Mohit Kulkarni

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Education

ETH Zurich and University of Zurich *Sep 2023-Dec 2025* (expected)
M.Sc, Neural Systems and Computation *5.3/6*

Harvard University *Sep 2024 - June 2025*
Masters Thesis, Pehlevan Group, School of Engineering and Applied Sciences

Indian Institute of Technology, Kanpur *2019-2023*
B.S, Mathematics and Scientific Computing. Minor in Machine Learning *8.2/10*

Relevant Courses

Math	Brownian Motion and Stochastic Calculus*	High Dimensional Statistics*	Topological Data Analysis*
	Nonlinear Dynamics and Chaos I/II*	Mathematics of Data Science*	Neural Network Theory*
	Linear and Abstract Algebra	Analysis: Real/Complex	ODE and PDE
CS	Data Structures and Algorithms	Statistical NLP	ML for Signal Processing

Experience

Research Assistant, ETH AI Center *June 2024 - Present*
Dr. Carmen Amo Alonso, Prof. Melanie Zeilinger

- Implemented and evaluated State Space Models (SSMs) and Transformer-based architectures for the ARC challenge.
- Developed a multi-GPU training pipeline and custom ARC-based generators to understand generalization capabilities. Currently learning CUDA programming to experiment with hardware-aware architectures like Mamba.

Research Assistant, Allen Institute for Neural Dynamics *Sep 2020 – May 2023*
Dr. Karel Svoboda, Dr. Kayvon Daie

- Built a data analysis pipeline on GCP using DataJoint to enable scalable data manipulation for a team of researchers
- Developed recurrent neural network (RNN) models to understand learning in biological and artificial networks. Compared the model with experimental data from 2Photon microscopy during learning in the mouse cortex.

Visiting Researcher, Imperial College London *Jun 2021 – Sep 2021*
Prof. Dan Goodman and Dr. Friedemann Zenke (FMI, Basel) *SNUFA*

- Created SNUFA100 and SNUFA100_sentences, 2 new datasets for systematic evaluation of Spiking Neural Networks
- Converted audio data from the Librispeech ASR corpus into spike trains using HPC clusters and multi-processing for efficient processing of the large-scale dataset. Implemented a baseline model based on surrogate gradient descent.

Selected Projects

GPU-accelarated Terminal Emulator | *Personal Project* Github

- C++ and OpenGL-based terminal emulator written to better understand graphics programming and terminals. Currently supports text rendering and ANSI X3.64. Currently working on supporting colors, and ligatures.

Sign language Segmentation | *Course Project, Natural Language Processing* Paper

- Used Semi-supervised learning to assign pseudslabels to unlabelled ISL data based on a model trained on BSL data.
- Generated features from videos using I3D, combined them with subtitle features, and passed them through an MS-TCN model. Achieved an F1 score of 32%, state of the art for temporal segmentation of Indian sign language.

Honors and Awards

Heyning-Roelli Foundation Scholarship | To conduct Masters thesis at Harvard *May 2024*
Brain Computation and Learning Workshop Travel Grant | IISc Bangalore *Jan 2023*
Cosyne 2022, Undergraduate Travel Grant | Lisbon, Portugal *Mar 2022*
INSPIRE scholarship | Awarded every year of Bachelors *2019-2023*
All India Rank 637 | JEE Advanced *2019*

Skills

Programming: (most to least experience) Python, C++, C, CUDA C, Bash, MATLAB, Excel, R.
Tools: Pytorch, Numpy, Pandas, Sklearn, LaTeX, Git. Strong background in data science and HPC.