Sebastian **Buschjäger**

RESEACHER AND PHD STUDENT

Bochum, Germany

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Education

Overberg Grundschule	*Fröndenberg*
BASIC EDUCATION	*1996 - 2000*

Gesamtschule Fröndenberg	*Fröndenberg*
HIGHSCHOOL DIPLOMA (ABITUR)	*2000 - 2010*

TU Dortmund — *Dortmund*
BACHELOR COMPUTER SCIENCE — *2010 - 2013*
- Computer Science with Minor in Electrical Engineering
- Bachelor thesis "Unsupervised Learning of Applied Robot Actuator Coordination"

TU Dortmund — *Dortmund*
MASTER COMPUTER SCIENCE — *2013 - 2016*
- Computer Science with Minor in Electrical Engineering
- Master thesis "Online Gauß-Prozesse zur Regression auf FPGAs"

Work Experience

Kommunix GmbH — *Unna*
INTERSHIP SOFTWARE DEVELOPMENT — *2006*

Communication Networks Institute, TU Dortmund — *Dortmund*
RESEARCH ASSISTANT (SHK) — *2010 - 2013*
- Development and implementation of a plotting tool in Matlab
- Development and implementation of a library for UAV and micro drone positioning in C/C++
- Development and implementation of algorithms for maximum search coverage with UAVs and micro drones in Matlab and C/C++

Artificial Intelligence Unit, TU Dortmund — *Dortmund*
RESEARCH ASSISTANT (WHF) — *2013 - 2016*
- Literature research and writing of a technical report on communication technologies in ad-hoc networks for embedded systems
- Development and implementation of a scheduling algorithm in the `streams` framework
- Development and implementation of a webcrawler for news entries of `welt.de`

Artificial Intelligence Unit, TU Dortmund — *Dortmund*
RESEARCHER AND PHD STUDENT — *2016 - now*
- Researcher and PhD Student in the SFB876, project A1

Skills

Programming	C/C++, Python, Java, LaTex, Matlab
Frameworks	Numpy, SciPy, Pandas, Docker, Git, GitHub and GitLab CI
Data Science	RapidMiner, Scikit-learn, PyTorch, 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

Selected Publications

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

Randomized Outlier Detection with Trees

S. Buschjäger, P.-J. Honysz, K. Morik

International Journal of Data Science and Analytics (2020). Springer International Publishing, 2020

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

Decision Tree and Random Forest Implementations for Fast Filtering of Sensor Data

S. Buschjäger, K. Morik

IEEE Trans. Circuits Syst. I Regul. Pap. 65-I.1 (2018) pp. 209–222. 2018

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

PyPruning (`https://github.com/sbuschjaeger/PyPruning`): PyPruning is a software library for pruning ensembles, i.e. removing models from the ensemble. Pruning improves the predictive performance of trained Ensembles (e.g. a Random Forest) while reducing its resource consumption at the same time. PyPruning currently implements 16 different pruning methods from 12 different paper. It is modular and can be easily extended to quickly implement novel methods.

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. Die 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.