Score-based Generative Models meet Data Assimilation* – ESA-ECMWF Workshop (May 2024)

Community

Reviewing

Since 2022, I am a recurrent peer-reviewer for machine learning journals, conferences and workshops such as NeurIPS, ICML, ICLR, AISTATS and TMLR.

Honors & Awards

- Research fellow grant – F.R.S.-FNRS (2022)
- Best Master's thesis award – AIM (2021)
- Best Master's thesis award – AILg & NRB (2021)
- National Physics olympiad 3rd laureate – ABPPC (2016)

Software

Azula

July 2024 probabilists/azlua 101

Azula is a Python package that implements diffusion models in PyTorch. Its goal is to unify the different formalisms and notations of the generative diffusion models literature into a single, convenient and hackable interface.

Inox

Dec 2023 francois-rozet/inox 34

Inox is a minimal JAX library for neural networks with an intuitive PyTorch-like syntax. Modules are represented as PyTrees, which enables complex architectures, easy manipulations, and functional transformations.

Zuko

Oct 2022 probabilists/zuko 380

Zuko is a Python package that implements normalizing flows in PyTorch. It relies heavily on PyTorch's built-in distributions and transformations, which makes the implementation concise, easy to understand and extend.

PIQA

Oct 2020 francois-rozet/piqa 418

PIQA is a collection of PyTorch metrics for image quality assessment in various image processing tasks such as generation, denoising, super-resolution, interpolation, etc. It focuses on the efficiency, conciseness and understandability of its (sub-)modules, such that anyone can easily reuse and/or adapt them to its needs

Languages

French native

English proficient (C1, TOEFL 106)

Dutch elementary (A1)

Skills

Python (NumPy, PyTorch, JAX, ...), C/C++, Julia, HTML, JavaScript, Git, GitHub, Linux, Docker, Slurm

Teaching

Teaching assistant

Sep 2021 – Present University of Liège

- Introduction to artificial intelligence – Prof. Gilles LOUPPE (since 2021)
- Deep learning – Prof. Gilles LOUPPE (since 2021)
- Data structure and algorithms – Prof. Pierre GEURTS (2021-2022)
- Functional programming – Prof. Christophe DEBRUYNE (2021-2022)

Student instructor

Sep 2017 – Jul 2021 University of Liège

- Introduction to machine learning – Prof. Pierre GEURTS (2020-2021)
- Introduction to artificial intelligence – Prof. Gilles LOUPPE (2020-2021)
- Elements of statistics – Prof. Louis WEHENKEL (2019-2020)
- Applied mathematics – Prof. Christophe GEUZAINE (2019-2020)