David Haolong Lee

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Education

University of Southern California — Los Angeles, California
Master of Science in Computer Science · GPA: 3.92/4.0 — Aug. 2024—May 2025
Bachelor of Science in Computer Science (Engineering Honors) · GPA: 3.84/4.0 — Aug. 2020—May 2024

Technical Skills

Coursework: Machine Learning, Natural Language Processing, Information Retrieval, Operating Systems, Algorithms
Programming Languages: Python, C/C++, Java, Javascript, SQL, HTML/CSS
Tools & Frameworks: PyTorch, JAX, Pandas, React, matplotlib, scikit-learn, MkDocs, Espresso, JUnit, Git, Linux, Firebase, Vim

Professional Experience

Research Assistant *Interactive and Collaborative Autonomous Robotics Lab* — Jun. 2022—Present
- Formalized quality diversity algorithms, which optimize for high-quality solutions with diverse features, in a framework of interchangeable modules; published at *GECCO 2023*.
- Conceptualized an algorithm that diversifies features by descending gradients of density estimates, achieving 400% more unique features in high-dimensional spaces and 20% more in low-dimensional spaces than SOTA; published at *GECCO 2024*.
- Accelerated density estimate computation by 150% and neural network evaluation by 200% using **PyTorch** and **JAX**.
- Constructed a pipeline that targets **VAE** encodings of specific MNIST digits and leverages a **DCGAN** to generate hand-written digits with similar encodings.

Teaching Assistant (Discrete Math & Algorithms) *University of Southern California* — Jan. 2023—May 2024
- Designed and implemented **dpvis**, a library that helps students visualize and interact with dynamic programming algorithms, cultivating an intuitive understanding of complex concepts and reinforcing learning through immediate feedback and iterative practice.
- Organized and led bi-weekly homework collaboration sessions with on average 40+ students to facilitate collaborative problem-solving.
- Graded exams and held office hours for 150+ students, providing guidance on algorithms, proofs, and problem-solving.

Co-founder *Licon Graphics* — May 2022—May 2023
- Finetuned **Stable Diffusion** model in **PyTorch** to achieve high-fidelity and high-novelty subject-driven image generation.
- Managed cloud infrastructure on **Google Cloud** for executing generative models and serving generated images to clients.

Projects

dpvis (dpvis.readthedocs.io) — Jan. 2024—Aug. 2024
- An open-source **Python** library that features auto-generated, interactive visualizations for dynamic programming algorithms and self-testing features that allow users to test their understanding by answering interactive questions about the next steps of the algorithm.
- Led a team of five in implementing industry-standard development practices, including **GitHub Automation** for code reviews, **pytest** for comprehensive testing, and **mkdocs** for professional documentation.
- Conducted user study on 150+ students where ∼80% of the respondents found our library helpful; published at *SIGCSE TS 2025*.

pyribs (pyribs.org) — Jun. 2022—Dec. 2023
- An open-source **Python** library for implementing quality diversity algorithms, earning 200+ stars on GitHub.
- Extended the library to support gradient-based optimization, improving efficiency for differentiable tasks.
- Incorporated memory and runtime efficient black-box evolutionary optimizers to support high-dimensional tasks.
- Drafted detailed technical tutorial with **Jupyter Notebook** on upgrading old algorithms to use SOTA threshold adaptation formulas.

USC DoorDrink — Jan. 2022—May 2022
- An **Android** application for coffee shop owners to list their shop and customers to search and place orders for coffee.
- Implemented the map interface with **Google Maps API** that displays nearby shops and the fastest routes to the shops.
- Systematized a **Firebase** database to store restaurant data, on-going orders, and order history.
- Administered black-box and white-box tests with **Espresso** and **JUnit** to ensure robustness and integrity of the application.

Publications

dpvis: A Visual and Interactive Learning Tool for Dynamic Programming — Feb. 2025
David H. Lee, Aditya Prasad, Ramiro Deo-Campo Vuong, Tianyu Wang, Eric Han, David Kempe
ACM Technical Symposium on Computer Science Education (SIGCSE TS 2025)

Density Descent for Diversity Optimization — Jul. 2024
David H. Lee, Anishalakshmi V. Palaparthi, Matthew C. Fontaine, Bryon Tjanaka, Stefanos Nikolaidis
Genetic and Evolutionary Computation Conference (GECCO 2024)

Training Diverse High-Dimensional Controllers by Scaling Covariance Matrix Adaptation MAP-Annealing — Oct. 2023
Bryon Tjanaka, Matthew C. Fontaine, David H. Lee, Aniruddha Kalkar, Stefanos Nikolaidis
IEEE Robotics and Automation Letters (RA-L 2023)

pyribs: A Bare-Bones Python Library for Quality Diversity Optimization — Jul. 2023
Bryon Tjanaka, Matthew C. Fontaine, David H. Lee, Yulun Zhang, Nivedit Reddy Balam, Nathaniel Dennler, ..., Stefanos Nikolaidis
Genetic and Evolutionary Computation Conference (GECCO 2023)