

# Pascal Leroy

MACHINE LEARNING PHD

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## PERSONAL STATEMENT

I completed a Ph.D. in **machine learning** in June 2024. My research focuses on training teams of agents with **multi-agent reinforcement learning**. Aside, I conducted projects on **neural network compression** for computer vision and **reinforcement learning** for drone control applications. I am particularly passionate about applying machine learning to address **real-world** challenges and contribute to **impactful applications**. I want to contribute to the development of concrete projects.

## EDUCATION

Ph.D. in Machine Learning - <i>Montefiore Institute, ULiège, Liège</i> Advisors: Damien Ernst and Jonathan Pisane. Research interests: reinforcement learning and multi-agent systems. Thesis: <a href="#">Contributions to Multi-agent Reinforcement Learning</a> .	08/2018 - 06/2024
Master in Computer Science and Engineering - <i>ULiège, Liège</i> Master's thesis: Automatic defect recognition in X-ray imaging by machine learning. <i>Cum Laude</i> - 75%	09/2016 - 09/2018
Bachelor in Engineering - <i>ULiège, Liège</i>	09/2010 - 06/2016

## WORK EXPERIENCE

Research Engineer <a href="#">Montefiore Institute, ULiège</a> Responsible for the research in projects with industrial consortia of Belgian companies. Responsible for writing proposals and administrative and financial reports.	08/2018 - Now
Student Trainee <a href="#">X-RIS: X-Ray Imaging Solutions</a> (Liège) Development of image processing filters dedicated to X-ray image optimisation. Additionally, a master's thesis on automatic defect recognition in X-ray imaging by machine learning.	10/2017 - 06/2018

## RESEARCH PROJECTS

Reinforcement learning for drone control WalEdgeIA: Embedded AI for Walloon SME: Facilitate embedded AI technologies for the industry. Partners: <a href="#">Sirris</a> , <a href="#">Cetic</a> , <a href="#">UMons</a> , <a href="#">ULiège</a> .	2023 - Now
Multi-agent reinforcement learning for infrastructure management planning Collaboration with <a href="#">Pablo G. Morato</a> Multi-agent RL for planning inspections, repairs, or retrofits in structures like wind turbines. We maintain an open-source repository of these real-world environments published in <b>NeuRIPS</b> .	2022 - 2024
Neural network compression for monocular depth estimation IADAS: Artificial Intelligence for Autonomous Drones and Satellites: Design hardware and software for embedding neural networks in drones and satellites. Partners: <a href="#">Deltatec</a> , <a href="#">Spacebel</a> , <a href="#">Multitel</a> , <a href="#">ALX</a> , <a href="#">ULiège</a> .	2021 - 2023
Multi-agent reinforcement learning for defense application IRIS: Intelligent Recognition Information System: Decision-aid based on detection, recognition, and analysis of behaviors and threats. Partners: <a href="#">John Cockerill Defense</a> , <a href="#">ACIC</a> , <a href="#">Multitel</a> , <a href="#">Royal Military Academy</a> , <a href="#">ULiège</a> .	2018 - 2022
Automatic defect recognition in X-ray imaging by machine learning Master's thesis supervised by Vincent Libertiaux, Raphaël Marée and Pierre Geurts. Support for non-destructive testing with tree-based ensemble methods to detect defects in X-ray images. This work was done during my internship at X-RIS. <b>Graded 85%</b> .	2017 - 2018

## SKILLS

**Programming languages:** Python, Bash, C, C++, Java, Matlab, Latex, Typst,...

**Software development:** Git, Agile, Docker, CI/CD, GCP, MLOPS.

**Libraries:** PyTorch, TensorFlow, Jax, Numpy, Matplotlib, Pandas, Onnx, RL libraries,...

**Languages:** French (native), English (professional proficiency).

## PERSONAL EXPERIENCE

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### Association Generale des Etudiants Liegeois (AGEL) ASBL

10/2014 - 09/2016

*Treasurer (2014-2015) and President (2015-2016)*

AGEL is a non-profit organisation in charge of holding student events (turnover > 300k€, 15000 students).  
As Treasurer, responsible for the financial viability and accounting management. As President, responsible for managing the team, public communication and major choices.

### Federation des etudiants ULiege (FEDE) ASBL

10/2013 - 09/2016

*Elected member of the general assembly and member of the Board of Directors of ULiège (2015-2016).*

The FEDE is a non-profit organisation representing 23000 ULiège students to academic authorities.

Responsible for representing the Fede and the students as a member of the Board of Directors of ULiège.

## PUBLICATIONS

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IMP-MARL: a Suite of Environments for Large-scale Infrastructure Management Planning via MARL

Pascal Leroy, Pablo G. Morato, Jonathan Pisane, Athanasios Kolios, Damien Ernst

*Thirty-seventh Conference on Neural Information Processing Systems Datasets and Benchmarks Track (NeurIPS), 2023.*

Value-based CTDE Methods in Symmetric Two-team Markov Game: from Cooperation to Team Competition

Pascal Leroy, Jonathan Pisane, Damien Ernst

*Deep Reinforcement Learning Workshop NeurIPS, 2022.*

QVMix and QVMix-Max: extending the deep quality-value family of algorithms to cooperative multi-agent reinforcement learning.

Pascal Leroy, Damien Ernst, Pierre Geurts, Gilles Louppe, Jonathan Pisane, Matthia Sabatelli

*AAAI-21 Workshop on Reinforcement Learning in Games, 2021.*

## TALKS

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*Multi-Agent Reinforcement Learning.* Deep Reinforcement Learning, University of Groningen.

05/2023

*Workshop on Reinforcement Learning and Multi-Agent RL.* Thales Belgium.

04/2023

*Emergent Tool Use From Multi-Agent Autocurricula.* Advanced Machine Learning, ULiège.

04/2020

## TEACHING

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Optimal decision-making for complex problems (lecture on multi-agent RL).

2020 & 21 & 22 & 23

Introduction to artificial intelligence (Python projects).

2019 & 20

Complementary computer science course (C projects).

2019 & 20

## REVIEWING

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*Workshop: SynS and ML (ICML, 2023).*

## AWARDS

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NeurIPS Travel Award (2023).

## REFEREES

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Damien Ernst (dernst@uliege.be) - Ph.D. advisor.

Jonathan Pisane - Ph.D. advisor.