Lukas Schäfer

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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] 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.

[4] 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

[5] T. McInroe, **Lukas Schäfer**, and S. V. Albrecht, "Learning temporally-consistent representations for data-efficient reinforcement learning," *(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
Python • C++ • SML • Bash

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

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

Soft Skills
Teamwork • Teaching • Communication

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**

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 MARL with curiosity under partial observability and sparse rewards in multi-agent particle environments
- 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 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

SUPERVISION

M.Sc. Thesis 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

TEACHING EXPERIENCE

Teaching Assistant, University of Edinburgh — 10/2019 -- Present

Reinforcement Learning, School of Informatics

Voluntary Lecturer and Coach, Saarland University — 09/2017 -- 10/2017

Mathematics Preparation Course

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

[References available on request - Last updated on November 19, 2021]