Alexander Loftus

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AI researcher & communicator with 6+ years translating deep learning & machine learning research into actionable insights. Kaggle $100k competition winner, forthcoming CUP textbook author, and organizer of a 200-person mechanistic interpretability conference. Seeking outward-facing role (Solutions Engineer / Developer Advocate) where technical depth and storytelling drive product adoption.

Some career highlights:

Textbook author: Authored 524-page technical book on network ML, published with Cambridge University Press.

Conference Organizer & Speaker: Organized New England Mechanistic Interpretability (NEMI) conference on understanding LLM internals; AI/ML San Diego, YouTube lecture series creator; taught hundreds of students through meetups, summer camps, and tutorials.

High-impact presentations: Best poster award at NeurIPS 2023 LatinX workshop, first author work in ICLR 2024.

Strategic Advisory Roles: Advisor for cybersecurity/mechanistic interpretability startup Krnel.ai; summer mentor for Harvard/MIT students.

1st place ranking, $100,000 ML competition: Work featured on cover of Scientific American. Competed against 1249 teams.

EXPERIENCE

Data Scientist — San Diego, CA
Creyon Bio — 2022-2024

ML for Drug Discovery: Developed a novel contrastive pipeline to predict oligo toxicity from 3-D electrostatic maps; cut wet-lab spend by order-of $2M/yr and increased classification AUC from 0.73 to 0.88.

Neuron Toxicity Detection: Developed scalable segmentation pipeline that accelerated toxicology workflows and informed R&D prioritization. Unlocked value for an entire class of neuronal wet lab experiments.

All Projects: Presented findings directly to C-suite, influencing series B pitch materials.

Machine Learning Research Engineer — Rockville, MD
Blue Halo — 2021-2022

Conditional Image Generation with Generative Adversarial Networks: Replaced GAN pipeline with diffusion-model synthetic data generator. Immediate 10x training run reliability.

Detecting Objects with Enhanced Yolo and Knowledge Graphs: Designed YOLO+ knowledge graph detector. Delivered live demos to program officers.

Geometric Multi-Resolution Analysis: Led infra for document clustering & analysis method.

Research Assistant — Baltimore, MD
Johns Hopkins University — Dr. Joshua Vogelstein — 2018-2021

MRI-to-Graphs: Optimized a diffusion MRI pipeline with Kubernetes and AWS orchestration, cutting 1000 lines of legacy code and halving runtime.

Graspologic: Co-authored an open-source graph statistics library later adopted by Microsoft Research.

Assistant Director — Seattle, WA
iD Tech Camps — University of Washington — 2014-2018 summers

Leader and Manager: Directed a high-throughput STEM education camp. Managed 10+ instructors/week and 300+ students.

Curriculum Designer: Designed game development curriculum rolled out to 50+ locations, reaching 10k+ students.

LEADERSHIP & COMMUNITY ENGAGEMENT

Conference Organizer — NEMI
Running 200+ person interpretability conference; Raised $17,000 grant funding. — 2025

Research Mentor — CBAI
Lead mentorship for Harvard/MIT students — 2025

Strategic Advisor — Krnel.ai
Advisor to cybersecurity-focused startup specializing in interpretability tooling for AI systems. — 2025

Meetup Speaker — SDML
Speaker & organizer for San Diego AI Meetups. — 2023–2024

Hackathon Organizer — NeuroData Workshop
Helped organize hackathon & workshop to explore statistics for high-dimensional testing. — 2019

Talks & Demos

A Shared Infrastructure for Interpretability: *Technical Innovations for AI Policy Conference, 2025*
Invited demo for AI governance conference in Washington, DC.

State of the Art in Knowledge Editing: *A.R. Loftus*, 2023
Current techniques in knowledge localization and editing in LLMs and diffusion models.

1st Place Solution - Vesuvius Ink Competition: *R. Chesler, **A.R. Loftus**, A. Tersol Montserrat, T. Kyi*, 2023
Presenting on our winning solution to a $100,000 Kaggle competition, part of the $1,000,000 Vesuvius competition.

ICML Conference Highlights: ***A.R. Loftus***, 2023
Machine learning techniques in drug discovery and medicine at ICML 2023.

Working with LLMs: ***A.R. Loftus***, 2023.
Invited talk: Introduction to LLM engineering. 100+ attendees, AI/ML San Diego community conference.

