Pascal **Leroy**

PhD student · Machine Learning

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PERSONAL STATEMENT

I am a Ph.D. student in **machine learning**. My research focuses on training teams of agents with **multi-agent reinforcement learning**, which can evolve in fully cooperative or mixed cooperative-competitive environments. I am particularly passionate about applying reinforcement learning to address **real-world** challenges and contribute to **impactful applications**. I am currently writing my PhD thesis and exploring opportunities for a position abroad to further contribute to the development of concrete applications.

EDUCATION

Ph.D. student in Machine Learning - *Montefiore Institute, ULiège, Liège* — 08/2018 - Now

Advisors: Damien Ernst and Jonathan Pisane.
Research interests: reinforcement learning and multi-agent systems.

Master in Computer Science and Engineering - *ULiège, Liège* — 09/2016 - 09/2018

Master's thesis: Automatic defect recognition in X-ray imaging by machine learning.
Cum Laude - 75%

Bachelor in Engineering - *ULiège, Liège* — 09/2010 - 06/2016

WORK EXPERIENCE

Research Engineer — 08/2018 - Now

Montefiore Institute, ULiège
Responsible for writing proposals and administrative and financial reports.
Responsible for the research in projects with industrial consortia of Belgian companies:

- IRIS: Intelligent Recognition Information System.
- IADAS: Artificial Intelligence for Autonomous Drones and Satellites.

Student Trainee — 10/2017 - 06/2018

X-RIS: X-Ray Imaging Solutions (Liège)
Development of image processing filters dedicated to X-ray image optimisation and the master's thesis.

RESEARCH PROJECTS

Infrastructure management planing — 2022 - Now

Collaboration with Pablo G. Morato
Using multi-agent RL for planning inspections, repairs or retrofits in structures like bridges or wind turbines.
We are maintaining an open-source repository of these real-world environments (published in **NeuRIPS**) and working on new environments to promote such applications in the machine learning community.

IADAS: Artificial Intelligence for Autonomous Drones and Satellites — 2021 - 2023

Partners: Deltatec, Spacebel, Multitel, ALX.
Design hardware and software for embedding neural networks in drones and satellites.
Responsible for compressing and optimising a neural network for monocular depth estimation.

IRIS: Intelligent Recognition Information System — 2018 - 2022

Partners: John Cockerill Defense, ACIC, Multitel, Royal Military Academy.
Decision-aid based on detection, recognition and analysis of behaviours and threats.
Responsible for designing environments and algorithms for multi-agent reinforcement learning.

Automatic defect recognition in X-ray imaging by machine learning — 2017 - 2018

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. **Graded 85%.**

PERSONAL EXPERIENCE

AGEL ASBL — 10/2014 - 09/2016

Treasurer (2014-2015) and President (2015-2016)
The Association Generale des Etudiants Liegeois is a non-profit organisation in charge of holding main 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.

FEDE ULiège ASBL — 10/2013 - 09/2016

Elected member of the general assembly and member of the Board of Directors of ULiège (2015-2016).
The Federation des etudiants ULiege is a non-profit organisation in charge of representing students to academic authorities (23000 ULiege students). Responsible for representing the Fede and the students as a member of the Board of Directors of the University of Liege.

PUBLICATIONS

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.

SKILLS

- ***Programming languages***: Python, Bash, C, C++, Java, Matlab, Latex, Typst.
- ***Software development***: Git, Agile.
- ***Libraries***: PyTorch, TensorFlow, Numpy, Matplotlib, Pandas, Onnx, RL libraries,...
- ***Languages***: French (native), English (professional proficiency).

TALKS

- *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

- 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

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

AWARDS

- NeurIPS Travel Award (2023).

REFEREES

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