Lukas Schäfer

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EDUCATION

PhD Data Science & Artificial Intelligence
University of Edinburgh   12/2019 -- Present
                                                        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
University of Edinburgh   09/2018 -- 08/2019
                                                        Edinburgh, United Kingdom

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

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

[8] **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.

[9] 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.

[10] 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

[11] T. McInroe, **Schäfer, Lukas**, and S. V. Albrecht, "Learning representations for control with hierarchical forward models," *Under review*, 2023.

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

📊 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
MICROSOFT RESEARCH

04/2023 -- 06/2023
CAMBRIDGE, UNITED KINGDOM

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 Scientist Intern
HUAWEI NOAH'S ARK LAB

07/2022 -- 12/2022
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
DEMATIC - TECHNOLOGY AND INNOVATION

11/2020 -- 03/2021
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
CURIOSITY IN MULTI-AGENT REINFORCEMENT LEARNING (74%)

05/2019 -- 08/2019

> 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
DOMAIN-DEPENDENT POLICY LEARNING USING NEURAL NETWORKS IN CLASSICAL PLANNING (1.0)

04/2018 -- 07/2018

> 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
REINFORCEMENT LEARNING, SCHOOL OF INFORMATICS

10/2019 -- Present

> **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
MATHEMATICS PREPARATION COURSE

09/2017 -- 10/2017

> 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
PROGRAMMING 1, DEPENDABLE SYSTEMS AND SOFTWARE GROUP

10/2016 -- 03/2017

🔍 REVIEWING

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