

Ethan Davis

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Research Interests

Bayesian machine learning, sequence modeling, generative modeling, reinforcement learning, representation learning, transfer learning, ensemble learning, healthcare AI.

Education

M.S., Computer Science <i>University of Washington</i> — Seattle, WA	2024–2026
B.S., Computer Science <i>Oregon State University</i> — Corvallis, OR	2020–2022
B.S., Mathematics <i>University of Portland</i> — Portland, OR	2011–2015

Research Experience

Master Thesis <i>Smart Neurorehabilitation Ecosystem</i> — University of Washington	2024–present
<ul style="list-style-type: none">Conducted a comprehensive evaluation of Bayesian versus frequentist ML models for motor-imagery EEG (MI-EEG) brain-computer interface classification.Compared top-performing MI-EEG classifiers, including linear spatial filters, Riemannian geometric filters, and deep neural networks.Implemented Bayesian models with diverse priors (Gaussian, Laplace, Cauchy) and inference methods: Laplace approximation, variational inference, and HMC sampling.Assessed models on discrimination, calibration, and sharpness metrics, identifying conditions where Bayesian ML improves predictive performance.Utilized MOABB benchmark for standardized preprocessing, model selection, and statistical evaluation across multiple MI-EEG datasets.Investigated the effect of prior distribution, inference speed/accuracy tradeoffs, and classifier type on Bayesian versus frequentist performance.	
Graduate Researcher <i>Independent Research</i> — University of Washington	2024–present

<ul style="list-style-type: none">Developed and benchmarked high-performance GEMM in CUDA, OpenMP, and C++, comparing against CuBLAS and BLAS using FLOPS analysis.Implemented EVD, SVD, QR, and power methods in C with correctness proofs and loop fusion for numerical stability.Authored a 400-page DSA textbook covering 120+ problems with implementations, tests, and complexity analyses.Built Hadoop MapReduce ACO for the traveling salesman problem on AWS EC2 with full deployment documentation.	2024–present
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- Designed distributed Apache Spark triangle counting for graph analytics and community detection on AWS EC2.
- Explored metaheuristic and HPC methods connecting cloud systems, optimization, and machine learning research.

Technical Reports

- [1] Ethan Davis. *Data Structures and Algorithms*. Zenodo, Oct. 2025. URL: <https://doi.org/10.5281/zenodo.17297422>.
- [2] Ethan Davis. *Exploration-Exploitation-Evaluation (EEE): A Framework for Metaheuristic Algorithms in Combinatorial Optimization*. 2025. arXiv: [2510.05027 \[cs.NE\]](https://arxiv.org/abs/2510.05027). URL: <https://arxiv.org/abs/2510.05027>.
- [3] Ethan Davis. *High Performance Matrix Multiplication*. 2025. arXiv: [2509.04594 \[cs.PF\]](https://arxiv.org/abs/2509.04594). URL: <https://arxiv.org/abs/2509.04594>.
- [4] Ethan Davis. *Linear Algebra for Image Compression*. Mar. 2025. URL: <https://doi.org/10.5281/zenodo.17180358>.

Software & Reproducibility

- [1] Ethan Davis. *davisethan/aco: Badge release*. Version v1.0.2. Oct. 2025. URL: <https://doi.org/10.5281/zenodo.17274214>.
- [2] Ethan Davis. *davisethan/data_structures_algorithms: DOI release*. Version v1.0.2. Oct. 2025. URL: <https://doi.org/10.5281/zenodo.17289626>.
- [3] Ethan Davis. *davisethan/eigenface: DOI release*. Version v1.0.1. Oct. 2025. URL: <https://doi.org/10.5281/zenodo.17299529>.
- [4] Ethan Davis. *davisethan/gemm: DOI release*. Version v1.0.1. Oct. 2025. URL: <https://doi.org/10.5281/zenodo.17299758>.
- [5] Ethan Davis. *davisethan/triangle_counting: DOI release*. Version v1.0.1. Oct. 2025. URL: <https://doi.org/10.5281/zenodo.17299086>.

Teaching & Mentoring

Teaching Assistant

2025–present

Computer Science Course — University of Washington

- Assisted MS advisor in updating a Mathematics for Machine Learning course curriculum and teaching materials.
- Surveyed leading ML textbooks (Duda et al., Bishop, Deisenroth et al.) to recommend optimal teaching resources.
- Drafted lecture schedule and slides introducing core math foundations for linear algebra, vector calculus, probability, and optimization.

Research Mentor

2025–present

Smart Neurorehabilitation Ecosystem — University of Washington

- Authored comprehensive onboarding documentation reducing new researcher ramp-up time from 3+ months to 1 week.
- Centralized key BCI and ML resources, experiment design guides, and software references for lab-wide accessibility.

- Established standardized, statistically valid BCI benchmarking procedures aligned with state-of-the-art Riemannian models.

Selected Industry Experience

Software Engineer

SeekOut — Bellevue, WA

2022–2024

- Developed ETL pipelines for integrating applicant tracking system (ATS) data into a centralized data sink for search indexing using C# .NET and Azure.
- Contributed to integrations supporting high-value customer accounts (over \$1M), ensuring reliable and performant data ingestion at scale.
- Produced UML diagrams, documentation, and unit tests to enforce maintainable, SOLID software design, enabling scalable ATS data integration services.

Software Engineer

Independent Project — Seattle, WA

2017–2020

- Designed and implemented a scalable image-sharing platform using Java Spring micro-services, Docker containers, and Kubernetes orchestration.
- Built reproducible cloud infrastructure on AWS with Terraform for provisioning, Ansible for configuration management, MongoDB for data storage, and S3 for BLOB storage.
- Developed a React.js frontend with full CRUD functionality, deployed via Node.js web servers within Docker containers in the Kubernetes cluster.

Software Engineer

StackBrew — Redmond, WA

2015–2017

- Developed core micro-services for cloud-based software platform, including a JavaScript AST interpreter (Node.js and C++ addon) for real-time variable inspection in the online editor.
- Built a git-based micro-service enabling version control and automated CI/CD pipeline integration, streamlining development workflows.
- Implemented a collaborative editing micro-service using CRDTs for consistent concurrent edits; platform technologies included Node.js, Go, MongoDB, Docker, Kubernetes, and GCP.

Conference Posters

- “Bayesian Deep Learning for Electroencephalogram Signal Recognition,” *PUMPS+AI ACM*, Barcelona, ES, July 2025. [Poster](#)

Certifications

PUMPS+AI ACM

Statement of Accomplishment in CUDA workshops — [Verify](#)

July 2025