







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: August 2023
- › 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

Conference/ Journals

- [1] **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.
- [2] **Lukas Schäfer**, "Task generalisation in multi-agent reinforcement learning," in **AAMAS, Doctoral Consortium**, 2022.
- [3] 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.
- [4] Autonomous Agents Research Group, "Deep reinforcement learning for multi-agent interaction," *AI Communications*, 2022.
- [5] 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.
- [6] F. Christianos, **Lukas Schäfer**, and S. V. Albrecht, "Shared experience actor-critic for multi-agent reinforcement learning," in **NeurIPS** (20% acceptance rate), 2020.

Workshops

- [7] **Lukas Schäfer**, F. Christianos, J. P. Hanna, and S. V. Albrecht, "Decoupling exploration and exploitation in reinforcement learning," in *Unsupervised Reinforcement Learning Workshop at ICML*, 2021.
- [8] R. Zhong, J. P. Hanna, **Lukas Schäfer**, and S. V. Albrecht, "Robust on-policy data collection for data efficient policy evaluation," in *Offline Reinforcement Learning Workshop at NeurIPS*, 2021.
- [9] G. Papoudakis, F. Christianos, **Schäfer, Lukas**, and S. V. Albrecht, "Comparative evaluation of cooperative multi-agent deep reinforcement learning algorithms," in *Adaptive and Learning Agents Workshop at AAMAS*, 2021.

Preprints

- [10] **Lukas Schäfer**, F. Christianos, A. Storkey, and S. V. Albrecht, "Learning task embeddings for teamwork adaptation in multi-agent reinforcement learning," *arXiv*, 2022.
- [11] T. McInroe, **Schäfer, Lukas**, and S. V. Albrecht, "Learning representations for control with hierarchical forward models," *arXiv*, 2022.
- [12] T. McInroe, **Schäfer, Lukas**, and S. V. Albrecht, "Learning temporally-consistent representations for data-efficient reinforcement learning," *arXiv*, 2021.

SKILLS

Programming

Python • C++ • SML • 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

Young Research Attendee

HEIDELBERG LAUREATE FORUM

09/2022 -- 09/2022

HEIDELBERG, GERMANY

- Selected as one of 100 international young researchers in computer science to network and discuss research

Research Intern

HUAWEI NOAH'S ARK LAB

07/2022 -- Present

LONDON, UNITED KINGDOM

- Researching Bayesian exploration for multi-agent reinforcement learning under the supervision of **David Mguni**

Research Intern

DEMATIC - TECHNOLOGY AND INNOVATION

11/2020 -- 03/2021

REMOTE

- Applied multi-agent reinforcement learning to automate large-scale robotic warehouse logistics

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**
- Evaluated intrinsic rewards under partial observability and sparse rewards in the multi-agent particle environment
- 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
- Extensive evaluation and analysis on IPC domains identifying limitations in generalisation and scalability

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