Alex Pierron

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alex-pierron

Education

PhD **Institut Polytechnique de Paris, SAMOVAR Laboratory**: Artificial Intelligence, AI Researcher, PhD student

Institut Polytechnique de Paris
Palaiseau, France
Oct. 2024 to Oct. 2027

- **PhD topic**: Cybersecurity impact of AI Optimization in B5G networks.
- **Keywords**: Artificial Intelligence, Machine Learning, Single & Multi-Agent Reinforcement Learning, B5G networks, Cybersecurity, Physical Layer, Physical Systems.
- **Abstract:** This PhD focuses on the application of Artificial Intelligence, particularly Reinforcement Learning, in 5G and 6G wireless networks. It investigates new potential threats and vulnerabilities targeting these AI systems, with a specific emphasis on applications involving Reconfigurable Intelligent Surfaces. The research aims to demonstrate the feasibility of such attacks and to propose effective mitigation strategies.
- **Working conditions**: Comprehensive scientific approach in an interdisciplinary research environment. This PhD is part of the PEPR Future Networks, and is financed by the French National Research Agency under the France 2030 label.

MS **Paris-Saclay University**, Master Of Science, Mathematics and Artificial Intelligence (Master website)

Paris-Saclay University,
Paris, France
Sept. 2022 to Sept. 2024

- Master directed by the **University Mathematics Department** and shared with **CentraleSupélec.** 2nd year courses shared with the MVA master's program at **ENS Paris-Saclay** and the StatML master's program at Ecole Polytechnique.
- **Relevant coursework:** *Advanced Supervised Methods, Advanced Unsupervised Methods, Data Analysis, Graphical Models: Discrete Inference and Learning, Guidelines in Statistical Learning, Object Recognition and Computer Vision, Online Learning: link with Optimization and Games, Optimization, Sequential Learning, Statistics in Large Dimensions, Theory and Applications in Reinforcement Learning, Theoretical Foundations of Deep Learning.*

BS **Paris-Saclay University**, Double Bachelor of Science in Mathematics and fundamental Physics

Paris-Saclay University,
Paris, France
Sept. 2019 to Sept. 2022

- **Selective and intensive double bachelor's degree in mathematics and physics** directed by the university Mathematics and Physics Departments. Final year of physics shared with **ENS Paris-Saclay** and the fundamental physics *"Magistère"* program at **Paris-Saclay University**.
- Relevant physics coursework: *Electromagnetism, Analytical Mechanics, Quantum Mechanics, Fluid Mechanics, Linear and Non-Linear Optics, Statistical Physics, Numerical Methods*
- Relevant mathematics coursework: *Probability, Integration, Differential Calculus, Partial Differential Equations, Ordinary Differential Equations, Algebra, Signal Processing, Numerical Methods.*

Experience

Dassault Aviation: AI Researcher in Reinforcement Learning, Intern — Saint-Cloud, France — Apr. 2024 to Sept. 2024 — 6 months

- **Internship topic**: AI for collaborative air combat: Multi-Agent Reinforcement Learning (MARL).
- **Keywords**: Applied and Fundamental Mathematics, Multi-Agent Reinforcement Learning, Python, Deep Learning, PyTorch, Industrial Research.
- **Main tasks**: Bibliographical study of the subject (RL + MARL) and resources available in open source. Development of realistic environments (Python,C++) for tactics proposals suggested by AI for different scenarios.
- **Working conditions**: Comprehensive scientific approach in an industrial research environment.

CNRS, Signals and Systems Laboratory: AI Researcher in Computer Vision, Intern — Gif-Sur-Yvette, France — Mar. 2023 to Jul. 2023 — 5 months

- **Internship topic**: How to classify small databases using the knowledge of larger ones by Few shot learning.
- **Keywords**: Mathematics (Statistics, Probability, Optimization), Artificial Intelligence, Deep Learning, Few Shot Learning, Image Processing, Research.
- **Main tasks**: Research Few-Shot Learning methods, implement chosen approaches in Python using PyTorch, validate them with texture databases, compare performance with other methods, and analyze results to suggest future research directions.
- **Working conditions**: Comprehensive scientific approach in a research environment.

CNRS, IJCLab: Research Assistant, Intern — Orsay, France — Oct. 2020 to Jan. 2021 — 3 months

- **Description**: Part-time internship at the ThomX particle accelerator demonstrator, focusing on camera calibration through image recognition and processing to optimize measurement instrument operation.

Core Competencies

- Statistics, Optimization, Probability.
- Machine Learning, Deep Learning, Computer Vision, Online Learning & Reinforcement Learning.
- Understanding, modeling & solving mathematical problems.
- Understand, use & clearly explain mathematical theory and results from scientific articles.
- Use & develop numerical tools to illustrate the concepts with pratical applications.
- Collaborate & deliver in a research environment.
- Rigor, scientific curiosity, agility of mind, interdisciplinarity.

Practical skills & Technologies

Languages:

- **English: fluent** *Cambridge English Certificate : L&R General English - C1+, ID: KZW58-VFJCS*
- **French: mother tongue**

Informatic Capacities:

- Advanced proficiency in **Python**, with expertise in libraries such as **NumPy, Scikit-Learn, PyTorch, JAX** & **Multiprocessing** to optimize computation performance during parallel computing.
- Proficient in **R**.
- Familiarity and practical experience with **C++** & **CUDA**.
- Use of **Git** for organizing collaborative work and **Slurm** for running programs on supercomputers.
- Skilled in **LaTeX & Typst** for writing scientific papers and technical documentation.

Software: Windows and Linux, Visual Studio, R Studio, Anaconda, Docker, Github, Zotero