

# Dr. Franziska Horn

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A **technical leader** with a strong **product mindset** and a background in **data science** and **software engineering** with 11+ years of experience building data products in both research and application contexts.

## WORK EXPERIENCE

**Freelance Data Product Consultant** | LEIPZIG (GERMANY) / REMOTE 10/2018 - present

- 1:1 coaching sessions and multi-day workshops on how (and when) to use machine learning techniques in practice
- strategic workshops with department heads and product managers to identify potential AI use cases
- design, implementation, and evaluation of data science solutions tailored to my client's needs (using Python)
- clients include BASF and TRUMPF

**Head of Solutions Engineering** | ALCEMY, BERLIN (REMOTE) 10/2022 - 11/2023

- hired and led a team of three data scientists and engineers, responsible for customer integration and data-related customer requests
- created team vision & strategy and prioritized projects & objectives together with the customer success, product, and sales teams
- analyzed, documented, and optimized internal processes, e.g., reduced onboarding time for new cement customers from 50 to 25 days
- built data products empowering the customer success team to conduct recurring customer data analyses independently

**Senior Customer-Facing Data Scientist** | ALCEMY, BERLIN (REMOTE) 02/2022 - 10/2022

- analyzed laboratory data from our customers (cement plants), e.g., to identify irregularities in their production processes
- reduced time spent on recurring analyses by implementing configurable, reusable report templates
- simplified data integration process for new customers by planning and implementing refactorings of core product components, minimized required code files per customer to 6 from 17

**Postdoc Visiting Scientist** | ML GROUP, TU (TECHNICAL UNIVERSITY) BERLIN 05/2020 - 11/2020

- developed continuously evolving word embeddings that account for meaning changes over time (published at ACL 2021)
- collaboration with Prof. Dr. Alan Akbik from the Humboldt University of Berlin

**Data Science Consultant** | BASF, LUDWIGSHAFEN 03/2018 - 10/2018

- most experienced Python developer in the team, responsible for code reviews
- implemented machine learning algorithms, e.g., the autofeat library for automated feature engineering and selection, and analyzed complex datasets to optimize processes in chemical plants

**Research Assistant** | ML GROUP, TU BERLIN 09/2017 - 02/2018

- predictive maintenance / time series analysis project in collaboration with BASF (worked on-site in Ludwigshafen)
- designed, implemented, and evaluated linear and non-linear regression models in Python to predict the degradation of catalysts in chemical plants (patented and published in Computers and Chemical Engineering)

**Machine Learning Scientist** | SPECTRM, BERLIN 07/2016 - 06/2017

- established the machine learning team and hired two ML engineers
- implemented a content recommendation API for newspaper articles to promote our clients' content (Python Flask App)
- developed a chatbot "AI" to respond to user messages automatically (using RiveScript)

**Data Scientist** | IDALAB, BERLIN 02/2014 - 06/2016

- advanced analytics consulting projects, ML algorithm development in Python, presentation of results, and project management
- clients included razorfish (NLP backend for automatic content classification) and outfittery (style prediction for curated shopping)

**Student Research Assistant** | ML GROUP, TU BERLIN 09/2013 - 09/2014

- focus on text classification, unsupervised learning (word2vec embeddings, dimensionality reduction), and information extraction
- short-term research stay at UCLA; collaboration with Prof. Dr. Alcino Silva

**Student Research Assistant** | BBCLAB, TU BERLIN 08/2012 - 08/2013

- EEG data analysis at the Berlin Brain-Computer Interface Lab; developed and efficiently implemented new algorithms in MatLab
- three peer-reviewed publications (journal and conferences)

**Research Intern** | MIT (MASSACHUSETTS INSTITUTE OF TECHNOLOGY), CAMBRIDGE, MA 07/2011 - 10/2011

- at the McGovern Institute for Brain Research / Gabrieli Lab; analyzed fMRI data using Python (published in JAMA Psychiatry)
- sponsored by a DAAD RISE scholarship

**Student Research Assistant** | FRAUNHOFER INSTITUTE FOR CHEMICAL TECHNOLOGY, PFINZTAL 07/2007 - 12/2009

- worked independently, responsible for collection of infrared spectroscopy data

# SKILLS

## Leadership

I'm a "get sh\*t done (well)" person, who motivates empowered teams through a strong vision and clear priorities while striving for operational excellence in an agile environment.

