Zeyu Yun
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Objective

I'm generally interested in NeuroAI, exploring the rich connection between machine learning and computational neuroscience. My research focuses on building neural computation models for stable perception and using these models to improve the efficiency, interpretability, and generalizability of popular machine learning algorithms.

Education

- **University of California, Berkeley** — Berkeley, CA
  M.Sc. in Electrical Engineering & Computer Sciences; Advisor: Prof. Bruno Olshausen — *August 2023 - Present*
- **University of California, Berkeley** — Berkeley, CA
  B.A. in Computer Sciences and Applied Math with Highest Honor; Major GPA: 3.93/4.00 — *Aug 2017 - Dec 2021*

Publications

[1] Yazhou Zhao*, **Zeyu Yun***, Ruichang Sun, and Dasheng Bi. Natural retinal cone distributions emerge from optical and neural limits to vision. *VSS 2024 in submission*, 2023.

[2] **Zeyu Yun** and Bruno Olshausen. Factorizing motion and form via motion straightening and resonator network. *in preparation.*

[3] **Zeyu Yun**, Juexiao Zhang, Bruno Olshausen, Yann LeCun, and Yubei Chen. Urlost: Unsupervised representation learning without stationarity or topology. *arXiv preprint (ICLR under review)*, 2023.

[4] Yubei Chen, **Zeyu Yun**, Yi Ma, Bruno Olshausen, and Yann LeCun. Minimalistic unsupervised representation learning with the sparse manifold transform. In *The Eleventh International Conference on Learning Representations (ICLR spotlight)*, 2022.

[5] **Zeyu Yun** and Reza Abbasi-Asl. Stability-driven design and denoising of sparse autoencoders. *in preparation.*

[6] ***Zeyu Yun**, *Yubei Chen, Bruno Olshausen, and Yann LeCun. Transformer visualization via dictionary learning: contextualized embedding as a linear superposition of transformer factors. In *Proceedings of Deep Learning Inside Out*. Association for Computational Linguistics (ACL), 2021.

Work & Research Experience

- **Herbert Wertheim School of Optometry & Vision Science, UC Berkeley** — Berkeley, CA
  Graduate Student Researcher — *Aug 2023 - Present*
  - Building computational models to factorize motions and forms. Manuscript under preparation.
  - Advisor: Prof. Bruno Olshausen
- **Aizip, Inc.** — Cupertino, CA
  Research Scientist — *Mar 2022 - Aug 2023*
  - Main developer of 6 industrial projects, providing Tiny ML solutions to industry-leading IC firms like Renesas.
  - Developed robust industrial-level predictive maintenance models. The models won an impactful industrial award: **Best of Sensors Award at Sensor Converge** and are deployed at a large-scale assembly line.

- **Redwood Center for Theoretical Neuroscience, UC Berkeley** Berkeley, CA
  Research Assistant *May 2020 - Aug 2023*
  - Developed an unsupervised learning model for generic high dimensional data. The model demonstrated exceptional performance across diverse data modalities from neural recording to gene expression. Submitted to **ICLR 2024.**
  - Constructed a two-layer interpretable unsupervised learning model based on principles from neural computation. The model remains competitive with deep learning methods. Published at **ICLR 2023 (Spotlight)**.
  - Adopted neural computation principle to improve interpretability of Large Language Models (LLMs). Published at **DeeLIO Workshop, ACL 2021**.
  - Advisor: Prof. Yubei Chen and Prof. Bruno Olshausen
- **Abbasi Lab, UC San Francisco** San Francisco, CA
  Research Assistant *Feb 2021 - Feb 2022*
  - Developed a stability-driven autoencoder to extract gene expression patterns. Manuscript under preparation.
  - Advisors: Prof. Reza Abbasi Asl

Honor and Award

- Best of Sensors Award in AI/ML Category - Sensors Converge July 2023
- Honor Program - Berkeley Mathematics, Computer Sciences, UC Berkeley Aug 2019 - Dec 2021
- Upsilon Pi Epsilon (UPE) - Honor Society for Computing and Information Disciplines Aug 2019 - Dec 2021

Selected Coursework

Deep Neural Networks ***(A+)*** , Deep Reinforcement Learning ***(A+)*** , Complex Analysis ***(A+)*** , Machine Learning ***(A)*** , Optimization Models ***(A)*** , Advanced Algorithm ***(A)*** , Introduction to Topology and Analysis ***(A)***

Teaching

- Deep Neural Networks (Berkeley CS 182) - Spring 2021 Jan 2021 – May 2021
- Discrete Math and Probability Theory (Berkeley CS 70) - Summer 2020 June 2020 – Aug 2020

Skills

- Programming: C/C++, Python, MATLAB
- Technologies and Frameworks: PyTorch, PyTorch Lightning, Tensorflow, Visual Studio, LaTeX, git, openCV
- Machine Learning Infrastructure: vision foundation models (timm), large language models (Huggingface), distributed data parallel, model training across large GPU clusters, memory mapping for processing large NLP dataset.

Additional Activities

- Reviewer for *Conference on Parsimony and Learning (CPAL).* Oct 2023
- *Transformer Visualization via Dictionary Learning.* Invited talk at Redwood Center, UC Berkeley June 2021
- Contributor for repository Huggingface, Transformer Vis, and Word-embeddings-benchmarks.