



Sebastian Buschjäger

RESEARCHER, POST-DOC AND PROGRAMMER

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Education

TU Dortmund

BACHELOR COMPUTER SCIENCE

- Computer Science with Minor in Electrical Engineering
- Bachelor thesis “Unsupervised Learning of Applied Robot Actuator Coordination”

Dortmund

2010 - 2013

TU Dortmund

MASTER COMPUTER SCIENCE

- Computer Science with Minor in Electrical Engineering
- Master thesis “Online Gauß-Prozesse zur Regression auf FPGAs”

Dortmund

2013 - 2016

TU Dortmund

DISSERTATION AT THE ARTIFICIAL INTELLIGENCE UNIT

- Dissertation “Ensemble Learning with Discrete Classifiers on Small Devices”
- Supervisor: Katharina Morik

Dortmund

2016 - 2022

Work Experience

Communication Networks Institute, TU Dortmund

RESEARCH ASSISTANT (SHK)

- Development and implementation of tools in the context UAV and micro drones (C/C++, Matlab)

Dortmund

2010 - 2013

Artificial Intelligence Unit, TU Dortmund

RESEARCH ASSISTANT (WHF)

- Literature research and report writing (LaTeX)
- Development and implementation in the context of streaming technologies and webcrawling (Java, Python)

Dortmund

2013 - 2016

Artificial Intelligence Unit, TU Dortmund

RESEARCHER AND PHD STUDENT

- Researcher and PhD Student in the SFB876, project A1

Dortmund

2016 - 2022

The Lamarr Institute for Machine Learning and Artificial Intelligence, TU Dortmund

POSTDOCTORAL RESEARCHER AND COORDINATOR OF RESOURCE-AWARE MACHINE LEARNING

- Postdoctoral Researcher in the context of Resource-Aware Machine Learning
- Coordination of Resource-Aware Machine Learning research in the Lamarr Institute

Dortmund

2023 - now

Skills

Programming	C/C++, Python, Java, LaTeX, Matlab
Frameworks	Numpy, SciPy, Pandas, Docker, Git, GitHub and GitLab CI
Data Science	RapidMiner, Scikit-learn, XGBoost, PyTorch, ONNXRuntime, Matplotlib, Plotly and Dash
Language	German, English

Honors

2007 - 2010 **Earning of University Credits during Highschool**, Projekt SchülerUni der TU Dortmund

2008/09 **Best Highschool Report of the Year**, Gesamtschule Fröndenberg

2010 **Valedictorian of Year 2010**, Gesamtschule Fröndenberg

2011 - 2012 **Scholarship Dortmunder-Modell**, TU Dortmund

2012 - 2013 **Scholarship Deutschen Telekom**, TU Dortmund

2016 **Masters degree with honors**, TU Dortmund

2022 **Dissertation with distinction (‘summa cum laude’)**, TU Dortmund

Selected Publications

Joint Leaf-Refinement and Ensemble Pruning Through L1 Regularization

S. BUSCHJÄGER, K. MORIK

Data Mining and Knowledge Discovery (DAMI) (to appear) (2023). 2023

Ensemble learning with discrete classifiers on small devices

S. BUSCHJÄGER

PhD Thesis, Technical University Dortmund (2022). 2022

Shrub Ensembles for Online Classification

S. BUSCHJÄGER, S. HESS, K. MORIK

Proceedings of the Thirty-Sixth AAAI Conference on Artificial Intelligence (AAAI-22), 2022

Margin-Maximization in Binarized Neural Networks for Optimizing Bit Error Tolerance

S. BUSCHJÄGER, J. CHEN, K. CHEN, M. GÜNZEL, C. HAKERT, K. MORIK, R. NOVKIN, L. PFAHLER, M. YAYLA

Design, Automation & Test in Europe Conference & Exhibition, DATE 2021, Grenoble, France, February 1-5, 2021, 2021

Very Fast Streaming Submodular Function Maximization

S. BUSCHJÄGER, P. HONYSZ, L. PFAHLER, K. MORIK

Machine Learning and Knowledge Discovery in Databases. Research Track, ECML PKDD 2021, Bilbao, Spain, September 13-17, 2021, Proceedings, Part III, 2021

On-Site Gamma-Hadron Separation with Deep Learning on FPGAs

S. BUSCHJÄGER, L. PFAHLER, J. BUSS, K. MORIK, W. RHODE

Machine Learning and Knowledge Discovery in Databases: ADS Track, ECML PKDD 2020, Ghent, Belgium, September 14-18, 2020, Proceedings, Part IV, 2020

Realization of Random Forest for Real-Time Evaluation through Tree Framing

S. BUSCHJÄGER, K.-H. CHEN, J.-J. CHEN, K. MORIK

The IEEE International Conference on Data Mining series (ICDM), 2018

Selected Software Projects

FastInference (<https://github.com/sbuschjaeger/fastinference>): FastInference is a code-generator and model-compiler for Machine Learning models that generates optimized inference code for a given model and a given target computing architecture. FastInference supports modern Deep Learning models (e.g. Deep Convolutional Neural Networks) and traditional ML methods (e.g. Random Forests). FastInference combines model optimization and code-generation through a template engine. A given model is first optimized (e.g. quantization of the weights) and then code snippets are loaded from a template-library that are fine-tuned for the target system (e.g. by optimizing the memory layout). FastInference currently supports linear Regression, Decision Trees, Multilayer Perceptrons, Convolutional Neural Networks, Binarized Neural Networks, and Ensembles thereof. The target language is C/C++ for Intel / ARM, but preliminary implementations for FPGAS (through High-Level Synthesis) as well as meta languages such as `haxe` or `iree` are also supported.

Submodular Streaming Maximization

(<https://github.com/sbuschjaeger/SubmodularStreamingMaximization>): Submodular Function Maximization implemented in a header-only C++ library with Python-bindings. This framework implements 7 maximization methods for submodular functions. The C++ and the Python API are fully compatible with one another so that Python objects can interact with the C++ backend. This way, novel submodular functions can easily be implemented in Python while benefiting from the fast C++ backend.