

Gerrit J.J. van den Burg, PhD

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Summary

- Machine Learning researcher with 8+ years of experience in algorithm design and implementation
- Skilled programmer comfortable with developing reproducible research pipelines and production-quality software packages in Python, C, and R
- Author of five first-author publications including two published in peer-reviewed journals
- Demonstrated ability to collaborate with other researchers and data scientists

Research Experience

The Alan Turing Institute (UK) Postdoctoral Research Scientist 2018–Present
Time series analysis

- Created a robust probabilistic matrix factorization algorithm for high-dimensional time series
- Established comparative performance of change detection algorithms by designing and implementing the first benchmark study on real-world data
- Collaborated with data scientists to develop a custom Bayesian change point detection method

Data wrangling

- Introduced an accurate method for automatic structure detection in textual data files
- Productized this algorithm into a Python package that has received over 300,000 downloads
- Designed a unified interface for AI-powered data cleaning tools, together with other researchers

Erasmus University Rotterdam (NL) Doctoral Researcher 2012–2018

- Formulated a majorization-minimization algorithm for sparse regularization and feature selection
- Built a maintainable C library for a generalized multiclass support vector machine algorithm
- Developed a meta-learning approach to classification by leveraging accurate Bayes error estimates

Erasmus University Rotterdam (NL) Student Researcher 2011–2012

- Devised a generalized formulation for multiclass SVMs that outperformed existing alternatives

Utrecht University (NL) Student Researcher 2011–2012

- Investigated phase transitions in reaction-diffusion models using high-performance GPU simulations

Delft University of Technology (NL) Student Researcher 2009

- Implemented image processing algorithms for detecting α -synuclein concentrations in vitro

Education

Erasmus University Rotterdam, The Netherlands

Ph.D. in Machine Learning, Econometric Institute 2018

M.Sc. Econometrics 2012

University of Michigan, USA

Visiting researcher (advisor: Prof. Alfred Hero) 2016

Delft University of Technology, The Netherlands

M.Sc. Applied Physics 2012

B.Sc. Applied Physics 2009

Technical Skills

- Very experienced with implementing software in Python, C, and R
- Skilled in mathematics for machine learning
- Familiar with modern machine learning paradigms (deep learning, GP, VAE, GAN, etc.)
- Knowledgeable about software engineering tools (e.g. Git) and practices (e.g. Scrum, CI/CD)
- Software: TensorFlow, PyTorch, Scikit-Learn, Matlab, Cython, Docker, Linux, Bash, Javascript

Selected Publications

G.J.J. van den Burg and C.K.I. Williams. An Evaluation of Change Point Detection Algorithms. *arXiv:2003.06222* (2020).

Ö.A. Akyildiz*, **G.J.J. van den Burg***, T. Damoulas, M.J.F. Steel. Probabilistic Sequential Matrix Factorization. *arXiv:1910.03906* (2019). Accepted for publication at AISTATS 2021.

G.J.J. van den Burg, A. Nazábal, C. Sutton. Wrangling Messy CSV Files by Detecting Row and Type Patterns. *Data Mining and Knowledge Discovery*, 33(6):1799–1820 (2019).

G.J.J. van den Burg and A.O. Hero. Fast Meta-Learning for Adaptive Hierarchical Classifier Design. *arXiv:1711.03512* (2017).

G.J.J. van den Burg, P.J.F. Groenen, A. Alfons. SparseStep: Approximating the Counting Norm for Sparse Regularization. *arXiv:1701.06967* (2017).

G.J.J. van den Burg and P.J.F. Groenen. GenSVM: A Generalized Multiclass Support Vector Machine. *Journal of Machine Learning Research*, 17(225):1–42 (2016).

Awards & Grants

Best Reviewer Award, Neural Information Processing Systems Conference (2019 & 2020); **Top 33% Reviewer**, ICML (2020); **Top Educator Award**, Erasmus School of Economics (2016); Research Grant to visit the University of Michigan, Erasmus Trustfonds (2016).

Open-Source Software Packages

- **GenSVM**: C/Python/R packages for *GenSVM: A Generalized Multiclass Support Vector Machine*
- **CleverCSV**: Python package for *Wrangling Messy CSV Files by Detecting Row and Type Patterns*
- **SmartSVM**: Python package for *Fast Meta-Learning for Adaptive Hierarchical Classifier Design*
- **SparseStep**: R package for *Approximating the Counting Norm for Sparse Regularization*
- **Abed**: Python package for easy benchmarking of machine learning methods on a compute cluster
- **SyncRNG**: Python and R package for synchronized random number generation

Service

Reviewer for NeurIPS, ICML, JMLR, IEEE Trans. Inf. Theory, and various conference workshops.

Other

Languages (fluent): English, Dutch