- built up the ML team at Spectrm and the solutions engineering team at alcemy
- mentored junior team members and students and conducted 1:1 data science coaching sessions as a freelancer
- stakeholder management (incl. external customers), project management, workshop facilitation, process management

**Certificates:** Professional Scrum Master 1 (Scrum.org)

## Data Science

A "data detective" who enjoys learning about new domains, particularly natural sciences and engineering, by diving deep into data and sharing insights through effective visualizations.

- PhD in Machine Learning; worked with both structured data (incl. time series) and unstructured data (text documents & images) and developed novel algorithms and neural network architectures
- designed and implemented data products, incl. gathering requirements, exploratory data analysis, building, evaluating, and explaining predictive models, and creating insightful data visualizations, e.g., to analyze chemical process data at BASF and alcemy

**Tools:** Python (incl. Jupyter, streamlit, pandas, sklearn, pytorch, numpy, scipy, plotly, matplotlib, seaborn, dash), Grafana, MatLab, R

## Software Engineering

Passion for clean code, crafting software architectures with optimal complexity, and refactoring existing code as needed.

- designed and implemented various web apps (e.g., data tools at alcemy, prototypes for freelance clients, and personal projects)
- authored open source Python libraries, e.g., [autofeat](#) for automated feature engineering with 400+ stars on GitHub
- worked on a shared codebase at alcemy, incl. contributing to production code and reviewing merge requests

**Tools:** Python (incl. poetry, ruff, black, mypy, FastAPI, SQLAlchemy, Jinja, Flask), SQL (mainly PostgreSQL, SQLite), git (GitLab & GitHub, incl. CI/CD pipelines), bash, AWS (incl. S3, SQS, CloudWatch), Argo Workflows, Sentry, Terraform, Docker, Kubernetes

## Communication

Proficient in professional writing and public speaking, enthusiastic about structuring information, clarifying complex concepts with diagrams, and meticulous editing.

- written a free online book "[A Practitioner's Guide to Machine Learning](#)"
- taught 45+ machine learning courses to various audiences, ranging from department heads to aspiring data scientists

**Tools:**  $\text{\LaTeX}$ , AsciiDoc(tor), HTML/CSS, Affinity Designer

**Languages:** German (native), English (fluent), French (basics), Spanish (basics)

# EDUCATION

**Ph.D. (Dr. rer. nat.) Computer Science** | ML GROUP, TU (TECHNICAL UNIVERSITY) BERLIN 04/2015 - 04/2020

- in the machine learning group of Prof. Dr. Klaus-Robert Müller; funded by the Elsa Neumann scholarship from the universities of Berlin
- thesis: SIMILARITY ENCODER - A NEURAL NETWORK ARCHITECTURE FOR LEARNING SIMILARITY PRESERVING EMBEDDINGS: developed a novel NN architecture to map high dimensional data into a low dimensional embedding space, where arbitrary pairwise relations between the data points are preserved as the embedding vectors factorize a given target similarity matrix
- supervised bachelor and master students
- graduated magna cum laude

**M.Sc. Computer Science** | TU BERLIN 10/2012 - 03/2015

- focus: intelligent systems (machine learning, big data) & computational neuroscience (at the BCCN)
- thesis: KNOWLEDGE EXTRACTION FROM COMPLEX BIOLOGICAL TEXTS: A MACHINE LEARNING APPROACH
- graduated top of my class (1.0 on a scale from 1 (best) to 5)

**B.Sc. Cognitive Science** | UNIVERSITY OSNABRÜCK 10/2009 - 09/2012

- interdisciplinary study program including courses in neurobiology, computer science, psychology, artificial intelligence, mathematics, computational linguistics, neuroinformatics, and philosophy; taught in English
- thesis: COMPARING AND COMBINING MULTIPLE EEG FEATURES IN MOTOR IMAGERY BCI - A LARGE SCALE STUDY
- graduated with distinction (1.1 on a scale from 1 (best) to 5)

**Abitur (secondary school)** | FICHTE-GYMNASIUM KARLSRUHE 09/2000 - 06/2009

- 11th grade as a year abroad in Missouri (USA)

# PUBLICATIONS

## Exploring Word Usage Change with Continuously Evolving Embeddings

Franziska Horn

In *Proceedings of the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing: System Demonstrations*, pages 290–297, Online, August 2021. Association for Computational Linguistics (ACL).

