Florentin GUTH

Postdoctoral researcher in deep learning theory

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💼 Experience

Faculty Fellow
Center for Data Science, New York University
📅 2023–Present
📍 New York, USA

Research Fellow
Center for Computational Neuroscience, Flatiron Institute
📅 2023–Present
📍 New York, USA

Research Intern
Center for Computational Neuroscience, Flatiron Institute
📅 May–August 2022
📍 New York, USA

We developed a multi-scale local conditional probability model of images.   **Advisor: Prof. Eero Simoncelli.**

Research Intern
Facebook AI Research
📅 March–August 2018
📍 New York, USA and Paris, France

I developed an AI module for tactical unit movement in the *StarCraft: Brood War* bot *CherryPi/TorchCraft*.
Advisors: Gabriel Synnaeve and Nicolas Usunier.

Research Intern
INRIA
📅 February 2018
📍 Paris, France

I did bibliography work on Counterfactual Regret Minimization.   **Advisor: Prof. Francis Bach.**

Research Intern
ETHZ
📅 June–August 2017
📍 Zürich, Switzerland

I developed a tool to describe interactions between smart contracts on the *Ethereum* blockchain.
Advisors: Valentin Wüstholz and Prof. Peter Müller.

🎓 Education

Ph.D. in applied maths and CS
École Normale Supérieure
📅 2019–2023
📍 Paris, France

Thesis title: *Towards a Mathematical Understanding of Deep CNNs.*   **Advisor: Prof. Stéphane Mallat.**

M.Sc. in Maths, CV and ML (MVA)
École Normale Supérieure Paris-Saclay
📅 2018 – 2019
📍 Paris, France

Advanced courses in mathematics, computer vision and machine learning.
With highest honors, GPA 4.00 (18.27/20).

ENS Diploma
École Normale Supérieure
📅 2016 – 2019
📍 Paris, France

Bachelor- and Master-level courses in computer science and mathematics.
With highest honors, GPA 4.00 (18.17/20).

Classe Préparatoire
Lycée du Parc
📅 2014 – 2016
📍 Lyon, France

Intensive undergraduate courses in mathematics, physics, and computer science.   **With highest honors.**
National rank: 6th at ENS and 16th at École Polytechnique.

Publications

- **Florentin Guth**, Brice Ménard. *On the universality of neural encodings in CNNs*. In **Re-Align workshop, ICLR, 2024** and **UniReps workshop, NeurIPS, 2023**.
- Zahra Kadkhodaie, **Florentin Guth**, Eero Simoncelli, Stéphane Mallat. *Generalization in diffusion models arises from geometry-adaptive harmonic representations*. In **ICLR, 2024**. **Oral (top 1.2% of submissions)**.
- **Florentin Guth**, Brice Ménard, Gaspar Rochette, Stéphane Mallat. *A Rainbow in Deep Network Black Boxes*. Preprint.
- **Florentin Guth***, Etienne Lempereur*, Joan Bruna, Stéphane Mallat. *Conditionally Strongly Log-Concave Generative Models*. In **ICML, 2023**.
- Zahra Kadkhodaie, **Florentin Guth**, Stéphane Mallat, Eero Simoncelli. *Learning Multi-Scale Local Conditional Probability Models of Images*. In **ICLR, 2023**. **"Top 25%" (top 8% of submissions)**.
- **Florentin Guth**, Simon Coste, Valentin De Bortoli, Stéphane Mallat. *Wavelet Score-Based Generative Modeling*. In **NeurIPS, 2022**.
- **Florentin Guth**, John Zarka, and Stéphane Mallat. *Phase Collapse in Neural Networks*. In **ICLR, 2022**.
- John Zarka, **Florentin Guth**, and Stéphane Mallat. *Separation and Concentration in Deep Networks*. In **ICLR, 2021**.

Talks

TAG-DS Seminar	Online	01/30/24
DeepMath Conf.	Baltimore, USA	11/17/23
CDS Lunch Seminar, NYU	New York, USA	09/27/23
Generative Models Working Group, NYU	New York, USA	09/14/23
MaD Group Meeting, NYU	New York, USA	09/11/23
Keynote and Tutorial, CCN Conf.	Oxford, UK	08/26/23
MALGA Seminar	Genova, Italy	07/17/23
CSD, ENS	Paris, France	06/15/23
Rough Path Interest Group	Online	10/05/22
4th IMA Conf. on Big Data	Oxford, UK	09/20/22
LCV, CCN, Flatiron I.	New York, USA	08/31/22
Bonner Lab, JHU	Baltimore, USA	07/12/22
LCV, CCN, Flatiron I.	New York, USA	06/08/22
MLIA, LIP6, Sorbonne U.	Paris, France	12/09/21
SIERRA, INRIA	Paris, France	11/25/21
3IA Doctoral Workshop	Toulouse, France	11/22/21
DL Theory Seminar, FAIR	Online	11/12/21

Good Programming Practices, Tools and QOL Tricks

CSD, ENS	Paris, France	12/06/21

45-minute tutorial talk about productivity tips at the PhD Seminar of the Center for Science of Data at ENS. Slides ⬈ .

🏛 Teaching

Co-instructor for DS-GA 1014: Computational Linear Algebra and Optimization 📅 2023
Center for Data Science, NYU 📍 New York, USA

Maths Teaching Assistant 📅 2020–2023
CPES, PSL 📍 Paris, France

Exercise sessions for undergraduate students.

200h of experience. Great feedback from students.

AI Teacher 📅 2021–2023
Ipesup 📍 Paris, France

I designed and teach a 24-hour-long introductory course on Artificial Intelligence to high-school students. Topics include the history, applications, limitations, ethical concerns, computational and mathematical aspects of AI, as well as practical programming sessions.

Great feedback from students (average satisfaction of 9/10).

Maths and CS Teacher 📅 2019–2021
Optimal Sup-Spé 📍 Paris, France

Classes and exercise sessions for undergraduate students.

More than 200h of experience. Great feedback from students.

👥 Students

- **Sixto Cerna Lopez** (Undergraduate): Implementation of machine learning algorithms for real-estate price estimation.

💬 Outreach

My Personal Experience Doing Research
Collège de France 📍 Paris, France 📅 03/22/21

10-minute-long talk about my research topic, why I love research and my background, given to 100 high-school students from underprivileged areas.

How to Create a Programming Language?
Savoirs Pour Tous, ENS 📍 Paris, France 📅 11/08/18

1-hour-long wide-audience talk on compilation, aimed at high-school students. Video 🔗 and slides 🔗 (in French).

More than 10k views and 300 likes on YouTube.