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Richard Oh

Prospective PhD Student

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Skills

Programming Languages	Python, MATLAB, SQL, Java, JavaScript, C/C++
Frameworks & Libraries	Springboot, PyTorch
Web Development	HTML, CSS, JavaScript, Maven
Tools	Multiphysics COMSOL, Mathematica, Maple

Relevant Courses

Data Structures and Algorithms, Computer Systems, Discrete Mathematics, Multivariable Calculus, Differential Equations/Application, Linear Algebra, Modeling and Statistical Analysis of Data, Probability and Statistics

Technical Projects

Autograd Engine for Backpropagation-Based Neural Network **May – June 2024**

- Built from scratch an Autograd engine with a PyTorch-like API that automates back-propagation of weight gradients over a Directed Acyclic Graph (DAG) via topological sorting algorithm.
- Demonstrated ability to develop machine learning algorithms end to end, from data pre-processing to model evaluation and tuning.

Autoregressive Character-Level Language Model **May – June 2024**

- Engineered a Multilayer Perceptron (MLP) with Batch Normalization using PyTorch to generate new names after training from a dataset containing 32,000 common names taken from ssa.gov.

Economic Analysis Using Data Science Techniques **June – July 2024**

- Applied time series techniques on data from the Fred Economic Data API like feature engineering, forecasting, and the extraction of trends, seasonality, and lag features (Time Series Kaggle Certificate).
- Proficient in many Python libraries including XGBoost, FB Prophet, Scikit-learn, PyTorch.

Work Experience

National Institute of Health (NIH) **June 2019 – July 2020**
Software Engineer *Bethesda, MD*

- Developed computational methods for analyzing axonal data from two-photon calcium imaging in MATLAB.
- Investigated machine learning-based image segmentation techniques.
- Designed a signal normalization and sorting algorithm to streamline data processing.
- Worked with large datasets (Hundreds of GB), optimizing data processing time from 4 weeks to 1 day.
- Applied Fourier Transform for time series filtering and signal processing.

University of Virginia Medical Student Summer Research Program **June – July 2021**
Data Scientist *Charlottesville, VA*

- Developed a novel computational, image analysis method in MATLAB to quantify alignment of annulus fibrosis fibrils for 100 percent consistency across any data set and performed analysis on the orientation index of the fibrils.

Johns Hopkins Computational Neuroscience Research **Jan 2016 – May 2019**
Data Scientist *Baltimore, MD*

- Modeled a neuronal network containing 65,536 excitatory pyramidal neurons for studying drug diffusion effects.
- Used finite element analysis to compute current density fields across cortical layers.
- Applied spectral analysis, autoregressive modeling, and causality measures for neuronal network calibration.

Publications

Science Advances 2020	https://doi.org/10.1126/sciadv.aaz8985
Nature Biomedical Engineering 2020	https://doi.org/10.1038/s41551-020-0597-7
Advanced Materials Technologies 2023	https://doi.org/10.1002/admt.202300606

Education

George Mason University **Jan 2025 - Dec 2025 (Expected Graduation)**
Graduate Student in Computer Science

University of Virginia School of Medicine **2020 - 2024**
Medical Student

Johns Hopkins University **2015 - 2019**
B.S. in Chemical and Biomolecular Engineering - Cumulative GPA: 3.86/4.00

Thomas Jefferson High School for Science and Technology **2011 - 2015**
Cumulative GPA: 4.41/4.00