

# Lucas Nunes Alegre

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## RESEARCH INTERESTS

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My main research interest is **reinforcement learning** (RL). In my Ph.D., I tackled the problem of how to design **principled sample-efficient RL algorithms** capable of **learning and combining multiple behaviors** to solve **multi-task** and **multi-objective** sequential decision-making problems.

## EDUCATION

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- Doctor of Philosophy – Computer Science** Jan. 2021 – Feb. 2025  
*Universidade Federal do Rio Grande do Sul (UFRGS) and Vrije Universiteit Brussel (VUB)* Porto Alegre, Brazil
- Supervisors: Prof. Ana L. C. Bazzan and Prof. Bruno C. da Silva (Univ. of Massachusetts)
  - One-year Doctoral Stay at Vrije Universiteit Brussel (VUB) — Supervisor: Prof. Ann Nowé
  - Title: Sample-Efficient Multi-Task and Multi-Objective Reinforcement Learning by Combining Multiple Behaviors
- Bachelor of Science *Cum Laude* – Computer Science** Jan. 2016 – Dec. 2020  
*Universidade Federal do Rio Grande do Sul (UFRGS)* Porto Alegre, Brazil
- Supervisor: Prof. Bruno C. da Silva – Cumulative GPA: 4.0/4.0

## EXPERIENCE

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- Adjunct Assistant Professor** March. 2025 – ongoing  
*Institute of Informatics - UFRGS* Porto Alegre, Brazil
- Professor of the Fundamentals of Algorithms and Algorithmic Complexity courses.
- Doctoral Researcher** Jan. 2021 – Feb. 2025  
*Institute of Informatics - UFRGS* Porto Alegre, Brazil
- Advisors: Prof. Ana L. C. Bazzan and Prof. Bruno C. da Silva (Univ. of Massachusetts)
- Data Scientist** Feb. 2025 – March. 2025  
*Big Data* Remote
- Implemented a deep reinforcement learning framework for recommendation systems.
- Research Intern** Jun. 2024 – Sept. 2024  
*Disney Research* Zürich, Switzerland
- Interned at the Robotics Group led by Dr. Moritz Bächer. Designed novel deep RL algorithms for motion tracking on physical characters that can be deployed in real-world robots.
- Project Manager** Jan. 2023 – ongoing  
*Farama Foundation* Remote
- I am the creator and maintainer of MO-Gymnasium, the main library for multi-objective RL environments. The Farama Foundation is a nonprofit organization that maintains the largest open-source RL libraries in the world.
- Doctoral Researcher** Aug. 2022 – Aug. 2023  
*AI-Lab at Vrije Universiteit Brussel (VUB)* Brussels, Belgium
- Advisor: Prof. Ann Nowé
  - Introduced the first model-based multi-objective RL algorithm for domains with continuous state spaces.
- Research Intern** Jan. 2020 – Feb. 2020  
*Technische Universität Berlin* Berlin, Germany
- Advisor: Prof. Kai Nagel. Developed a RL traffic signal controller with Fourier basis function approximation that outperformed a state-of-the-art rule-based controller in a real-world multiagent scenario.
- Undergraduate Research Assistant** Aug. 2017 – Dec. 2020  
*Multiagent Systems Lab. (Institute of Informatics - UFRGS)* Porto Alegre, Brazil
- Advisors: Prof. Ana L. C. Bazzan and Prof. Bruno C. da Silva

## SELECTED PUBLICATIONS (FULL LIST ON [GOOGLE SCHOLAR](#))

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- NeurIPS 2023    Lucas N. Alegre, Ana L. C. Bazzan, Ann Nowé and Bruno C. da Silva. **Multi-Step Generalized Policy Improvement by Leveraging Approximate Models**. Thirty-seventh Conference on Neural Information Processing Systems, 2023.
- NeurIPS 2023    Florian Felten\*, Lucas N. Alegre\*, Ann Nowé, Ana L. C. Bazzan, El-Ghazali Talbi, Grégoire Danoy and Bruno C. da Silva. **A Toolkit for Reliable Benchmarking and Research in Multi-Objective Reinforcement Learning**. Thirty-seventh Conference on Neural Information Processing Systems Track on Datasets and Benchmarks, 2023.
- AAMAS 2023    Lucas N. Alegre, Diederik M. Roijers, Ann Nowé, Ana L. C. Bazzan and Bruno C. da Silva. **Sample-Efficient Multi-Objective Learning via Generalized Policy Improvement Prioritization**. Proceedings of the 22nd International Conference on Autonomous Agents and Multiagent Systems, 2023.
- ICML 2022    Lucas N. Alegre, Ana L. C. Bazzan and Bruno C. da Silva. **Optimistic Linear Support and Successor Features as a Basis for Optimal Policy Transfer**. Proceedings of the Thirty-ninth International Conference on Machine Learning, 2022.
- AAMAS 2021    Lucas N. Alegre, Ana L. C. Bazzan and Bruno C. da Silva. **Minimum-Delay Adaptation in Non-Stationary Reinforcement Learning via Online High-Confidence Change-Point Detection**. Proceedings of the 20th International Conference on Autonomous Agents and Multiagent Systems, 2021.

