

Dr. Franziska Horn

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With more than 11 years of experience tackling machine learning problems in both research and application contexts, I'm currently on a mission to accelerate the decarbonization of cement and concrete at alchemy. I hold a PhD in machine learning, where my research focused on deep learning, natural language processing, representation learning, and data visualization. I also hold a MSc in computer science and a BSc in cognitive science.

experience

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|-------------------|--|
| 10/2018 – present | Freelance Data Science Consultant Leipzig / remote <ul style="list-style-type: none">- teach workshops on how to use machine learning techniques in practice- design, implement, and evaluate data science solutions tailored to my client's needs- web development (mostly backend), with a focus on data driven web apps- clients include BASF and TRUMPF |
| 10/2022 – present | Head of Solutions Engineering alchemy, Berlin <ul style="list-style-type: none">- supervise the Solutions Engineering team, responsible for integrating new customers into our cement and concrete products and resolving technical customer requests- reduce operational complexity of our internal processes |
| 02/2022 – 10/2022 | Customer-Facing Data Scientist alchemy, Berlin <ul style="list-style-type: none">- analyzed laboratory data from our customers, e.g., to identify irregularities in their production processes- reduced time spent on reoccurring analyses by establishing easy to configure report templates- reduced time spent on integrating new customer into our cement product by encouraging and implementing refactorings of core product components |
| 05/2020 – 11/2020 | Visiting Scientist TU Berlin (Technische Universität Berlin) <ul style="list-style-type: none">- developed continuously evolving word embeddings that account for meaning changes over time (published at ACL 2021) |
| 03/2018 – 10/2018 | Data Science Consultant (Working Student) BASF, Ludwigshafen <ul style="list-style-type: none">- most experienced Python developer in the team, responsible for code review- implemented machine learning algorithms, e.g., a library for automated feature engineering and selection, and analyzed complex datasets to optimize processes in chemical plants |
| 09/2017 – 02/2018 | Research Assistant TU Berlin <ul style="list-style-type: none">- in the machine learning group of Prof. Dr. Klaus-Robert Müller- 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 |
| 07/2016 – 06/2017 | Machine Learning Scientist Spectrm, Berlin <ul style="list-style-type: none">- developed a chatbot AI to respond to user messages automatically (RiveScript)- implemented a content recommendation API for newspaper articles, which can be used by all clients to promote their content (Python Flask App)- selected new members for and set up the machine learning team |
| 02/2014 – 06/2016 | Data Scientist idalab, Berlin <ul style="list-style-type: none">- 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 algorithms for curated shopping) |

- 09/2013 – 09/2014 **Student Research Assistant** TU Berlin
- machine learning research in the group of Prof. Dr. Klaus-Robert Müller
 - focus on text classification, unsupervised learning (word2vec vector space embeddings, dimensionality reduction), and information extraction
 - short-term research stay at UCLA; collaboration with Prof. Dr. Alcino Silva
- 08/2012 – 08/2013 **Student Research Assistant** TU Berlin
- 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)
- 07/2011 – 10/2011 **Research Intern** MIT (Massachusetts Institute of Technology), Cambridge, MA
- at the McGovern Institute for Brain Research / Gabrieli Lab
 - analyzed fMRI data using Python with results published in JAMA Psychiatry
 - sponsored by a DAAD RISE scholarship
- 07/2007 – 12/2009 **Student Research Assistant** Fraunhofer Institute for Chemical Technology, Pfinztal
- worked independently, responsible for collection of infrared spectroscopy data

education

- 04/2015 – 04/2020 **Ph.D. (Dr. rer. nat.) Computer Science** TU Berlin (Technische Universität Berlin)
- in the machine learning group of Prof. Dr. Klaus-Robert Müller
 - 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; potential application areas include recommender systems, especially to target the cold start problem, i.e., generate recommendations for items without previous user ratings, and natural language processing, by extending the word2vec algorithm to produce embeddings for out-of-vocabulary words and words with multiple meanings
 - supervised bachelor and master students
 - funded by the Elsa-Neumann Scholarship from the universities of Berlin
 - graduated magna cum laude
- 04/2013 – 03/2015 **M.Sc. Computer Science** TU Berlin
- focus: intelligent systems. machine learning: theory, lab course, project; advanced information management (big data & Hadoop); neurobiology
 - thesis: KNOWLEDGE EXTRACTION FROM COMPLEX BIOLOGICAL TEXTS: A MACHINE LEARNING APPROACH (supervisor: Prof. Dr. Klaus-Robert Müller, TU Berlin)
 - graduated top of my class (1.0)
- 10/2012 – 03/2013 **(M.Sc. Computational Neuroscience)** BCCN / TU Berlin
- interdisciplinary & strongly research oriented international master program
 - highly competitive application process (10 places/year)
 - switched to computer science after 1 semester to deepen my technical knowledge and get a wider choice of application areas
- 10/2009 – 09/2012 **B.Sc. Cognitive Science** Universität Osnabrück
- interdisciplinary study program including courses in neurobiology, computer science, psychology, artificial intelligence, mathematics, computational linguistics, neuroinformatics, and philosophy; taught in English
 - thesis in the field of brain-computer interfaces at the TU Berlin: COMPARING AND COMBINING MULTIPLE EEG FEATURES IN MOTOR IMAGERY BCI - A LARGE SCALE STUDY (supervisor: Prof. Dr. Benjamin Blankertz, TU Berlin)
 - graduated with distinction (1.1)
- 09/2000 – 06/2009 **Abitur (secondary school)** Fichte-Gymnasium Karlsruhe
- 11th grade as a year abroad in Missouri (USA)

skills

language German (native), English (fluent), French (basics), Spanish (basics)

programming Python (11+ years, incl. pandas, sklearn, pytorch, etc.), SQL, MatLab, R, Java, bash
~> <https://github.com/cod3licious>

other Linux/Unix
version control (command-line Git)
LaTeX, Markdown, AsciiDoc(tor), HTML/CSS
Affinity Designer
regular office applications (e.g., Google Docs/Sheets, Miro)

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.

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.

Association for Computational Linguistics.

“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.

Association for Computational Linguistics.

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.