Christopher **Bülte**

Deep Learning · Probabilistic modeling · Uncertainty quantification

Ludwig-Maximilians University Munich, Akademiestraße 7, Munich, 80799 Germany

buelte@math.lmu.de | cbuelt.github.io

Objective

Aspiring researcher in theoretical and physics-informed machine learning with strong background in statistics and data science, always eager to learn something new. Special interest in foundations of deep learning, uncertainty quantification and statistics as well as applications in the natural and engineering sciences.

Education

Ludwigs-Maximilians-University Munich (LMU) *Munich, Germany*

PhD on Mathematical Foundations of Deep Learning *03/2024 - present*

- Working on the intersection of machine learning, uncertainty and the natural sciences
- Research on theoretical foundations of uncertainty quantification and its applications
- Applying novel machine learning methods in science domains, such as weather forecasting or quantum physics
- Associated PhD student, Konrad Zuse School of Excellence in Reliable AI and Munich Center for Machine Learning
- Advisor: Prof. Dr. Gitta Kutyniok

Karlsruhe Institute of Technology (KIT) *Karlsruhe, Germany*

M.Sc. in Economathematics *04/2021 - 02/2024*

- Specialization in statistics, machine learning and optimization (with distinction)
- Thesis: *Estimation of Extremes for Spatio-Temporal Processes with Neural Networks*, Advisor: Prof. Dr. Melanie Schienle
- Exchange semester: Big Data and Machine learning at ITMO University, (St. Petersburg, Russia)
- Supplementary studies on Sustainable Development

Karlsruhe Institute of Technology (KIT) *Karlsruhe, Germany*

B.Sc. in Industrial engineering *10/2017 - 03/2021*

- Thesis: *Nonlinear Kernel Regression: Theoretical Aspects and Robust Extensions*

Professional experience

Chair of Statistical Methods and Econometrics, KIT *Karlsruhe, Germany*

Research Assistant *06/2022 - 02/2024*

- Developing and analyzing neural-network based methods for large-scale probabilistic weather forecasting
- Implementing different methods to assess uncertainty in data-driven weather forecasts

Chair of Energy Economics, KIT *Karlsruhe, Germany*

Research Assistant *11/2020 - 10/2021*

- Development of a neural-network based imputing algorithm for multivariate energy time series
- Research on energy market structure and sustainability

anacision GmbH *Karlsruhe, Germany*

Data Science Intern *09/2019 - 02/2020*

- Forecasting and extreme value identification for large scale time series (Python)
- Developing, testing and implementing algorithms for big data integration (Python, Apache Spark)

Karlsruhe Institute of Technology *Karlsruhe, Germany*

Assistant Teacher *09/2018 - 02/2020*

- Assistant Teacher for the courses Mathematics 1 & 2, and Statistics
- Conducted tutorials and problem-solving sessions for undergraduate students

Publications

Bülte, C., Sale, Y., Löhr, T., Hofman, P., Kutyniok, G., and Hüllermeier, E. An Axiomatic Assessment of Entropy- and Variance-based Uncertainty Quantification in Regression. preprint, arxiv: 2504.18433

Bülte, C., Maskey, S., Scholl, P., von Berg, J. and Kutyniok, G. Graph Neural Networks for Enhancing Ensemble Forecasts of Extreme Rainfall. ICLR 2025 Workshop on Tackling Climate Change with Machine Learning, [link]

Bülte, C., Scholl, P., and Kutyniok, G. Probabilistic neural operators for functional uncertainty quantification. **Transactions on Machine Learning Research**, 2025, [link]

Bülte, C., Horat, N., Quinting, J. and Lerch, S. Uncertainty quantification for data-driven weather models. **Artificial Intelligence for the Earth Systems**, 2025, doi: 10.1175/AIES-D-24-0049.1

Bülte, C., Scholl, P., and Kutyniok, G. Probabilistic predictions with Fourier neural operators. NeurIPS 2024 Workshop on Bayesian Decision-making and Uncertainty, [link]

Bülte, C., Leimenstoll, L., and Schienle, M. Estimation of spatio-temporal extremes via generative neural networks. preprint, arxiv: 2407.08668

Bülte, C., Kleinebrahm, M., Yilmaz, Ü. and Gomez-Rómero, J. Multivariate time series imputation for energy data using neural networks. **Energy and AI**, 2023, Vol. 13, doi: 10.1016/j.egyai.2023.100239

Yilmaz, Ü., Kleinebrahm, M., **Bülte, C.** and Gomez-Rómero, J. Applying transformer to imputation of multivariate energy time series data. ICML 2021 Workshop on Tackling Climate Change with Machine Learning, [link]

Talks

Compstat 2024, Gießen (Germany), Contributed talk on Estimation of spatio-temporal extremes via generative neural networks.

MathSEE Symposium 2023, Karlsruhe (Germany). Probabilistic data-driven weather forecasting (Best poster award).

Skills

Coding	Python, git, LaTeX, R, Linux, Bash, High-performance computing
Frameworks	PyTorch, TensorFlow, SciPy, Xarray, Weights & Biases
Languages	German (native), English (fluent)