

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: 3.74/4.00

Coursework: Machine Learning, Computer Vision, Computer Architecture, Large Language Models, Data Structures/Algorithms, Web System Design, Computability/Complexity, Multivariable Calculus, Machine Learning for Human Behavior, Applied Linear Algebra, Discrete Math, Neocortex Processing, Psycholinguistics

EXPERIENCE

University of Michigan Psychiatry Department, Software Developer + Researcher Dec./2020 – Present

- Engineered unique solution to signal processing problem of spike-sorting multiday EP datasets, writing/adapting custom kmeans++/DBSCAN clustering algorithm implementations (*NeuroZIP*)
- 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, Computer Vision Researcher May./2023 – Present

- Developed software of MPupil, a novel pupillary-reflex tracking device, tracking pupil + iris diameter, ratio, and pupillary constriction rate with 95% accuracy in six training videos using OpenCV

University of Michigan Neuroscience Institute, Undergraduate Researcher Jun./2021 – Aug./2022

- Performed microscopy verifying gene expr. in lab of Dr. Akil, 2023 Natl. Medal of Science recipient

PROJECTS

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

- Leveraged UMAP/PCA-based dimensionality reduction and unsupervised machine learning to efficiently cluster data of up to 12 terabytes into batches as part of a dynamic subsampling algorithm that decreases runtime of modern spike sorting algorithms by up to 50%
- Built automated testing pipeline using Agile methodology to evaluate performance across datasets of varying complexity/length in anticipation of release of NeuroZIP python package

SideKick – *An AI virtual assistant for business meetings powered by Gemini 1.5*

- Developed a Chrome extension utilizing Gemini 1.5 API for real-time sentiment analysis
- Tracked emotional states, engagement, and knowledge transfer of up to five meeting participants concurrently using multithreading, optimizing meeting dynamics and decision-making processes.
- Won Google Spotlight Award for Workplace Integration at Google x MHacks hackathon (April 2024)

NeoSearch – *A High-Performance Web Search Engine*

- Engineered distributed search engine scaling to 100,000+ pages using Python, Hadoop, and ReactJS
- Developed custom MapReduce pipeline for efficient calculation of TF-IDF scores across large document collections, allowing for sub-second query resolution
- Incorporated PageRank, TF-IDF scoring, and query expansion for enhanced result relevance
- Implemented API library to simplify user actions as part of broader UI/UX frontend package
- Deployed to Amazon Web Services EC2 clusters to maximize distributed compute availability

PUBLICATIONS AND SELECTED CONFERENCE PRESENTATIONS

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

Kirca D et al. *NeuroZIP: an approach to spike sorting long-term electrophysiology recordings using batch subsampling*. Neuroscience 2024 (Society for Neuroscience) – Chicago IL October 2024

SKILLS

Languages: Python, JavaScript, SQL, C, Modern C++ (up to C++20), MATLAB, Bash, HTML/CSS

Technologies & Frameworks: OOP, React, Ubuntu Linux, Flask, Windows, Agile, Arduino

Libraries and Tools: Git, CMake, Docker, AWS, OpenCV, Torch, TensorFlow, Scikit-learn, Pandas, NumPy

Organizations and Leadership: UM Neuroscience Student Association (outreach chair), UM Brain Bee Committee (Founder + Chair, oversaw a committee of 40+ students that successfully hosted first-ever UM Brain Bee, pulling over 250 total attendees and managing ~10K in funding)