

# 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

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

## Research Experience

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

<ul style="list-style-type: none"><li>Developed and benchmarked high-performance GEMM in CUDA, OpenMP, and C++, comparing against CuBLAS and BLAS using FLOPS analysis.</li><li>Implemented EVD, SVD, QR, and power methods in C with correctness proofs and loop fusion for numerical stability.</li><li>Authored a 400-page DSA textbook covering 120+ problems with implementations, tests, and complexity analyses.</li><li>Built Hadoop MapReduce ACO for the traveling salesman problem on AWS EC2 with full deployment documentation.</li></ul>	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 & Training

### PUMPS+AI ACM

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

July 2025