Lucas Nunes Alegre

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Education

Doctor of Philosophy — Jan. 2021 – ongoing
Universidade Federal do Rio Grande do Sul (UFRGS) — *Porto Alegre, Brazil*
- Supervisors: Prof. Ana L. C. Bazzan and Prof. Bruno C. da Silva
- Partial time at Vrije Universiteit Brussel (VUB) — Supervisor: Prof. Ann Nowé

Bachelor of Science *Cum Laude* – Computer Science — Jan. 2016 – Dec. 2020
Universidade Federal do Rio Grande do Sul (UFRGS), Program ranked #1 in the country — *Porto Alegre, Brazil*
- Cumulative GPA: 4.0/4.0
- Supervisor: Prof. Bruno C. da Silva

Experience

Project Manager — Jan. 2023 – ongoing
Farama Foundation — *Remote*
- The Farama Foundation is a nonprofit organization that maintains the largest open-source Reinforcement Learning libraries in the world.

Doctoral Researcher — Aug. 2022 – Aug. 2023
AI-Lab at Vrije Universiteit Brussel (VUB) — *Brussels, Belgium*
- Advisor: Prof. Ann Nowé
- Designed the first model-based multi-objective reinforcement learning algorithm for continuous states and actions.

Intern Researcher — Winter 2020
Technische Universität Berlin — *Berlin, Germany*
- Advisor: Prof. Dr. Kai Nagel
- Developed a reinforcement learning traffic signal controller with Fourier basis function approximation.

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
- Developed a model-based reinforcement learning algorithm able to deal with non-stationary in high-dimensional continuous environments.
- Studied the impact of non-stationarity and partial-observability in RL-based multiagent traffic signal control.

Teaching

Data Science Specialization Course - Teaching Assistant — Aug. 2023 — ongoing
Institute of Informatics - UFRGS — *Porto Alegre, Brazil*
- Tutored students in a range of machine learning and data science-related courses.

Artificial Intelligence - Teaching Assistant — Jan. 2022 — Jul. 2022
Institute of Informatics - UFRGS — *Porto Alegre, Brazil*
- Tutored students in AI fundamentals and algorithms.

Fundamentals of Algorithms - Teaching Assistant — Aug. 2021 — Dec. 2021
Institute of Informatics - UFRGS — *Porto Alegre, Brazil*
- Tutored students in fundamental concepts of algorithms and functional programming.

Introduction to Algorithms - Monitor — Aug. 2016 — Dec. 2016
Institute of Informatics - UFRGS — *Porto Alegre, Brazil*
- Tutored students in fundamental concepts of programming logics and the C language.

Selected Publications (full list on Google Scholar)

[1] L. N. Alegre, A. L. C. Bazzan, A. Nowé, and B. C. d. Silva, "Multi-step generalized policy improvement by leveraging approximate models," in *Proc. of the 37th Conference on Neural Information Processing Systems (NeurIPS)*, New Orleans, USA, 2023.

[2] F. Felten*, L. N. Alegre*, A. Nowé, A. L. C. Bazzan, E.-G. Talbi, G. Danoy, and B. C. da Silva, "A toolkit for reliable benchmarking and research in multi-objective reinforcement learning," in *Proc. of the 37th Conference on Neural Information Processing Systems (NeurIPS) Track on Datasets and Benchmarks*, New Orleans, USA, 2023.

[3] L. N. Alegre, D. M. Roijers, A. Nowé, A. L. C. Bazzan, and B. C. d. Silva, "Sample-efficient multi-objective learning via generalized policy improvement prioritization," in *Proc. of the 22nd International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2023.

[4] L. N. Alegre, A. L. Bazzan, and B. C. da Silva, "Optimistic linear support and successor features as a basis for optimal policy transfer," in *Proceedings of the Thirty-ninth International Conference on Machine Learning (ICML)*, 2022.

[5] L. N. Alegre, A. L. C. Bazzan, and B. C. d. Silva, "Minimum-delay adaptation in non-stationary reinforcement learning via online high-confidence change-point detection," in *Proceedings of the 20th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Virtual Event, United Kingdom, 2021, pp. 97–105, ISBN: 9781450383073.

