







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: March 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 leading industry (MSR, Google Brain, Deepmind, FAIR) and academic (Oxford University, McGill University, Georgia Institute of Technology, National University of Singapore) labs

M.Sc. Informatics

09/2018 -- 08/2019

UNIVERSITY OF EDINBURGH

EDINBURGH, UNITED KINGDOM

- › Degree classification: **Distinction** (77.28%)
- › Received **DAAD** (German Academic Exchange Service) **graduate scholarship** and **Stevenson Exchange Scholarship**
- › Modules include: Reinforcement Learning, Algorithmic Game Theory and its Applications, Machine Learning and Pattern Recognition, Probabilistic Modelling and Reasoning, Decision Making in Robots and Autonomous Agents

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

Refereed Publications

- [1] **Lukas Schäfer**, F. Christianos, J. P. Hanna, and S. V. Albrecht, "Decoupled reinforcement learning to stabilise intrinsically-motivated exploration," in *International Conference on Autonomous Agents and Multiagent Systems* (26% acceptance rate), 2022.
- [2] G. Papoudakis, F. Christianos, **Lukas Schäfer**, and S. V. Albrecht, "Benchmarking multi-agent deep reinforcement learning algorithms in cooperative tasks," in *Neural Information Processing Systems* (26% acceptance rate), *Datasets and Benchmarks Track*, 2021.
- [3] **Lukas Schäfer**, F. Christianos, J. P. Hanna, and S. V. Albrecht, "Decoupling exploration and exploitation in reinforcement learning," in *ICML Workshop on Unsupervised Reinforcement Learning (URL)*, 2021.
- [4] F. Christianos, **Lukas Schäfer**, and S. V. Albrecht, "Shared experience actor-critic for multi-agent reinforcement learning," in *Neural Information Processing Systems* (20% acceptance rate), 2020.
- [5] R. Zhong, J. Hanna, **Lukas Schäfer**, and S. V. Albrecht, "Robust on-policy data collection for data efficient policy evaluation," in *NeurIPS Workshop on Offline Reinforcement Learning*, 2021.

Work in Progress

- [6] T. McInroe, **Lukas Schäfer**, and S. V. Albrecht, "Learning temporally-consistent representations for data-efficient reinforcement learning," *arXiv preprint arXiv:2110.04935*, 2021.

EXPERIENCE

Research Intern

11/2020 -- 03/2021

DEMATIC - TECHNOLOGY AND INNOVATION

REMOTE

- › Applying state-of-the-art AI technology to automate large-scale robotic warehouse logistics

Navigation Software Engineer and Navigation Advisor

09/2018 -- 08/2020

HYPED -- UNIVERSITY OF EDINBURGH HYPERLOOP TEAM

EDINBURGH, UNITED KINGDOM

- › Developed navigation system of Hyperloop prototype using Kalman filters, sensor processing and control techniques to estimate location, orientation and speed of the pod
- › Finalist for the SpaceX 2019 Hyperloop competition in California in Summer 2019

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

DISSERTATIONS

M.Sc. Dissertation, Autonomous Agents Research Group

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 (MARL)
- › Evaluated MARL with curiosity under partial observability and sparse rewards in multi-agent particle environments
- › Proposed multi-agent curiosity led to improved stability and convergence of policy-gradient MARL in sparse-reward tasks

B.Sc. Dissertation, Foundations of Artificial Intelligence (FAI) Group

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 RL coursework** covering wide range of topics from single- to multi-agent and deep RL
- › Marking project and exam for reinforcement learning course

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
- › Assisted M.Sc. student from their thesis towards a successful workshop submission at NeurIPS 2021

Voluntary Lecturer and Coach, Saarland University

09/2017 -- 10/2017

MATHEMATICS PREPARATION COURSE

- › Explained formal languages and predicate logic to ~ 250 participants in daily lectures of the first week
- › Supervised two groups to provide feedback and further assistance in daily coaching-sessions
- › 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

- › **Conferences:** AAMAS 2022, NeurIPS 2021 Datasets and Benchmarks Track
- › **Workshops:** Pre-Registration Experiment Workshop at NeurIPS 2020

PROJECT EXPERIENCE

Autonomous Robot Localisation, University of Edinburgh

09/2018 -- 12/2018

GROUP PROJECT FOR ROBOTICS: SCIENCE AND SYSTEMS LECTURE

- › Constructed a differential steering mobile robot using LEGO, a Raspberry Pi, and an array of IR, camera and sonar sensors
- › Implemented particle-filter localisation and obstacle avoidance in a predetermined environment
- › Robot successfully managed to navigate through the constructed arena, detect and communicate points of interest using light sensors and return back to its deployment location

For more project experience, see lukaschaefer.com/#projects