Leon Kloker

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EDUCATION

Stanford University September 2022 – June 2024
M.Sc. in Computational and Mathematical Engineering. GPA 3.9/4.0 *Stanford, CA*

University of Stuttgart October 2017 – August 2021
B.Sc. in Simulation Technology. GPA 1.3 (inverted 4.0 scale, top of the class) *Stuttgart, Germany*

INTERNSHIPS

Scientific ML research intern @ Ansys June 2023 – September 2023
Developed transformer models in order to time integrate solution snapshots of the 2D incompressible Navier-Stokes equation in the turbulent regime as a benchmark. Also explored the intersection of Fourier Neural Operators and Transformers for Neural Operator Learning. *(Tools: PyTorch, PDEs)*

ML research intern @ **Sandia National Laboratories** December 2022 – March 2023
Investigated the performance of different model architectures, such as convolutional networks or graph transformers for predicting the probability of a successful trial for of a given single-outcome quantum computation circuit. *(Tools: PyTorch Geometric, Quantum Computing)*

RESEARCH PROJECTS

Machine Learning for allergy prognosis January 2024 – now
Tang Lab @ Stanford Engineering. Developing ML models such as regressions, SVMs and CNNs to predict the percentage of CD63-positive basophils in an ex-vivo anti-IgE or allergen stimulated blood sample of allergic patients from the sample's Impedance Flow Cytometry data (>0.99 Pearson). This activation directly correlates with the severity of an allergic reaction. *(Tools: ML, Sklearn, Pandas)*

LLM-powered intelligent search December 2023 – April 2024
Course project @ CS224G Apps with LLMs. Developing a chatbot tailored towards buy-side solar M&A analysts that allows to talk to a data-room via natural language. Responsibilities range from web deployment to coding a RAG-powered search engine providing citations for sources with LlamaIndex. *(Tools: LLM, Python, RAG)*

RNA reactivity prediction September 2023 – December 2023
Course project @ CS330 Deep Multi-Task and Meta Learning. Worked on sequence models such as LSTM, GRU, 1D-CNN and Transformer to predict the reactivity (SHAPE data) of each nucleotide in an RNA sequence. Trained multi-heads on top of a fine-tuned BERT-style foundation model to simultaneously predict reactivity and binding information. *(Tools: PyTorch,* Foundation models)

CUDA parallel computing April 2023 – June 2023
Course project @ CME 213 Parallel Computing. A feedforward neural network was implemented from scratch in C++. Forward and backward pass were implemented using CUDA with custom optimized kernels for several functions such as general matrix-matrix multiplication or softmax. The model was further parallelized by using MPI for data distribution. *(Tools: CUDA, MPI, C++, Nvidia Nsights)*

Computer Vision for precision oncology December 2022 – June 2023
Integrative Imaging and Molecular Diagnostics lab @ Stanford Medicine. Built ML algorithms for automated cell segmentation and classification in digitalized cancer tissue samples to discover biomarkers that can predict response to Immunotherapy with AUC 0.82. *(Tools: PyTorch, Statistics)*

Modeling endogenous liquidity crises April 2023 – June 2023
Project with Prof. Papanicolaou. Used models such as multivariate Hawkes processes or Q-reactive Hawkes processes to model the emergence of flash crashes. Fitted models to real limit order book data, analytically investigated the stability bounds and ran simulations. *(Tools: Stochastics, Python)*

Navier-Stokes solver C++ October 2021 – March 2022
Course project @ Numerical Simulation. Built a solver for the incompressible non-isothermal Navier-Stokes equations in 2 dimensions with a range of possible boundary conditions from scratch in C++. The solver was parallelized using MPI and several iterative methods to solve the pressure Poisson equation were implemented. *(Tools: C++, MPI, Numerics)*

Modeling convective groundwater flow June 2021 – September 2022
Final thesis @ University of Stuttgart. Developed a model for convective groundwater flow due to evaporation in arid regions. Derived the ground-state flow analytically and stability criteria via a linear stability analysis. Also ran direct numerical simulations of the system using my own MATLAB code. Research resulted in a first-author publication in Physics of Fluids. *(Tools: MATLAB, Numerics, PDEs)*

Molecular Monte-Carlo simulation of CO2-alcohol February 2020 – December 2022

Research project @ Thermodynamics lab. Implemented a novel molecular force field and Monte-Carlo moves in RASPA and conducted NPT-Gibbs ensemble simulations of CO2-alcohol mixtures on a HPC cluster to investigate the mole-fraction in the gaseous phase. *(Tools: Monte-Carlo, Statistical physics)*

PUBLICATIONS

Solution approaches for evaporation-driven density instabilities in a slab of saturated porous media
with Carina Bringedal. Physics of Fluids (Vol.34, Issue 9, 2022)

Use of artificial intelligence-based digital pathology to predict outcomes for immune checkpoint inhibitor therapy in advanced gastro-esophageal cancer. American Society of Clinical Oncology abstract (2024 annual meeting)

AWARDS AND FELLOWSHIPS

Scholarship of the German Academic Exchange Service (DAAD) 2022 – 2024
Simulation Technology valedictorian award 2021
Ferry Porsche Abitur Prize, German Physical Society Abitur Prize 2017

ADDITIONAL WORK

One Semester of M.Sc. Simulation Technology at University of Stuttgart 2021 – 2022
TA: Engineering Mechanics 1-4, ML, Intro to AI, Linear Algebra for Computing, Parallel Computing 2018 – 2023
Tennis and fitness coach at Tennis Club Grötzingen and Bernhausen 2018 – 2022

SKILLS

Language: Fluent in German and English, proficient in French
Technical: Python, C++, CUDA, MATLAB, Julia, Java, Git, Bash Script, Latex

INTERESTS & RECENT CLASSES

Mathematical modeling and solving impactful real-world problems using analytical tools or Machine Learning
Recent classes: *Advanced Software Engineering, Parallel Computing, LeanLaunchpad, Stochastic Methods, Deep Meta Learning, Machine Learning, Apps with LLMs, Machine Learning Systems, applied PDEs*