[6] L. V. Schreiber, L. N. Alegre, A. L. C. Bazzan, and G. de O. Ramos, "On the explainability and expressiveness of function approximation methods in rl-based traffic signal control," in *Proceedings of the 2022 International Joint Conference on Neural Networks (IJCNN)*, 2022.

[7] L. N. Alegre, T. Ziemke, and A. L. C. Bazzan, "Using reinforcement learning to control traffic signals in a real-world scenario: An approach based on linear function approximation," *IEEE Transactions on Intelligent Transportation Systems*, 2021. DOI: 10.1109/TITS.2021.3091014.

[8] L. N. Alegre, A. L. C. Bazzan, and B. C. d. Silva, "Quantifying the impact of non-stationarity in reinforcement learning-based traffic signal control," *PeerJ Computer Science*, vol. 7, e575, May 2021, ISSN: 2376-5992. DOI: 10.7717/peerj-cs.575. [Online]. Available: http://dx.doi.org/10.7717/peerj-cs.575.

[9] L. N. Alegre and M. M. Oliveira, "Selfieart: Interactive multi-style transfer for selfies and videos with soft transitions," in *Proceedings of the 2020 33rd SIBGRAPI Conference on Graphics, Patterns and Images*, 2020, pp. 17–22. DOI: 10.1109/SIBGRAPI51738.2020.00011.

[10] A. Weber, L. N. Alegre, J. Torresen, and B. C. da Silva, "Parameterized melody generation with autoencoders and temporally-consistent noise," in *Proceedings of the International Conference on New Interfaces for Musical Expression (NIME)*, 2019.

Open Source Projects

SUMO-RL | github.com/LucasAlegre/sumo-rl ★+500

- Open source repository of reinforcement learning environments for traffic signal control
- Compatible with Gymnasium, PettingZoo and popular RL libraries such as Stable-Baselines and RLlib

MO-Gymnasium | github.com/Farama-Foundation/MO-Gymnasium | Paper ★+180

- Library of environments for multi-objective reinforcement learning (MORL)

MORL Baselines | github.com/LucasAlegre/morl-baselines | ★+130

- Library of MORL algorithms implementations

Vote Network | github.com/LucasAlegre/vote-network | Visualization

- Network analysis and interactive visualization of the Brazilian Chamber of Deputies

Invited Talks

University of Luxembourg. Topic: Sample-Efficient Multi-Objective RL. 2023
Vrije Universiteit Brussel. Topic: Sample-Efficient Multi-Objective RL. 2023

Service

Reviewer: ICML (2022–2023), NeurIPS (2022–2023), ICLR (2022–2024), AAMAS (2020–2023), AAAI (2023–2024), ALA 2023, ICDL 2021, EUMAS 2021, EWRL 2023, Neural Computing and Applications, IEEE TAI, IEEE TCDS, J. of Supercomputing, MODeM 2023 Workshop, LXAI 2021 Workshop
Volunteer: AAMAS 2023, AAMAS 2021, LXAI@ICML 2021, NIME 2019

Technical Skills

Languages: Portuguese (Native), English (Fluent), Spanish (Beginner)
Programming Languages: Python, C/C++, Java, R, MATLAB, Kotlin, SQL
Tools & Others: Jax, PyTorch, Tensorflow, Gym/Gymnasium, Pandas, NumPy, Matplotlib, i-graph, OpenCV, QT, Git, Unix/Linux, Cplex, LaTeX, SUMO, Network Analysis, Graphistry, VS Code

Awards and Honors

- NeurIPS 2023 Scholar Award
- 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
- Finalist of the City Brain Challenge - KDD Cup 2021
- 1st Place in Computer Science Joint Entrance Examination - Vestibular PUCRS, 2016

Additional Education

- 22nd European Agent Systems Summer School (EASSS), 2021
- Competitive Programming Winter School - Brazilian Computer Society, 2018