Lukas Schäfer

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SKILLS

Programming

Competent
Python • C++ • SML

Familiar
C • Java • Rust • 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

EDUCATION

PhD Data Science & Artificial Intelligence — 12/2019 -- Present

University of Edinburgh — Edinburgh, United Kingdom

- Principal supervisor: Dr. Stefano V. Albrecht (Autonomous Agents Research Group)
- Project: Collaborative Exploration in Multi-Agent Reinforcement Learning using Intrinsic Curiosity
- Research: Reinforcement Learning, Multi-Agent Systems, Exploration, Intrinsic Rewards

M.Sc. Informatics — 09/2018 -- 08/2019

University of Edinburgh — Edinburgh, United Kingdom

- Degree classification: Distinction (77.28%)
- MSc thesis: Dissertation: Curiosity in Multi-Agent Reinforcement Learning (74%)
- DAAD (German Academic Exchange Service) graduate 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
- BSc thesis: Domain-Dependent Policy Learning using Neural Networks in Classical Planning (1.0)
- Modules include: Automated Planning, Admissible Search Enhancements, Neural Networks: Implementation and Application, Information Retrieval and Data Mining, Software Engineering, Modern Imperative Programming Languages

Abitur - Secondary School — 08/2008 -- 06/2015

Warndtgymnasium Geislautern, Völklingen — Geislautern, Germany

- Graduated Abitur 1.0; school year's best student award, computer science and mathematics award of Saarland University

WORK EXPERIENCE

Team Advisor, University of Edinburgh — 09/2019 -- 08/2020

HYPED -- University of Edinburgh Hyperloop Team

- Consulting the HYPED software team especially regarding navigation and sensor filtering to achieve a reliable prototype

Navigation Software Engineer, University of Edinburgh — 09/2018 -- 08/2019

HYPED -- University of Edinburgh Hyperloop Team

- 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

PROJECT EXPERIENCE

M.Sc. Dissertation, University of Edinburgh — 05/2019 -- 08/2019

Autonomous Agents Research Group

- 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

Reinforcement Learning for Soccer Playing, University of Edinburgh — 02/2019 -- 03/2019

Project for Reinforcement Learning Lecture

- Implemented several foundational RL methods including value iteration, Q-learning, first-visit Monte Carlo and SARSA for simple control tasks and the half-field-offense (HFO) 2D environment
- Implemented asynchronous 1-step Q-learning with deep Q-networks (DQNs)
- Implemented multi-agent RL methods independent Q-learning, joint action learning and WoLF-PHC controlling two cooperating agents in the HFO environment

Autonomous Robot Localisation, University of Edinburgh — 09/2018 -- 12/2018

Group Project for Robotics: Science and Systems Lecture

- Constructed a four-wheel differential steering mobile robot as group of three for autonomous localisation in a known environment using LEGO aside of technical components including a Raspberry Pi computer
- Implemented particle-filter localisation and obstacle avoidance based on IR and sonar sensors
- 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

B.Sc. Dissertation, Saarland University — 04/2018 -- 07/2018

Foundations of Artificial Intelligence (FAI) Group

- Transferred domain-dependent policy learning Action-Schema Networks to classical automated planning
- Implemented the network using Keras, slightly adjusted its training for classical planning and extended the FastDownward planning framework
- Extensive evaluation and analysis was conducted on IPC domains of varying complexity identifying limitations in generalisation and scalability

Plagiarism Detection Tool, Saarland University — 04/2017 -- 07/2017

Group Project for Software Engineering Lecture

- Researched, planned and built a reliable similarity detection for text & code in Python with language-specific analysis for Python and C as a group of five
- Designed and implemented a web-based output creation, highlighting similar submissions and plagiarism
- Our software is now successfully used in our customer's lectures to detect plagiarism cases on Python code

TEACHING EXPERIENCE

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

Reinforcement Learning, School of Informatics

- Designing reinforcement learning (RL) project covering wide range of topics including dynamic programming, single- and multi-agent RL as well as deep RL
- Marking project and exam for reinforcement learning course
- Advising students on various challenges regarding lecture material and content

Teaching Assistant, Saarland University — 10/2016 -- 03/2017

Programming 1, Dependable Systems and Software Group

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

[References available on request - Last updated on October 28, 2020]