

Louis BETHUNE

Research Software-Engineer (PhD)
Deep-Learning Full Stack

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Experience

- since 2024 **ML/AI Research SWE**, *Apple Machine Learning Research*, Paris 
- In the research group led by Samy Bengio. I lead large-scale AI research systems and model development:
- *Experimental design*: scaling laws, zero-shot hyperparameter transfer, tooling for sweeps and their analysis.
 - *Architect distributed infrastructure*: high-throughput multimodal dataloaders, preemption resilience.
 - *Write pre-training codebases from scratch*: DDP/FSDP/EP, mixed precision.
 - *Drive multimodal modeling*: text, speech, images, data mixture optimization.
 - *Evaluation owner*: benchmarking, efficient inference, and iterative model improvement.
 - *Post-training owner*: multi-turns Instruct, VQA, image-edition.
 - *Pretrain foundation models*: autoregressive and masked discrete diffusion paradigms.
- ★ **Technical lead** for multimodal diffusion (MDM): coordinated ~15 researchers and 2k-GPU training of 8B tri-modal models (text, image, audio) at 18T tokens scale, targetting fast on-device generation.
- 2021 **Google Research intern**, *Google Brain*, Paris, 
- 2020 **Research intern**, *MILA*, (remote due to Covid19).
- 2020 **Research intern**, *IMT Atlantique*, Brest.
- 2019 **Research intern**, *ENS de Lyon*.
- 2019 **Google SWE intern**, *Google Brain*, Paris, 
Deep reinforcement learning on Atari using A3C, on TPU.
- 2018 **Research intern**, *Universidade do Algarve*, Faro.
- 2017 **Research intern**, *Inria TAO (LRI)*, Paris.

Education

- 2020–2023 **PhD in Computer Science**, *Université Paul-Sabatier*, Toulouse
Supervised by Mathieu Serrurier. Hosted by IRIT. I was also part of the IRT DEEL team.
Under ANITI funding, in the chair “Fair and robust learning” of Jean-Michel Loubes.
 - **Topic**: Deep learning under Lipschitz constraints.
 - Applications to robustness, optimal transport, privacy, XAI, Gaussian processes, fairness, GANs.
 - Designer, teacher of more than **160 hours** of courses and practical sessions, at university level.
- 2016–2020 **Diplôme de l'École Normale Supérieure de Lyon**, *ENS de Lyon*, France
Selective entrance exam (civil servant track). Equivalent to a **72k€ scholarship** over 4 years.
- 2019 **Master in Fundamental Computer Science**, *ENS de Lyon*
“Complex systems” speciality: optimization, graph signal processing, complex networks, statistical physics.

Programming and software engineering:

- Python **mainly machine learning and deep learning.**
 - **Top-3 contributor of Jaxopt library**, a Jax library for differentiable optimization.  1k  72
 - **Deep learning**: Jax&Flax, Pytorch, Tensorflow, MLX, xgboost, pandas, numba, hydra...
- C++ **on various topics, with libraries Boost, SFML, MPI, Eigen, CGAL.**
 - **Team leader of CartomensIA project (17 people), 2017–2018.**
 - **Notable projects**: inpainting (2018), SQL interpreter (2018), raytracing engine (2017), neural network from scratch (2016), procedural generation on GPU with Voronoi diagrams (2016), genetic algorithm (2015), AI for game with MCTS (2014).
 - **Competitive programming**: SWERC (2017–2018), Prologin (2013–2018), France-IOI (2012–2014).
- Miscellaneous OCaml, Haskell, Rust, Zig, PDDL.

Research and community service:

- Publications **ICML (2026, 2025, 2023), ICLR (2026, 2024), NeurIPS (2025, 2024, 2023, 2022), CVPR (2025, 2023), AISTATS (2025, 2023), Best paper award** at Symposium on Geometry Processing (2024), Annals of Statistics.
- Peer Review ICLR (2026, 2025, 2024), NeurIPS(2025, 2024, 2023, **Top 10% reviewer in 2022**), ICML (2023), AISTATS (2024, 2023), CVPR (2023, 2021), ICCV (2025, 2021), IEEE Transactions on Signal Processing (2021, 2020), ECML (2020).
- Area Chair ICLR (2027), NeurIPS (2026), ICML (2026, 2025).
- Volunteering Animator of the summer camp *Girls can code!* in Lyon (2017–2019).