

Moritz Boos

Technical skills

General	Data Science and Research, Software Engineering, Signal Processing
Programming	Python, SQL
Statistics	(hierarchical) Bayesian modeling, Frequentist statistics
Machine Learning	Deep Learning, linear and nonlinear regression and classification, Natural Language Processing, Unsupervised Learning
Software	NumPy, SciPy, Pandas, Scikit-Learn, Pytorch, Airflow, Docker

Experience

Work

3/2021– **Data Scientist**, EYEO, Brighton.

- I developed and put into production a Bayesian model with active learning that is used to automatically steer and optimize data collection processes.
- I use data engineering to build scalable data pipelines via Airflow and Docker that utilize both machine and human generated data.
- I build well tested, documented, and containerized software for automated data analysis and data processing.

3/2020– **Research Associate**, APPLIED NEUROCOGNITIVE PSYCHOLOGY LAB, CARL-VON-OSSIETZKY UNIVERSITY, Oldenburg.
2/2021

- I developed research **software** for voxel-wise encoding models using Python and Docker.
- I conducted research on the neural basis of speech processing using machine learning and human neural data.

6/2019– **Staff Associate**, NEURAL ACOUSTIC PROCESSING LAB, COLUMBIA UNIVERSITY, New York.
1/2020

- I developed a new Deep Learning model for linking audio data with brain activity based on self attention in recurrent neuronal networks.
- I built scalable data pipelines and machine learning experiment tracking tools for processing, cleaning, and linking audio data and human neural data.

11/2016– **Research Associate**, APPLIED NEUROCOGNITIVE PSYCHOLOGY LAB, CARL-VON-OSSIETZKY UNIVERSITY, Oldenburg.
5/2019

- I developed a Machine Learning model to relate Bayesian unsupervised learning of an audio signal to brain activity. This model employs sparse coding, principal component analysis, and linear and non-linear regression to build an interpretable model of neuronal speech processing.

- I designed experiments and collected data to measure human auditory processing of naturalistic stimuli.
- 2/2015– **Contractual Work**, GEORG-AUGUST UNIVERSITY, Göttingen, Statistical analysis
 11/2015 of questionnaire data using R.
- 11/2013– **Contractual Work**, MEDICAL SCHOOL HANOVER, Hanover, Statistical analysis
 12/2015 of EEG data using Python.

Education

- 2016–2021 **PhD student in the Applied Neurocognitive Psychology Lab**, *Carl-von-Ossietzky University*, Oldenburg.
- 2013–2017 **Masters of Science in Neurocognitive Psychology (in English)**, *Carl-von-Ossietzky University*, Oldenburg.
- 2009–2013 **Bachelor of Science in Psychology**, *Technische Universität Carolo-Wilhelmina*, Braunschweig.

Selected Internships

- 7/2016– **Internship**, INRIA SACLAY, Saclay, I developed machine learning models of brain activity during audio processing..
- 5/2015– **Internship**, OTTO-VON-GUERICKE UNIVERSITY, Magdeburg, I developed a pipeline for testing the hyper-parameter sensitivity of predictive models neuroimaging data. This work resulted in a paper..

Machine Learning competitions

- 2018 **Toxic Comment classification challenge**, *Identify and classify toxic online comments using Natural Language Processing.*, Place 119/4551, Top 3%.

Open source

- Nilearn Multiple contributions to a Python machine learning library for neuroimaging.
- Datalad-OSF I contributed to an extension of a research data management tool in Python.
- Voxel-wise I wrote a Python library for running scalable voxel-wise encoding models on large encoding neuroimaging datasets.
- BIDS app

Grants

- German academic exchange grant I won a grant for developing a Deep Learning model for automatic speech recognition that is aligned to neuronal representations.

Selected Publications

Moritz Boos, J. Swaroop Guntupalli, Jochem W. Rieger, and Michael Hanke. “The role of auxiliary parameters in evaluating voxel-wise encoding models for 3T and 7T BOLD fMRI data”. In: *bioRxiv* (2020). DOI: 10.1101/2020.04.07.029397. URL: <https://www.biorxiv.org/content/>

early/2020/04/09/2020.04.07.029397.

Moritz Boos, Jörg Lücke, and Jochem W Rieger. "Generalizable dimensions of human cortical auditory processing of speech in natural soundscapes: A data-driven ultra high field fMRI approach". In: *NeuroImage* (2021), p. 118106.

Moritz Boos, Caroline Seer, Florian Lange, and Bruno Kopp. "Probabilistic inference: Task dependency and individual differences of probability weighting revealed by hierarchical Bayesian modelling". In: *Frontiers in Psychology* 7 (2016), p. 755.