

Emmarius DELAR

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RESEARCH INTERESTS

I am a first-year PhD candidate at LAMSADE (Université Paris Dauphine-PSL), supervised by Prof. Tristan Cazenave, and affiliated with the **PR[AI]RIE Institute**. My PhD is funded by an ANR project led by Orange Labs.

My research lies at the intersection of **Reinforcement Learning**, **Monte Carlo methods**, and **Combinatorial Optimisation on graphs**. Concretely, I develop MCTS-based algorithms to tackle complex graph-structured problems such as Virtual Network Embedding, Boolean models for Gene Regulatory Network, or again Graph reconstruction under attacks.

I am particularly interested in multi-objective RL-based algorithm, and lazy-evaluation strategies that reduce simulation cost without sacrificing performance.




EXPERIENCE

- **Université Paris Dauphine-PSL**  – **PhD in Reinforcement Learning** Nov. 2025 - Now
Fully funded by the ANR TREES project
 - **Thesis:** Monte Carlo Tree Search for Graph Generation
 - Advisor: Prof. Tristan Cazenave
- **LAMSADE**  & **Orange Labs**  – **AI Research Intern** Apr. 2025 - Sept. 2025
Paris, FRANCE
 - I developed algorithms for the multi-objective optimization problem of Virtual Network Embedding under energy constraints. Designed a nested algorithm that incorporates prior knowledge of the physical network and follows a lazy evaluation regime, significantly reducing simulation cost with minimal performance loss.
 - **Keywords:** MCTS • Federated Learning • Latency Optimization • Energy-Efficient Networking
- **CERFACS**  – **AI Research Intern** May 2024 – Aug. 2024
Toulouse, FRANCE
 - I implemented dimensionality reduction techniques for large 3D meshes using Kernel PCA to build statistical emulators of atmospheric dispersion models. According to FAC2, VG and NMSE metrics, we showed that Kernel PCA outperforms other ML/DL approaches while enabling transfer learning from 2D meshes to 3D meshes. (Thesis available [here](#) – in French)
 - **Keywords:** Pollutant Dispersion • ROM • Mesh • Dimensionality Reduction • Representation Learning • CFD

EDUCATION

- **MSc (M2) IASD**, PSL Research University Sept. 2024 - April 2025
Research master jointly run by ENS, Dauphine & Mines de Paris (highly selective)
 - Coursework: Learning Theory, Optimisation, Kernel Methods, RL, Mathematics of Deep Learning
 - **Master Thesis:** Optimisation of large network topologies for Federated Learning via MCTS
- **MSc (M1) Applied Mathematics + Magistère Statistics & Modelling**, University of Rennes Sept. 2023 - May. 2024
Highly selective double degree: GPA: 3.7/4 • High honours • rank 2
 - Coursework: Supervised Learning, Unsupervised Learning, MCMC, Spatial Statistics, Advanced Time Series
 - **Master Thesis:** Statistical emulation of atmospheric dispersion models
- **BSc Mathematics and Computer Science**, University of Rennes Sept. 2020 - Apr. 2023
minor in Economics

ACADEMIC PROJECTS

- **LAB PROJECT: Improve GAN using rejection sampling approaches** Nov. 2025
Python 
 - Re-implemented Discriminator Rejection Sampling (DRS) and Metropolis-Hastings GAN from scratch; applied **Optimal Budget Rejection Sampling** to improve sample quality while preserving mode diversity.
- **Kernel Methods for DNA Sequence Classification** Mar. 2025
Python 
 - Built from scratch a Kernel SVM and Kernel Logistic Ridge Regression with custom string kernels to predict transcription-factor binding sites on raw DNA sequences.
- **Non-convex inverse problems: Sparse PCA** Mar. 2025
Python 
 - Matrix reconstruction from partial measurements via convex relaxation and non-convex approaches.

HONORS AND AWARDS

• ENS Challenge Data

InsurPrime: Can You Guess the Insurance Premium?, Crédit agricole

March 2025



- Ranked 1st out of 89 participants
- Built an XGBoost + Random Fourier Features pipeline to model agricultural insurance premiums.
- Final grade (written report & oral defence): **4.0/4.0**

ORAL AND POSTER PRESENTATION

• Dimension reduction approaches for Statistical emulation of atmospheric dispersion

AI Interns Days in Earth, Ecology, Environment & Space Sciences, Observatoire Midi-Pyrénées (OMP)

Jul. 2024

Toulouse, FRANCE

- Support available [here](#) (in French)

• Monte Carlo Tree Search for Graph Generation

PhD Seminare, Orange Lab

Dec. 2025

Châtillon, FRANCE

SKILLS

- **Programming:** Python, Julia, R, SQL, SAS
- **ML/ DL / RL Libraries:** PyTorch, NumPy, Scikit-learn, NetworkX
- **Mathematical Foundations:** Algebra, Probability & Statistics, Stochastic Processes, Convex & Non-convex Optimisation, Graph Theory
- **Deep Learning Architectures:** GANs, VAE, Diffusion Models, Transformers, PINNs, Geometrical-Informed NNs
- **Systems & Tools:** Git, Docker, Linux/Bash, SSH, HPC clusters
- **Research Skills:** Mathematical Proofs, Scientific Writing, Reproducible Research, Oral Presentation

RELEVANT COURSEWORK

- Foundations of machine learning (F. Bach)
- Optimization for machine learning (G. Peyré)
- Machine learning with kernel method (J. Mairal)
- Non-convex inverse problems (I. Waldspurger)
- Mathematics of deep learning (B. Loureiro)
- Generative Models: Transport & Denoising (S. Mallat)
- Reinforcement Learning (O. Cappé)
- Computational statistics and MCMC methods (I. Gavra)
- Advanced econometrics (I. Cadoret)
- Advanced Time Series and Forecasting (T. RAZAFINDRABE)
- Incremental learning & Game theory (G. Vigerl)

OTHER

- **Languages:** French (native), English (C1)
- **Hobbies:** Futsal, Tennis, Kayaking, Hiking, Robotics, Cooking