## Forecasting Industrial Aging Processes with Machine Learning Methods

Mihail Bogojeski, Simeon Sauer, Franziska Horn, Klaus-Robert Müller

*Computers and Chemical Engineering*, 144:107123, 2021.

## The autofeat Python Library for Automatic Feature Engineering and Selection

Franziska Horn, Robert Pack, Michael Rieger

*ECML PKDD Workshops 2019*, Springer, Cham, 2020.

## Automating the search for a patent's prior art with a full text similarity search

Lea Helmers\*, Franziska Horn\*, Franziska Biegler, Tim Oppermann, Klaus-Robert Müller

*PLoS ONE*, 14(3):e0212103, 2019.

## Predicting Pairwise Relations with Neural Similarity Encoders

Franziska Horn, Klaus-Robert Müller

*Bulletin of the Polish Academy of Sciences: Technical Sciences*, 66(6):821-830, 2018.

## Context encoders as a simple but powerful extension of word2vec

Franziska Horn

In *Proceedings of the 2nd Workshop on Representation Learning for NLP*, pages 10–14, Vancouver, Canada, August 2017. ACL.

## “What is Relevant in a Text Document?”: An Interpretable Machine Learning Approach

Leila Arras, Franziska Horn, Gregoire Montavon, Klaus-Robert Müller, Wojciech Samek

*PLoS ONE*, 12(8):e0181142, 2017.

## Explaining Predictions of Non-Linear Classifiers in NLP

Leila Arras, Franziska Horn, Gregoire Montavon, Klaus-Robert Müller, Wojciech Samek

In *Proceedings of the 1st Workshop on Representation Learning for NLP*, pages 1–7, Berlin, Germany, August 2016. ACL.

## Robust Artifactual Independent Component Classification for BCI Practitioners

I. Winkler, S. Brandl, F. Horn, E. Waldburger, C. Allefeld, M. Tangermann

*Journal of Neural Engineering*, 11(3):035013, 2014.

## Predicting Treatment Response in Social Anxiety Disorder From Functional Magnetic Resonance Imaging

O. Doehrmann, S. S. Ghosh, F. E. Polli, G. O. Reynolds, F. Horn, A. Keshavan, ... & J. D. Gabrieli

*JAMA Psychiatry*, 70(1):87-97, 2013.

## Increasing the Spectral Signal-To-Noise Ratio of Common Spatial Patterns

Franziska Horn, Sven Dähne

*Proceedings of the Fifth International Brain-Computer Interface Meeting*, 2013.

## Combining Multiple EEG Features in Motor Imagery BCI

Franziska Horn, Johannes Höhne, Sven Dähne, Benjamin Blankertz

*BBCI Workshop - Advances in Neurotechnology, Berlin, Germany*, 2012.

## PREPRINTS

## The DALPHI annotation framework & how its pre-annotations can improve annotator efficiency

Robert Greinacher, Franziska Horn

*arXiv preprint arXiv:1808.05558*, 2018.

## Discovering topics in text datasets by visualizing relevant words

Franziska Horn, Leila Arras, Gregoire Montavon, Klaus-Robert Müller, Wojciech Samek

*arXiv preprint arXiv:1707.06100*, 2017.

## Exploring text datasets by visualizing relevant words

Franziska Horn, Leila Arras, Gregoire Montavon, Klaus-Robert Müller, Wojciech Samek

*arXiv preprint arXiv:1707.05261*, 2017.

## Interactive Exploration and Discovery of Scientific Publications with PubVis

Franziska Horn

*arXiv preprint arXiv:1706.08094*, 2017.