Nils Eckstein

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EDUCATION

Ph.D. Information Technology & Electrical Engineering	Zürich, ZH, CH
ETH Zürich	09.2016 - (01.2021)
Visiting Scientist in Residence	Ashburn, VA, US
HHMI Janelia Research Campus	09.2018 - 09.2020
Master of Science Physics	Zürich, ZH, CH
ETH Zürich	09.2014 - 09.2016
Bachelor of Science Physics	Zürich, ZH, CH
ETH Zürich	09.2011 - 09.2014

RESEARCH EXPERIENCE

Ph.D. Research - Institute of Neuroinformatics (ETHZ) & Funke Lab (HHMI Janelia)
Development of machine learning algorithms for the automated analysis of very large scale electron microscopy image datasets such as the fruit fly brain.

- Development of a novel computer vision algorithm for tracking of sub-cellular structures (Microtubules) in various electron microscopy datasets at scale, combining deep learning with discrete optimisation on graphs.
- Development of a pipeline for neurotransmitter classification in the fruit fly brain from electron microscopy images alone and corresponding tools and algorithms for deep neural network interpretability and knowledge extraction.
- Investigation of uncertainty prediction in deep neural networks for neuron segmentation.
- Teaching assistant for the course "Models of Computation" (Matthew Cook, ETHZ).

MSc. Research - Institute of Neuroinformatics, ETHZ
Combining echo state networks with Boltzmann machines to predict the next frames in simple videos of hand movements via self supervision.

MSc. Research - Black hole astrophysics group, ETHZ
Development of black hole accretion disk simulations for the prediction of Active Galactic Nuclei light curves.

PUBLICATIONS

Nils Eckstein, Alexander S. Bates, Michelle Du, Volker Hartenstein, Gregory S.X.E. Jefferis, Jan Funke (2020) - Neurotransmitter Classification from Electron Microscopy Images at Synaptic Sites in Drosophila. bioRxiv 2020.06.12.148775.

Nils Eckstein, Julia Buhmann, Matthew Cook, Jan Funke (2020) - Microtubule Tracking in Electron Microscopy Volumes. MICCAI 2020. Lecture Notes in Computer Science, vol 12265.

Julia Buhmann, Renate Krause, Rodrigo Lentini, Nils Eckstein, Matthew Cook, Srinivas Turaga, Jan Funke (2018). Synaptic Partner Prediction from Point Annotations in Insect Brains. MICCAI 2018. Lecture Notes in Computer Science, vol 11071.

SKILLS

Programming Languages: Python, C++.

Selected Libraries: PyTorch, Tensorflow, Gurobi, MongoDB.

Other: Image classification, Image segmentation, Tracking, Generative models (GAN, VAE), Neural network interpretability, Integer linear programming, Biomedical image processing, Computer Vision, Statistics, Physics, Neuroscience, Mathematics, Scientific Writing, Public Speaking, Teaching, Science Communication, Mentoring, Music production.

AWARDS

MICCAI 2020 Young Scientist Award.