

Hunter S. HEIDENREICH, MACHINE LEARNING ENGINEER HUNTERHEIDENREICH.COM

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EDUCATION

Computer Science — *Master of Science* 09/2021 - 10/2023
Harvard University, Cambridge, MA GPA: 3.94
Focus: deep learning, machine learning for scientific simulation, probabilistic modeling

Computer Science — *Bachelor of Science* 09/2016 - 06/2021
Drexel University, Philadelphia, PA GPA: 4.00
Focus: machine learning, algorithms, natural language processing (NLP)

WORK EXPERIENCE

Graduate Research Assistant — *CSElab, Harvard University* 09/2021 -

- Executed studies on Transformers and RNNs for time series forecasting in the scientific and engineering domains, enhancing short-term prediction accuracy by 700% and ensuring long-term stability of predictions.
- Optimized neural mechanisms including gating and attention, improving model interpretability and performance.
- Conducted comprehensive hyperparameter optimization on high-performance computing resources.
- Refined Encoder-Decoder Transformers for probabilistic forecasting by implementing MDN predictions, leading to more flexible models that better capture the multi-modal nature of stochastic dynamics.
- Performed high-precision simulations in GROMACS and LAMMPS, creating novel datasets for machine learning and surrogate modeling in catalyst and protein studies.
- Investigated generative, reduced-order models of atomistic simulations by synthesizing VAEs, MDNs, and GNNs.

Undergraduate Research Assistant — *CODED Lab, Drexel University* 01/2019 - 06/2021

- Developed a novel unsupervised machine learning algorithm, leading to a publication at EMNLP 2019.
- Spearheaded experiments on large language models (LLMs) like GPT-2, uncovering misuse potentials and contributing to a publication at AIES 2021.
- Engineered the PyConversations module, optimizing the acquisition and preprocessing of social media datasets.
- Applied domain adaptation to fine-tune BERT and RoBERTa models, elevating performance in spam detection and toxicity classification.

Data Science Intern — *SAP Labs, Conversational AI Team* 04/2018 - 12/2018

- Deployed diverse natural language processing (NLP) algorithms enhancing capabilities in text segmentation, question-answering, answer retrieval, and sentence representation.
- Launched Python microservices for integrating real-time question-answering systems into existing platforms.
- Communicated algorithmic impacts and limitations in bi-weekly presentations to the project management team.

TECHNICAL PROJECTS

Latent Effective Dynamics — *CSElab* 12/2021 -

- Led the enhancement of CSElab's computational framework designed for efficient, reduced-order surrogate modeling of molecular dynamics and other scientific simulations.
- Transformed existing research code to a modular architecture, introducing versatility and extending support to diverse neural modules such as Transformers, RNNs, RHNs, and GNNs, and implemented advanced neural mechanisms like attention and gated connections.

PyConversations — *CODED Lab* 09/2020 - 06/2021

- Designed, developed, and rigorously tested a package for acquiring, cleaning, analyzing, and visualizing conversational data from social media platforms.
- Applied NetworkX package to represent graph structures of conversations to extract metrics for a study into how the design of a social media platform influences the structure, scale, and nature of conversations.
- Utilized the package to prepare data for fine-tuning Transformer networks tailored for social media analysis and classification.

SKILLS

Languages: Python, C/C++, BASH, Julia, Matlab, SQL (postgres), JavaScript, Haskell

Frameworks: PyTorch, Keras, TensorFlow, JAX, HuggingFace APIs, NLTK, SpaCy

Developer Tools: Git, Visual Studio, PyCharm, AWS

Libraries: pandas, NumPy, Matplotlib, scikit-learn