David Haolong Lee

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Education

University of Southern California Aug. 2024—May 2025
Masters of Science in Computer Science *Los Angeles, California*

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

- **Ph.D. Coursework**: Theoretical Machine Learning, Algorithm Design, Convex & Combinatorial Optimization.

Publications

D. H. Lee, A. Prasad, R. Deo-Campo Vuong, T. Wang, E. Han, D. Kempe. "dpvis: A Visual and Interactive Learning Tool for Dynamic Programming." *In Proceedings of ACM SIGCSE Technical Symposium*, Feb 2025.

D. H. Lee, A. V. Palaparthi, M. C. Fontaine, B. Tjanaka, S. Nikolaidis. "Density Descent for Diversity Optimization." *Genetic and Evolutionary Computation Conference*, July 2024. https://arxiv.org/abs/2312.11331.

B. Tjanaka, M. C. Fontaine, **D. H. Lee**, A. Kalkar, S. Nikolaidis. "Training Diverse High-Dimensional Controllers by Scaling Covariance Matrix Adaptation MAP-Annealing." *IEEE Robotics and Automation Letters*. https://arxiv.org/abs/2210.02622.

B. Tjanaka, M. C. Fontaine, **D. H. Lee**, Y. Zhang, N. R. Balam, N. Dennler, S. S. Garlanka, N. D. Klapsis, S. Nikolaidis. "pyribs: A Bare-Bones Python Library for Quality Diversity Optimization." *Genetic And Evolutionary Computation Conference*, July 2023. https://arxiv.org/abs/2303.00191.

D. H. Lee, B. Tjanaka, N. R. Balam, M. C. Fontaine, S. Nikolaidis. "Upgrading CMA-ME to CMA-MAE on the Sphere Benchmark." *pyribs tutorials*, 2023. https://docs.pyribs.org/en/stable/tutorials/cma_mae.html.

Y. Wang, H. Zhu, Z. Wang, **D. H. Lee**, G. Li. "A Uniform Parcel Delivery System Based on IoT." *Advances in Internet of Things*, January 2018. *08*, 39–63. https://doi.org/10.4236/ait.2018.84004.

Research Experience

Undergraduate Researcher Jun. 2022—Present
Interactive and Collaborative Autonomous Robotics Lab · Advisor: Stefanos Nikolaidis *Los Angeles, California*

– Proposed a generalized quality diversity algorithm enabling targeting specific feature distributions during optimization.
– Designed a new diversity optimization algorithm that optimizes for diversity through density estimation.
– Developed an open-source library, **pyribs**, to support on-going research in quality diversity optimization.

Undergraduate Researcher Nov. 2023—May 2024
Advisor: Shaddin Dughmi *Los Angeles, California*

– Attempted to establish axiomatic models of diversity measures on a set of points in metric space.

Co-founder May 2022—May 2023
Licon Graphics *Los Angeles, California*

– Implemented a stable diffusion model for high-fidelity and high-novelty subject-driven image generation.
– Conceptualized a 3D reconstruction pipeline in PyTorch based on state-of-the-art research in computer graphics.

Research Assistant Apr. 2018—Aug. 2018
Cathaypath Institute of Science · Advisor: Fouad A. Tobagi *Shanghai, China*

– Designed a uniform parcel delivery system based on the Internet of Things curated to the logistics system in China.

Teaching Experience

Teaching Assistant, Algorithms Design Jan. 2024—May. 2024
University of Southern California *Los Angeles, California*

– Developed a library, **dpvis**, to help students visualize and interact with dynamic programming algorithms.

Teaching Assistant, Discrete Mathematics Jan. 2023—Dec. 2023
University of Southern California *Los Angeles, California*

Projects

dpvis (dpvis.readthedocs.io/en/latest/)
– Open-source library cultivalting more thorough understanding of DP through auto-generated visualizations for arbitrary DPs.
– Evaluated the effectiveness of dpvis in an undergraduate algorithm class at USC.

pyribs (pyribs.org)
– Open-source library (**150+ stars**) facilitating efficient implementation of novel quality diversity algorithms.
– Extended the library to support more algorithms in qualty diversity optimization.

Airline Stock Prediction (github.com/itsdawei/qsc-airplane)
– Utilized principle componenet analysis and auto-regression to project airline stock prices based on flight data.

Survey on Low Rank Matrix Completion (github.com/itsdawei/NBA-matrix-completion)
– Surveyed mathematical properties of low rank matrix completion algorithms based on convex optimization.
– Experimented with applying low-rank matrix completion algorithm to predict NBA play-off results.
– Generalized experimental results to modeling competitive sports under low-rank assumptions.

Honors & Awards

W.V.T. Rusch Undergraduate Engineering Honors 2024
USC Provost's Undergraduate Research Fellowship 2022
USC Academic Achievement Award 2021
USC Dean's List 2020–2024

Technical Skills

Programming: Python, C/C++, Java, LaTeX, Linux, vim, git, HTML/CSS.
Libraries/Frameworks: PyTorch, matplotlib, statsmodels, sklearn.

Involvement

Quant SC, *Project Manager* Aug. 2022—Dec. 2022
Center for AI in Society Student Branch, *Member* Sep. 2021—Aug. 2022
Trojan Chess Club, *Member* Aug. 2021—Mar. 2023