Linear Algebra, from Dot Products to Neural Networks: ***A.R. Loftus***, 2023.
Created a YouTube tutorial series on the fundamentals of linear algebra for machine learning.

Skills Summary

Languages: Python, Bash, R, Rust, SQL

Tools & Frameworks: pytorch, pytorch-lightning, tensorflow, jax, numpy, scipy, pandas, polars, sklearn, seaborn, matplotlib, docker, AWS, google cloud (GCP), photoshop, SQL, weights & biases, mlflow, kubernetes, linux, cursor.

Areas of Expertise: Linear algebra, probability & statistics, deep learning, information theory, transformers, diffusion models, convolutional autoencoders, GPUs and CUDA, public speaking, leadership & management, teaching, natural language processing, computer vision

Soft Skills: Public Speaking, Technical Writing, Leadership, Mentorship, Community-Building, Confidence & Charisma

Textbook

Hands-On Network Machine Learning with Python: *Eric Bridgeford, **Alexander R. Loftus**, Joshua Vogelstein.*
Cambridge University Press, in copy-editing phase. To be printed November 2025.
Spectral representation theory on networks. 524 pages, 147 figures.

Education

Northeastern University   Boston, MA
PhD Student, Computer Science   2024-Present
Advisor: Dr. David Bau

Mechanistic interpretability, evaluations, and training dynamics in Code LLMs.

Johns Hopkins University   Baltimore, MD
MSE Biomedical Engineering: Machine Learning & Data Science Focus   2020-2022
Advisor: Dr. Joshua Vogelstein
Thesis: Hands-On Network Machine Learning

dean's list, highest honors, GPA 3.97/4.0.

Western Washington University   Bellingham, WA
BS Behavioral Neuroscience — *Minors*: Chemistry, Philosophy   2014-2018
Founder & President, Computational Neuroscience Club
Vice President, Neuroscience Club

Built computational neuroscience club from scratch, taught weekly seminars.

Publications

* indicates equal contribution.
🏆 indicates best poster.

NNsight and NDIF: Democratizing Access to Open-Weight Foundation Model Internals: ***A.R. Loftus****, *J.Fiotto-Kaufman*, et al.* ICLR 2025.
Infrastructure project to easily explore and manipulate foundation model internals with no engineering overhead.

A Saliency-based Clustering Framework for Identifying Aberrant Predictions 🏆: *A. Tersol Montserrat,* ***A.R. Loftus***, *Y. Daihes.* Paper, **NeurIPS** LatinX AI Workshop, 2023.

Use embeddings of saliency map crops to identify predictions caused by spurious features.

A low-resource reliable pipeline to democratize multi-modal connectome estimation and analysis: *J. Chung, R. Lawrence,* ***A.R. Loftus****, et al.* Paper, in review at Nature Methods, 2024

Turn diffusion MRI scans into adjacency matrices. Code on github.

Fellowships & Awards

First Place Winner	
Kaggle Vesuvius Competition, $100,000.	2023
Khoury Distinguished Fellowship	
Northeastern University PhD fellowship.	2024
Best Poster Award	
NeurIPS 2023 LatinX AI Workshop.	2023
Harvard AI Safety Technical Fellowship	2025
Harvard fellowship for technical work in AI safety.	
AWS Research Grant	
$10,000 grant for computational research on cloud services.	2019

Teaching

Head Teaching Assistant	Johns Hopkins University
Foundations of Computational Biology and Bioinformatics, *EN.BME.410/634*	Spring 2021
Teaching Assistant	Johns Hopkins University
NeuroData Design II, *EN.BME.438/638*	Spring 2020
Teaching Assistant	Johns Hopkins University
NeuroData Design I, *EN.BME.437/637*	Fall 2019
Teaching Assistant	Western Washington University
Introduction to Behavioral Neuroscience, *PSY.220*	Winter 2017
Curriculum Designer	iD Tech Camps
Built curriculum used across 50 locations in the United States by tens of thousands of students.	Spring 2017
Instructor	iD Tech Camps
Taught programming and game design to high school students.	2014-2018 summers

Fun

Gaming: Starcraft 2 grandmaster in high school, competed and won in Seattle-area tournaments.

Music: Fingerstyle guitarist. Played at open mic nights.

Dancing: Partner dance instructor and competition winner. Fusion, West Coast Swing, Zouk, Salsa, Bachatta.