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Alexander Loftus
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AI communicator with deep technical expertise and an award-winning track record in deep learning and ML. Passionate about translating complex technical concepts to non-experts through product strategy, developer engagement, and high-level partnerships. Skilled community builder with an academic & industry network spanning Anthropic, Harvard & MIT, Kaggle grandmasters, and leading AI research laboratories.

Some 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 learning method to classify drug toxicity from 3D electrostatic potential data. Increased AUC from 0.73 to 0.88, saving thousands to millions of dollars in lab testing costs.

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.

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

Conditional Image Generation with Generative Adversarial Networks: Spearheaded synthetic data generation with diffusion models as opposed to GAN networks.

Detecting Objects with Enhanced Yolo and Knowledge Graphs: Designed method for conditional generation and object detection on large video datasets using enhanced YOLO and knowledge graphs.

Geometric Multi-Resolution Analysis: Infrastructure for a hierarchical clustering 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 weekly and developed curriculum in C++, Python, and robotics.

Curriculum Designer: Designed and deployed teaching tools and live demos across 50+ locations with 10,000+ students.

Leadership & Community Engagement

Conference Organizer — NEMI
Running 200+ person interpretability conference; secured $17,000 grant funding; curating top researchers. — 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.
Introduction to LLM engineering. Talk given to 100 people for 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.