Lukas Schäfer

Lukas Schäfer   in lukas-schaefer   LukasSchaefer

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💼 WORK 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
> Developing navigation system of "The Flying Podsman" Hyperloop prototype using sensor filtering, 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
> Advising navigation team on the adaptation and implementation of improved sensor and filtering techniques

📖 PUBLICATIONS

Refereed Publications
[1] **Lukas Schäfer**, F. Christianos, J. Hanna, and S. V. Albrecht, "Decoupling exploration and exploitation in reinforcement learning," in *ICML Workshop on Unsupervised Reinforcement Learning (URL); (Revised Under Review)*, 2021.

[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 (NeurIPS), Datasets and Benchmarks Track*, 2021.

[3] F. Christianos, **Lukas Schäfer**, and S. V. Albrecht, "Shared experience actor-critic for multi-agent reinforcement learning," in *Neural Information Processing Systems (NeurIPS)*, 2020.

Under Review
[4] T. McInroe, **Lukas Schäfer**, and S. V. Albrecht, "Learning temporally-consistent representations for data-efficient reinforcement learning," *(Under Review)*, 2021.

[5] R. Zhong, J. Hanna, **Lukas Schäfer**, and S. V. Albrecht, "Robust on-policy data collection for data efficient policy evaluation," *(Under Review)*, 2021.

🎓 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: December 2023
> Project: Sample Efficiency and Generalisation in Multi-Agent Reinforcement Learning
> Receiving **Principal's Career Development Scholarship** from the University of Edinburgh
> Research: Reinforcement Learning, Multi-Agent Systems, Generalisation, Exploration, Intrinsic Rewards

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) equivalent to UK **1st class honours**

Abitur - Secondary School   08/2008 -- 06/2015
WARNDTGYMNASIUM GEISLAUTERN, VÖLKLINGEN   GEISLAUTERN, GERMANY
> **Grade of 1.0**; school year's best student award, computer science and mathematics award of Saarland University

SKILLS

Programming
Competent
Python · C++
Familiar
C · Java · Rust · SML · HTML · CSS · Matlab · Bash

Technologies and Tools
PyTorch · TensorFlow · Keras · NumPy · UNIX · Git

Languages
Native in German · Fluent in English · Intermediate in French · Beginner in Chinese · Beginner in Japanese

DISSERTATIONS

M.Sc. Dissertation, Autonomous Agents Research Group   05/2019 -- 08/2019
CURIOSITY IN MULTI-AGENT REINFORCEMENT LEARNING (74%)

- Applied curiosity as intrinsically computed exploration bonuses for multi-agent reinforcement learning (MARL)
- Implemented count- and prediction-based curiosities for value-based and policy-gradient MARL methods using PyTorch
- Evaluated the influence of curiosity on cooperative and competitive MARL under partial observability and sparse rewards in a multi-agent particle environment
- Applied curiosity led to improved stability and convergence of policy-gradient MARL trained with sparse reward signals

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 domain-dependent policy learning Action-Schema Networks to classical automated planning
- Keras implementation, adjusted training for classical planning and extended 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** coveringwide range of topics from single- to multi-agent and deep RL
- Marking project and exam for reinforcement learning course
- Advising students on various challenges regarding lecture material and content

Voluntary Lecturer and Coach, Saarland University   09/2017 -- 10/2017
MATHEMATICS PREPARATION COURSE

- Assisted the organization of the mathematics preparation course for upcoming computer science students
- 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

- Taught first-year students concepts of functional programming, basic complexity theory and inductive correctness proofs in weekly tutorials and office hours
- Collectively created learning materials and discussed student progress as part of the whole teaching team

REVIEWING

- Reviewer for **NeurIPS 2021 Datasets and Benchmarks Track**
- Reviewer for **NeurIPS 2020 workshop** "**The pre-registration experiment**: an alternative publication model for machine learning research"

For software project experience, see **lukaschaefer.com/#projects**