## OPEN SOURCE PROJECTS

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- MO-Gymnasium** | [github.com/Farama-Foundation/MO-Gymnasium](https://github.com/Farama-Foundation/MO-Gymnasium) | Paper ★+300  
• Library of environments for multi-objective reinforcement learning (MORL).
- MORL-Baselines** | [github.com/LucasAlegre/morl-baselines](https://github.com/LucasAlegre/morl-baselines) | ★+310  
• Library of MORL algorithms implementations.
- SUMO-RL** | [github.com/LucasAlegre/sumo-rl](https://github.com/LucasAlegre/sumo-rl) ★+740  
• Open source repository of reinforcement learning environments for traffic signal control.

## HONORS & AWARDS

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- Doctoral thesis awarded with distinction - PPGC/UFRGS, 2025
- 1/200 selected internationally for the Heidelberg Laureate Forum 2024 and 1/30 selected to receive the Abbe Grant from the Carl Zeiss Foundation
- NeurIPS 2023 Scholar Award
- AAMAS 2023 Student Scholarship
- Best Paper Award - LXAI Workshop @ ICML 2021
- Brazilian Computer Society Distinguished Student Award, 2021
- Top Reviewer - NeurIPS 2022
- Highlighted Reviewer - ICLR 2022
- Graduated *cum laude* in Computer Science. Cumulative GPA: 4.0/4.0, 2021
- Ph.D. Scholarship from the Brazilian National Council for Scientific and Technological Development (CNPq) and the Brazilian Coordination for the Improvement of Higher Education Personnel (CAPES) (2021–2024)
- Finalist of the City Brain Challenge - KDD Cup 2021
- 1st Place at PUCRS University Entrance Exam - Computer Science, 2016

## TEACHING

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| <b>Fundamentals of Algorithms - Professor</b>                  | Mar. 2025 – ongoing         |
| <i>Institute of Informatics - UFRGS</i>                        | <i>Porto Alegre, Brazil</i> |
| <b>Algorithmic Complexity - Professor</b>                      | Mar. 2025 – ongoing         |
| <i>Institute of Informatics - UFRGS</i>                        | <i>Porto Alegre, Brazil</i> |
| <b>Data Science Specialization Course - Teaching Assistant</b> | Aug. 2023 — Aug. 2024       |
| <i>Institute of Informatics - UFRGS</i>                        | <i>Porto Alegre, Brazil</i> |
| <b>Artificial Intelligence - Teaching Assistant</b>            | Jan. 2022 — Jul. 2022       |
| <i>Institute of Informatics - UFRGS</i>                        | <i>Porto Alegre, Brazil</i> |
| <b>Fundamentals of Algorithms - Teaching Assistant</b>         | Aug. 2021 — Dec. 2021       |
| <i>Institute of Informatics - UFRGS</i>                        | <i>Porto Alegre, Brazil</i> |
| <b>Introduction to Algorithms - Monitor</b>                    | Aug. 2016 — Dec. 2016       |
| <i>Institute of Informatics - UFRGS</i>                        | <i>Porto Alegre, Brazil</i> |

## INVITED TALKS

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**Princeton RL Lab.** Sample-Efficient Multi-Task and Multi-Objective Reinforcement Learning by Combining Multiple Behaviors. 2024.  
**Cohere For AI.** Sample-Efficient Multi-Task and Multi-Objective Reinforcement Learning by Combining Multiple Behaviors. 2024. [\[Talk Link\]](#)  
**University of Luxembourg.** Towards Sample-Efficient Multi-Objective Reinforcement Learning. 2023.  
**Vrije Universiteit Brussel.** Sample-Efficient Multi-Objective Learning via Generalized Policy Improvement. 2023.

## STUDENTS

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| Liam Mertens (Bachelor, VUB)           | 2023 |
| Vicent N. de Almeida (Bachelor, UFRGS) | 2022 |

## PROGRAM COMMITTEE MEMBER/REVIEWER

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|---|-----------|
| International Conference on Machine Learning (ICML)                                     | 2022–2025 |
| Conference on Neural Information Processing Systems (NeurIPS)                           | 2022–2024 |
| International Conference on Learning Representations (ICLR)                             | 2022–2025 |
| Reinforcement Learning Conference (RLC)   | 2024–2025 |
| AAAI Conference on Artificial Intelligence  | 2023–2025 |
| International Conference on Autonomous Agents and Multiagent Systems (AAMAS)            | 2020–2025 |
| International Joint Conference on Artificial Intelligence (IJCAI)                       | 2024      |
| Neural Computing and Applications (NCAA)  |           |
| IEEE Transactions on Artificial Intelligence  |           |
| The Knowledge Engineering Review  |           |
| <b>Workshop Reviewer:</b> ALA (2023–2025), MODeM (2023–2024), EWRL 2023, LXAI@ICML 2021 |           |
| <b>Volunteer:</b> AAMAS 2023, AAMAS 2021, LXAI@ICML 2021, NIME 2019.                    |           |

## TECHNICAL SKILLS

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**Languages:** Portuguese (Native), English (Fluent), Spanish (Beginner).  
**Programming Languages:** Python, C/C++, Java, R, MATLAB, Kotlin, SQL.  
**Tools & Others:** Jax, PyTorch, Tensorflow, Scikit-Learn, Gym/Gymnasium, Pandas, NumPy, Matplotlib, i-graph, OpenCV, QT, Git, Unix/Linux, Cplex, L<sup>A</sup>T<sub>E</sub>X, SUMO, Network Analysis, Graphistry, VS Code.

## OTHER INTERESTS

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- Guitar playing • Music • Travelling • Football/Soccer • Cinema • Board Games