Mohit Kulkarni

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Education

ETH Zurich and University of Zurich *2023-2025* (expected)
M.Sc, Neural Systems and Computation

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

Technical Skills

Programming: Python, C++, R **Libraries:** Pytorch, Tensorflow, OpenCV, ROS **Tools:** LaTeX, Git, i3wm

Relevant Courses

Math	Brownian Motion and Stochastic Calculus*	Introduction to Lie Groups*	Topological Data Analysis*
	Nonlinear Dynamics and Chaos 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

(*): Graduate Courses

Experience

Research Assistant, Allen Institute for Neural Dynamics *Jan 2022 – May 2023*
Research Assistant, Svoboda Lab *Sep 2020 – Dec 2021*
Dr. Karel Svoboda

- Analysed 2P calcium imaging data recorded in mice during a Brain Computer Interface (BCI) behavioral task
- Developed recurrent neural network (RNN) models to test the hypothesis that learning involves out of manifold network reorganization of neural activity, comparing the activity reorganization to experimental data
- Analysed activity and behavior correlates during learning, to test the alternate hypothesis that behavioral changes, and not network reorganization, is what drives learning

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

- Created SNUFA100, 2 new datasets for systematic evaluation of Spiking Neural Networks (SNNs)
- Audio data, from the Librispeech ASR corpus, was converted into spike trains using an artificial model of inner ear
- The first dataset SNUFA100 is created for a word identification challenge, with 100,000+ words in 100 classes. The second dataset SNUFA100_sentences, contains 10,000+ sentences, and is created for a keyword spotting challenge

Selected Projects

Sign language Segmentation | *Course Project, Natural Language Processing* *Paper*
Prof. Ashutosh Modi, *Dept. of Computer Science and Engineering, IIT Kanpur*

- Sign segmentation refers to delineating temporal boundaries to distinguish individual signs in continuous footage.
- We used a semi-supervised transfer learning method to generate changepoint-modulated pseudolabels(CMPL).
- Our model generated features from videos using Inflated 3D Convnet (I3D). The features were then combined with subtitle features and passed through a Temporal Convnet (MS-TCN) to generate pseudolabels.

Neural Turing Machines | *Course Project, Computational Cognitive Science* *Documentation*
Prof. Nisheeth Srivastava, *Dept. of Computer Science and Engineering, IIT Kanpur*

- Conducted literature review on the development of memory augmented machines and their differentiable variants
- Built upon an existing implementation of NTM to include priority & lexicographic sort and added GPU support

The Omniglot Project *Overview*
Brain and Cognitive Society, IIT Kanpur

- Aimed at understanding the problem of meta learning using the Omniglot dataset of handwritten characters
- Implemented Memory-Augmented Neural Network (MANN) to solve one-shot classification and text generation

Extra-Curricular Activities

Group Leader | *Brain and Cognitive Society, IIT Kanpur* *May 2021 – Apr 2022*

- Conducted an "Introduction and Topics in Brain Sciences" workshop, with lectures on ML/DL, RNNs, SNNs, and RL
- Led a two-tier team of 20 to conduct and organize projects in brain sciences with participation from over a 100 people