Lukas Judith

Sydney Olympic Park, NSW 2127 | 0433 470 441
lukasjudith12@gmail.com | https://github.com/lukas-judith

SUMMARY

Data scientist with three years of experience in statistical data analysis, machine learning, and developing software in Python. Also experienced in automated ETL data flows and working with SQL and relational databases in an industry setting. Working knowledge of cloud computing with AWS. Quick learner and highly motivated to take on projects in data science and data engineering.

PROFESSIONAL EXPERIENCE

Mannheim Central Institute for Mental Health **Mannheim, Germany**
Graduate Researcher in Machine Learning *Jan 2022 – Jan 2023*

- Developed and fine-tuned a recurrent neural network architecture with time-dependent parameters for forecasting and dynamical systems reconstruction of non-stationary time series.
- Implemented the network in Python (PyTorch) and used version control with Git.
- Wrote Python scripts (NumPy, SciPy) for generating non-stationary benchmark time series data based on mathematical models used in climate science and neuroscience.
- Evaluated the model performance using MSE, power spectrum analysis, and Kullback-Leibler divergence, demonstrating the architecture's ability to accurately forecast and reconstruct the non-stationary dynamics of the simulated benchmark datasets.

Heidelberg Collaboratory for Image Processing **Heidelberg, Germany**
Research Assistant in Statistical Image Analysis *Apr 2021 – Dec 2021*

- Designed and implemented an automated data flow for cell images in Python (NumPy, SciPy, scikit-image, PIL), as part of a research project at the Center for Integrative Infectious Disease Research (CIID) in Heidelberg.
- Integrated automatic extraction, denoising, single-cell segmentation, statistical point pattern analysis, and two-sample testing of the cell images into the data flow.
- Quantified the aggregation of different fluorescent proteins in the cell images using the automated data flow, which yielded key results for the research project (presented at FOM 2023).

German Electron Synchrotron (DESY) **Hamburg, Germany**
Student Researcher in Deep Learning for Particle Physics *Apr 2020 – Sep 2020*

- Implemented a novel deep learning architecture for density estimation and anomaly detection in Python (PyTorch) to facilitate the discovery of new physics in the CMS experiment at CERN.
- Evaluated the model as a classifier for particle signals, using TPR, FPR, and ROC-AUC, successfully demonstrating its ability to detect new physics in simulated benchmark datasets.
- Collaborated with scientists from CERN in regular meetings to improve the data quality and model performance.

Zeppelin Power Systems GmbH & Co. KG **Hamburg, Germany**
Data Engineer *Oct 2019 – Mar 2020*

- Analysed and visualised time series data from vessels using Python (NumPy, Pandas, scikit-learn, Jupyter Notebook), drawing data from a relational database (PostgreSQL) using SQL.
- Implemented an automated ETL data flow for extracting, pre-processing, and storing time series data using Python and SQL (NumPy, Pandas, SQLAlchemy), including unit testing, version control with git, and containerising the application with Docker.
- Evaluated the performance of a random forest classifier for anomaly detection.
- Produced numerous visualisations, dashboards, and reports (Jupyter Notebook, Grafana, Microsoft Office) on my findings, providing the responsible engineers with a better understanding of the occurrence of anomalous values in the data.

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EDUCATION & QUALIFICATIONS

University of Heidelberg **Heidelberg, Germany**
M.Sc. in Physics: Specialisation in Computational Physics *Oct 2020 – Mar 2023*

- Final grade: 1.1 (high distinction), Thesis grade: 1.0 (highest achievable grade)
- Modules included: Advanced Machine Learning, Time Series Analysis and Recurrent Neural Networks, Dynamical Systems Theory for Machine Learning, Computational Statistics, Introduction to GPU Accelerated Computing, Seminar on Quantum Information Theory
- Thesis**:** *Non-Stationary Recurrent Neural Networks for Dynamical Systems Reconstruction*
- Independent projects: visualisation and analysis of trends and patterns in a customer dataset using Tableau, implementation of a CNN for classifying brain tumours (Kaggle dataset)
- All modules taught in English.

University of Hamburg **Hamburg, Germany**
B.Sc. in Physics *Oct 2016 – Sep 2020*

- Final grade: 1.2 (high distinction), Thesis grade: 1.0 (highest achievable grade)
- Modules included: Linear Algebra and Analysis, Calculus, Probability Theory, Software Development (Java), Seminars on Quantum Computing and Quantum Cryptography
- Thesis**:** *Anomaly Detection using Density Estimation for the CMS Experiment*

Durham University **Durham, United Kingdom**
Erasmus Exchange Program *Oct 2018 – Jun 2019*

- Modules included: Statistics, Computer Systems (hardware, OS, SQL databases), Software Methodologies (search algorithms, cryptography, image processing, 3D graphics)
- Relevant projects: image analysis (Python, OpenCV), 3D graphics (OpenGL, JavaScript), data compression and search algorithms (Python, NumPy); all graded with high distinction.

OTHER EXPERIENCE

CANDLE Institut Yerevan **Yerevan, Armenia**
Internship in Accelerator Physics *Oct 2019*

- Took part in a one-week exchange supported by the German Federal Foreign Office.
- Conducted an experiment on vacuum technology as used in modern particle accelerators in cooperation with students of Yerevan State University.
- Evaluated and visualised the recorded data using Python (NumPy, Pandas).

SKILLS AND INTERESTS

- **Skills:** Programming languages: Python (PyTorch, NumPy, Scikit-learn, SciPy, Pandas, Matplotlib, Jupyter Notebooks), Java, R; Databases: SQL, PostgreSQL; MS Office: Excel, PowerPoint, Word; Cloud: AWS; Other technologies: Git, Linux/Bash, Docker, basic GPU computing with CUDA in C, Visual Studio Code, Tableau, Power BI
- **Completed online courses:** *Machine Learning* (Coursera certificate), *AWS Cloud Technical Essentials* (Coursera certificate)
- **Languages**: English (IELTS: 8.0); German (Native); Mandarin Chinese (completed a class at level A2), Spanish (elementary proficiency)
- **Interests/hobbies**: guitar, piano, language learning, travelling, bouldering, running, chess