Deniz Kirca

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EDUCATION

University of Michigan (LSA Honors) | Ann Arbor, MI *December 2024*

Bachelor of Science in Neuroscience, Computer Science (Double Major) *GPA: 3.84/4.00*

Computer Science Coursework: Machine Learning, Computer Vision, Computer Organization, Data Structures/Algorithms, Discrete Math, Multivariable Calculus, Linear Algebra, Statistics and Probability

Neuroscience Coursework: Neocortex Processing, Molecular/Cellular Neuroscience, Genetics, Biochemistry, Physiology, Psycholinguistics, Neuropsychology, Cognitive + Behavioral Neuroscience

SKILLS

Programming Languages/Tools: Advanced in Python, C, C++, MATLAB, JavaScript

Tools & Frameworks: numPy, OOP, OpenCV, React, Git, Linux, HTML/CSS

Laboratory: Experimental Design, Fluorescence In-Situ Hybridization (FISH), Western Blot, Tissue Sectioning

EXPERIENCE

University of Michigan Neuroscience Institute, *Research Assistant II* *December 2020 – Present*

- Wrote/adapted custom kmeans++/DBSCAN clustering algorithms to compress data by up to 20x, allowing signal processing of multiday electrophys. datasets under Dr. Brendon Watson (*NeuroZIP*)
- Collaborated with team performing daily hardware checks/drafting experimental designs for behavioral phenotyping project investigating correlation between stress/murine depressive behavior
- Spearheaded overhaul of phenotyping project's data analysis pipeline producing interactive GUI, four new analysis tools, and a manual for team newcomers, decreasing onboarding time by 60%

University of Michigan Genetics Department, *Research Assistant I* *May 2023 – Present*

- Integrated OpenCV into Python script aiding physicians in diagnosing patients based on pupillary reflex measurements, collaborating with postdoctoral researcher to improve runtime by 75% (*MPupil*)

University of Michigan Physiology Department, *Undergraduate Researcher* *June 2021 – August 2022*

- Verified VGLUT1 mRNA expression in mouse PFC and NAcc using FISH protocol under Dr. Huda Akil

PROJECTS

NeuroZIP – *a user-friendly algorithm for neuroscientists to visualize and compress big electrophysiology data*

- Implemented unsupervised ML algorithm for efficient ~20x compression of data up to 12 TB.
- Leveraged UMAP-based dimensionality reduction to efficiently segment data into batches

MPupil – *a diagnostic tool for neurological conditions ranging from concussions to Multiple Sclerosis*

- Built software of novel pupillary-reflex tracking device in lab of Dr. David Burke, tracking pupil + iris diameter, ratio, and pupillary constriction rate with 95% accuracy in six training videos

HourlyCriticalityAnalyzer - *a data processing pipeline for analysis of criticality in neural networks*

- Wrote a MATLAB + Python-based analysis workflow extracting hourly neural criticality metrics from rat electrophys. recordings, revealing 25% decrease in DCC metric in hippocampus during NREM sleep

LEADERSHIP

University of Michigan Neuroscience Student Association - *Outreach Chair* *August 2021 – April 2023*

University of Michigan Brain Bee Committee - Founder + Chair *August 2021 – April 2023*

- Led five subcommittees totaling ~40 undergraduate/graduate students in hosting first + second annual Michigan Brain Bees in 2022 + 2023, pulling over 250 total attendees and ~$10K in funding

PUBLICATIONS

Steffke EE, Kirca D, Mazei-Robison MS, Robison AJ. *Serum- and glucocorticoid-inducible kinase 1 activity reduces dendritic spines in dorsal hippocampus.* Neuroscience Letters 2020 Apr. 23

SELECTED CONFERENCE PRESENTATIONS

Kirca D et al. *The Circadian Dynamics of Neural Criticality in Mouse Hippocampus*. Neuroscience 2023 (Society for Neuroscience) - Washington DC November 2023

Ghimire A, Kirca D et al. *Studying the Longitudinal Effects of Chronic Stress Using a Novel Digital Behavioral Box System.* Neuroscience 2022 (Society for Neuroscience) - San Diego, CA November 2022