Nils Eckstein

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Github, Portfolio

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 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 method 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 - 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.

Larissa Heinrich, Davis Bennett, David Ackerman, Woohyun Park, John Bogovic, Nils Eckstein, Alyson Petruncio, Jody Clements, C. Shan Xu, Jan Funke, Wyatt Korff, Harald Hess, Jennifer Lippincott-Schwartz, Stephan Saalfeld, Aubrey Weigel, and COSEM Project Team. Cell organelle segmentation in electron microscopy. (2020 - In Preparation).

SKILLS

Programming Languages: Python, C++, Javascript, HTML, CSS.

Selected Libraries: PyTorch, Tensorflow, Gurobi, MongoDB.

Machine Learning: Image classification, Image segmentation, Tracking, Generative models (GAN, VAE), Neural network interpretability.

Other: Integer linear programming, Biomedical image processing, Computer Vision, Statistics, Physics, Neuroscience, Mathematics, Scientific Writing, Public Speaking, Teaching, Science Communication, Mentoring, Music production, Git.

AWARDS

MICCAI 2020 Young Scientist Award.