Lukas Schäfer

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EDUCATION

PhD Data Science & Artificial Intelligence — 12/2019 -- Present
University of Edinburgh — Edinburgh, United Kingdom

- Supervisors: **Stefano V. Albrecht** (primary) and **Amos Storkey** (secondary) | Expected graduation: April 2024
- Project: **Sample Efficiency and Generalisation in Multi-Agent Reinforcement Learning**
- Receiving **Principal's Career Development Scholarship** from the University of Edinburgh
- Organisation and hosting of **RL reading group** with speakers from industry (DeepMind, MSR, Google Brain, FAIR) and academia (Oxford University, McGill University, Georgia Institute of Technology, National University of Singapore)

M.Sc. Informatics — 09/2018 -- 08/2019
University of Edinburgh — Edinburgh, United Kingdom

- Degree classification: **Distinction** (77.28%)
- Received **DAAD graduate scholarship** and **Stevenson Exchange Scholarship**

B.Sc. Computer Science, minor subject Japanese — 10/2015 -- 09/2018
Saarland University — Saarbrücken, Germany

- Degree classification: grade of **1.2** (German scale) - within **top 5%**

PUBLICATIONS

Textbook

[1] S. V. Albrecht, F. Christianos, and **Lukas Schäfer** (equal contributions), *Multi-Agent Reinforcement Learning: Foundations and Modern Approaches*. To be published with **MIT press**, 2024.

Conference/ Journals

[2] **Lukas Schäfer**, F. Christianos, J. P. Hanna, and S. V. Albrecht, "Decoupled reinforcement learning to stabilise intrinsically-motivated exploration," in ***AAMAS*** *(26% acceptance rate)*, 2022.

[3] **Lukas Schäfer**, "Task generalisation in multi-agent reinforcement learning," in ***AAMAS***, *Doctoral Consortium*, 2022.

[4] R. Zhong, D. Zhang, **Lukas Schäfer**, S. V. Albrecht, and J. P. Hanna, "Robust on-policy data collection for data efficient policy evaluation," in ***NeurIPS*** *(26% acceptance rate)*, 2022.

[5] Autonomous Agents Research Group, "Deep reinforcement learning for multi-agent interaction," ***AI Communications***, 2022.

[6] G. Papoudakis, F. Christianos, **Lukas Schäfer**, and S. V. Albrecht, "Benchmarking multi-agent deep reinforcement learning algorithms in cooperative tasks," in ***NeurIPS*** *(26% acceptance rate), Datasets and Benchmarks Track*, 2021.

[7] F. Christianos, **Lukas Schäfer**, and S. V. Albrecht, "Shared experience actor-critic for multi-agent reinforcement learning," in ***NeurIPS*** *(20% acceptance rate)*, 2020.

Workshops

[8] **Lukas Schäfer**, O. Slumbers, S. McAleer, Y. Du, S. V. Albrecht, and D. Mguni, "Ensemble value functions for efficient exploration in multi-agent reinforcement learning," in *Adaptive and Learning Agents Workshop at* ***AAMAS***, 2023.

[9] A. Andres, **Schäfer, Lukas**, E. Villar-Rodriguez, S. V. Albrecht, and J. Del Ser, "Using offline data to speed-up reinforcement learning in procedurally generated environments," in *Adaptive and Learning Agents Workshop at* ***AAMAS***, 2023.

[10] T. McInroe, **Schäfer, Lukas**, and S. V. Albrecht, "Learning representations for control with hierarchical forward models," in *Deep Reinforcement Learning Workshop at* ***NeurIPS***, 2022.

Preprints

[11] **Lukas Schäfer**, F. Christianos, A. Storkey, and S. V. Albrecht, "Learning task embeddings for teamwork adaptation in multi-agent reinforcement learning," *arXiv*, 2022.

[12] A. Krnjaic, J. D. Thomas, G. Papoudakis, **Schäfer, Lukas**, P. Börsting, and S. V. Albrecht, "Scalable multi-agent reinforcement learning for warehouse logistics with robotic and human co-workers," *arXiv*, 2022.

[13] T. McInroe, **Schäfer, Lukas**, and S. V. Albrecht, "Learning temporally-consistent representations for data-efficient reinforcement learning," *arXiv*, 2021.

SKILLS

Programming
Python • C++ • Bash

Technologies and Tools
PyTorch • NumPy • UNIX • Git

Languages
Native in German • Fluent in English • Beginner in Chinese

Soft Skills
Teamwork • Teaching • Communication • Organisation

EXPERIENCE

Research Scientist Intern — 04/2023 -- 06/2023
Microsoft Research — Cambridge, United Kingdom

Young Research Attendee — 09/2022 -- 09/2022
Heidelberg Laureate Forum — Heidelberg, Germany
- Selected as one of 100 international young researchers in computer science to network and discuss research

Research Scientist Intern — 07/2022 -- 12/2022
Huawei Noah's Ark Lab — London, United Kingdom
- Researched techniques to use the uncertainty of **ensemble models** to improve sample efficiency and training stability of **value-based multi-agent reinforcement** under the supervision of **David Mguni**

Research Intern — 11/2020 -- 03/2021
Dematic - Technology and Innovation — Remote
- Applied multi-agent reinforcement learning to automate **large-scale robotic warehouse logistics**
- My internship led to two further internship projects and a **fellowship-funded research collaboration**

DISSERTATIONS

M.Sc. Dissertation, Supervision by Stefano Albrecht — 05/2019 -- 08/2019
Curiosity in Multi-Agent Reinforcement Learning (74%)
- Applied count- and prediction-based **intrinsic rewards** as exploration bonuses to **multi-agent reinforcement learning**
- Proposed multi-agent curiosity **improved stability and convergence of MADDPG in sparse-reward tasks**

B.Sc. Dissertation, Supervision by Jörg Hoffmann — 04/2018 -- 07/2018
Domain-Dependent Policy Learning using Neural Networks in Classical Planning (1.0)
- Transferred policy learning **Action-Schema Networks** to classical automated planning with adjusted training scheme, Keras implementation and extension of the **FastDownward** planning framework

TEACHING EXPERIENCE

Teaching Assistant, University of Edinburgh — 10/2019 -- Present
Reinforcement Learning, School of Informatics
- **Delivering lectures** and **designing coursework** on reinforcement learning (including deep and multi-agent RL)

M.Sc. Student Supervision, University of Edinburgh — 02/2021 -- 08/2021
- Co-supervised two M.Sc. students through project proposal, refinement and execution towards final thesis
- One thesis was further refined and accepted as a **main conference paper at NeurIPS 2022**

Voluntary Lecturer and Coach, Saarland University — 09/2017 -- 10/2017
Mathematics Preparation Course
- Delivered daily **lectures** on formal languages and predicate logic **to 250 participants** in first week
- The course received **BESTE-award** for special student commitment 2017 of Saarland University

Teaching Assistant, Saarland University — 10/2016 -- 03/2017
Programming 1, Dependable Systems and Software Group

REVIEWING

- ICML 2022 – **top 10% outstanding reviewer award**
- NeurIPS 2022, NeurIPS Datasets and Benchmarks Track 2021 and 2022, AAMAS 2022