Lawrence R. Liu

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Education

University of California Los Angeles — Los Angeles, CA
MS, Electrical Engineering, GPA: 4.0/4.0 — *Sep 2024 – June 2026*

University of California Los Angeles — Los Angeles, CA
BS, Electrical Engineering, GPA: 3.8/4.0 — *Sep. 2021 – June 2024*

Research Experience

Graduate/Undergraduate Researcher — April 2023 – Present
Advised By Professor Lin F. Yang — *UCLA*

- Developed NoWag, a family of computationally efficient pruning (NoWag-P) and quantization (NoWag-VQ) algorithms for LLMs with a shared normalization method and optimization objective.
- Achieved competitive performance against SOTA pruning and quantization algorithms
- Reduced calibration data dependence by over 32x compared with SOTA VQ methods

Undergraduate Researcher — February 2022 – October 2024
Advised By Professor Vwani Roychowdhury — *UCLA*

- Trained and pruned a lightweight deep learning classifier for epilepsy biomarker detection
- Developed unsupervised time-frequency VAEs and graph-based models in PyTorch to discover more accurate, faster to detect, biomarkers for predicting surgery outcomes
- Led a multidisciplinary team to build a Python GUI tool for real-time brain signal recording and biomarker detection, now actively used by pediatric neurologists at UCLA

Publications

- **Lawrence Ray Liu**, Inesh Chakrabarti, Yixiao Li, Mengdi Wang, Tuo Zhao, Lin F. Yang. "A Unified Framework for Shape Preserving Compression of Large Language Models", In *ICLR 2025 Workshop on Sparsity in LLMs*
- Yipeng Zhang, **Lawrence Liu**, Yuanyi Ding, et al. "PyHFO: Lightweight Deep Learning-powered End-to-End High-Frequency Oscillations Analysis Application", In *Journal of Neural Engineering* , 21, 2024.
- Yipeng Zhang, Atsuro Daida, **Lawrence Liu**, et al. "Discovery of Neurophysiological Characteristics of Pathological High-Frequency Oscillations in Epilepsy with an Explainable Deep Generative Model", Under Review at *Epilepsia*, 2025.
- Tonmoy Monsoor, Atsuro Daida, Prateik Sinha, Yipeng Zhang, **Lawrence Liu**, et al. , "Synchronization network-based approach for accurate epileptogenic zone identification from short interictal EEG data ", To be submitted to *Nature Neuroscience* , 2024.

Teaching Experience

Teaching Assistant — April 2024 – June 2024
UCLA Electrical and Computer Engineering Department — *Los Angeles, CA*

- TAed for a graduate class, Deep Learning 2 (ECE 239AS) for spring quarter 2024, lead office hours and discussions
- Created from scratch two Deep Reinforcement Learning projects in python with Deep Deterministic Policy Gradient (DDPG) and Deep Q Learning (DQN)

Projects

Kernel-Density-Estimation Stock Trading Algorithm — April 2023 - June 2023

- Single handily developed a novel Kernel-Density based algorithm to identify optimal portfolio weights for a buy and hold strategy in stocks
- Lead a team of 4 undergraduates representing UCLA against 40+ teams from Stanford, Harvard, CMU, etc at the UChicago 2023 Trading Competition
- Optimized Kernel Parameters with Stochastic Gradient Descent for greater accuracy, efficency, and scalability
- Utilized Spectral Clustering to identify sectors of correlated stocks, iterative applied this algorithm on each sector
- Backtested on 2 years of real world S&P 500 data and was able to achieve a 17.4% year over year return and a Sharpe ratio of 1.424, outperformed the S&P500 and naive Markowitz Baseline

Technical Skills

Languages: Python, C/C++, R, Matlab, Octave, Julia, Mathematica
Tools: Git, Bash Scripting, Pytorch, Sklearn, Tensorflow, Pandas, NumPy, Matplotlib, Simulink, Gymnasium, Optuna, Cvxpy, Mosek, Cuda
Techniques: Classical Machine Learning, Deep Learning, Reinforcement Learning, Graph Neural Networks, Time Series Analysis, Signal Processing, Data Mining, Data Visualization, Statistical Analysis, Optimization, Numerical Analysis, Control Theory, Model Parallelism & Scaling, Generative AI