Till Richter

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EDUCATION

Ph.D. in Machine Learning, Technical University of Munich (TUM) — Munich, Germany
- Advised by Fabian Theis, Niki Kilbertus, Yoshua Bengio — Expected Graduation: Dec 2025
- Self-Supervised Machine Learning in Single-Cell Genomics
- Member of Munich School for Data Science (MUDS), Munich Center for Machine Learning (MCML), HELENA

M. Sc. in Robotics, Cognition, Intelligence, Technical University of Munich (TUM) — Munich, Germany
- GPA: 1.6 / 1.0 scale — Graduated: Aug 2021
- Relevant coursework: Machine Learning, Deep Learning, Artificial Intelligence, Robotics

B. Sc. in Engineering and Business Administration, Leibniz Universität Hannover — Hannover, Germany
- GPA: 2.1 / 1.0 scale — Graduated: Sep 2018
- Relevant coursework: Mathematics, Control Technology, Informatics

Erasmus Exchange Program, Chalmers University of Technology — Gothenburg, Sweden
- Relevant coursework: Statistics, Discrete Mathematics — Completed: Jan 2018

WORK EXPERIENCE

Technical University of Munich (TUM), Helmholtz Munich — Munich, Germany
Ph.D. Student in Machine Learning — Sep 2021 - Present
- Collaboration: Contribute to the Causal Cell Dynamics international lab (Helmholtz Munich, MILA Montreal). Develop methods for causally structured deep representation learning to improve our understanding of cellular decisions.
- Research interests
  - Self-Supervised Learning and Foundation Models
  - Generative Models and Flow Matching
  - Neural Differential Equations
- Conferences and Summer Schools
  - Co-Organizer Learning Meaningful Representations of Life (LMRL) Workshop at ICLR 2025 (Singapore)
  - Co-Organizer Explainable ML Workshop at ECCB 2024 (Finland)
  - Talk at Helmholtz AI 2024 (Germany)
  - Poster at NeurIPS 2022 (USA)
  - Attended Oxford ML Summer School 2022 (UK), Advanced Course on Data Science and ML 2022 (Italy)
- Teaching experience at the Technical University of Munich (TUM)
  - MSc-level: Statistical Learning (SS24), Deep Learning Seminar (WS21-WS24, Organizer since WS24)
  - BSc-level: Analysis for Informatics (WS23-WS24)
  - Supervision of interns, working- and thesis students

KI macht Schule! — Munich, Germany
Volunteer — Sep 2023 – Present
- Hold workshops for high-school students on artificial intelligence

Data Analytics and Machine Learning Group, Technical University of Munich (TUM) — Munich, Germany
Tutor — Apr 2020 – Mar 2021
- Assisted in teaching Machine Learning and Machine Learning for Graphs and Sequential Data
- Provided programming support and evaluated student projects and exams

UnternehmerTUM GmbH — Munich, Germany
Manage&More Scholar — Oct 2019 – Feb 2021
- Led a MedTech innovation project at Heller GmbH, developing a novel business model
- Student consultant for a design thinking project at LOEWI GmbH in medical nutrition, resulting in new sales strategies

BMW Group — Munich, Germany
Working Student — May 2019 – Sep 2019
- Developed data visualization tools for autonomous vehicles and automation scripts using VBA

SELECTED PROJECTS

Generating Multi-Modal and Multi-Attribute Single-Cell Counts with CFGen 2024
- Paper accepted at ICLR 2025
- Generative model based on Flow Matching to generate single-cell count data

Delineating the Effective Use of Self-Supervised Learning in Single-Cell Genomics 2024
- Paper accepted at Nature Machine Intelligence
- Adapt and develop self-supervised learning methods for single-cell RNA-sequencing data

Generative Models of Cell Dynamics: From Neural ODEs to Flow Matching 2024
- Paper under review
- Primer on modeling single-cell dynamics with neural differential equations

SpatialSSL: Whole-Brain Spatial Transcriptomics in the Mouse Brain with Self-Supervised Learning 2023
- Paper accepted at NeurIPS 2023 Workshop AI4Science
- Improve cell type prediction performance on a large-scale spatial transcriptomics dataset with self-supervised learning

Heterogeneity-driven phenotypic plasticity and treatment response in branched-organoid models of pancreatic ductal adenocarcinoma 2023
- Paper accepted at Nature Biomedical Engineering
- Contributed single-cell RNA-sequencing data analysis to a collaborative project with clinical partners

Sparsity in Continuous-Depth Neural Networks 2022
- Paper accepted at NeurIPS 2022, Poster presentation
- Improve explainability in Neural ODEs for single-cell RNA-sequencing data through novel regularization scheme

SKILLS

- **Programming Languages**: Python (advanced), R (basic)
- **Machine Learning and Data Science Tools**: PyTorch, Lightning, Hydra, Numpy, Scanpy, Pandas
- **Workflow Management**: SLURM, Agile methods
- **Languages**: English (fluent), German (native), Spanish (conversational)