Melanie Maier

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Date of Birth: 2002-03-02

SUMMARY

Motivated and detail-oriented Master's student in Mathematics in Data Science, specializing in computer vision with hands-on experience in motion tracking and strong interest in scene understanding. A significant personal project, coupled with insights gained from the AR Munich Research Talk Series at Google during a Data Science internship at Intrinsic, fuels a strong desire to pursue impactful research in this field.

RESEARCH EXPERIENCE

TUM Data Innovation Lab, Munich - *Research Project Data Science in Earth Observation*

October 2024 - March 2025

- Adapted an Elucidated Diffusion Model (EDM) implementation to be trained on satellite imagery for sea surface temperature image downscaling
- Outperformed GAN and CNN architectures in a comparative study in metrics such as average PSNR and SSIM (scientific manuscript in preparation)

TUM Klinikum rechts der Isar, Munich - *Student Research Assistant Biosignalanalysis*

May 2022 - July 2024

- Discovered novel medical correlations in large scale medical studies (KORA, NAKO) for example among diabetes and respiratory rate
- Conducted large scale statistical data analyses to support a clinical study on cardiac operations
- Presented a novel wavelet-transform based ML-algorithm to detect cardiac arrhythmia (PVC) in an ECG signal, scoring an accuracy of > 99.2% on a balanced dataset with more than 1,000,000 heartbeat samples (NAKO)

SCIENTIFIC PUBLICATIONS

- I.-M. Rückert-Eheberg, A. Steger, A. Müller et al. (2025): Respiratory rate and its associations with disease and lifestyle factors in the general population – results from the KORA-FF4 study. Plos ONE. Co-Authorship
- A. Steger, P. Barthel, A. Müller et al. (2024): Deceleration capacity derived from a five-minute electrocardiogram predicts mortality in the general population. Scientific Reports. Co-Authorship
- E. Martens, H.-U. Haase, G. Mastella et al. (2024): Smart hospital: achieving interoperability and raw data collection from medical devices in clinical routine. Frontiers in Digital Health. Co-Authorship

PERSONAL PROJECTS

- Enhancing athlete learning and coaching efficacy in equestrian sports by developing a MediaPipe-based posture analysis tool with targeted language feedback (ongoing project)

WORK EXPERIENCE

Intrinsic, an Alphabet Company, Munich - *Data Science for Robot Operations Intern*

April 2025 - September 2025

- Identified requirements for metrics based on conversations with internal and external stakeholders
- Improved post-commissioning workflows and accelerated performance monitoring by implementing a scalable metrics service with gRPC and Protocol Buffers to handle the collection and computation of key performance indicators such as Overall Equipment Effectiveness

CHECK24 (Kredite24), Munich - *Data Science Working Student*

October 2024 - March 2025

- Improved the detection of important metrics by up to 5% F1 score in a low quality document image by implementing a line detection algorithm based on the bounding box rotation of words
- Supported NLP model development and evaluation, including named entity recognition with LSTM and xLSTM (Tensorflow) and experimented with computationally efficient large language models.

Rocket Factory Augsburg, Augsburg - *Software Engineering, Mission Analysis Intern*

August 2024 - September 2024

- Enabled the mission analysis team to make flight-critical decisions by implementing a Python software to visualize a given rocket trajectory and its visibility to a selection of ground stations
- Improved rocket trajectory optimization by implementing an initial guess creator using a supervised learning approach
- Essentially supported the first internal AI application for generating rocket build configurations

EDUCATION

Technical University of Munich (TUM), Munich - *M. Sc. Mathematics in Data Science*

April 2023 - September 2025

Anticipated final grade: 1.6, Focus: Machine Learning, Computer Vision, Mathematical Foundations of ML

Master thesis (grade 1.3): A Systematic Evaluation of RRI and Morphological Wavelet Features for PVC Detection in ECG Signals Using Machine Learning.

Technical University of Munich (TUM), Munich - *B. Sc. Mathematics*

October 2019 - March 2023

Final grade: 2.3, Focus: Analysis, Functional Analysis, Partial Differential Equations

Bachelor thesis (grade: 1.0): The Hille-Yosida Theorem for Semigroups of Linear Operators.

AWARDS AND HONORS

- Munich Data Science Institute (MDSI)/Linde Master Scholarship (2023-2024)
- 2nd prize at HackaTUM (Huawei Challenge) (2022)
- Abitur graduation prize of Deutsche Physikalische Gesellschaft (DPG) (2019)
- 2nd prize at Landeswettbewerb Mathematik (2016)
- 3rd prize at Jugend Forscht (Bavarian Level) (2014)