

Alexander Loftus

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Author, network machine learning textbook: Publishing contract with Cambridge University Press.

1st place ranking, \$100,000 Machine Learning competition: Work featured in Scientific American. Competed against 1249 teams. Vesuvius ink detection.

Best poster, NeurIPS: Won best workshop poster award for saliency clustering paper at NeurIPS 2023.

Open-source contributions: Primary contributor to microsoft network statistics package graspologic.

Teaching and Leadership: Led a team of three to develop an object detection augmentation algorithm; a team of five to contribute to a brain network estimation pipeline; assistant director managing 8-12 instructors.

EDUCATION

Northeastern University Boston, MA
PhD Computer Science 2024-

Advisor: Dr. David Bau

Johns Hopkins University Baltimore, MD
MSE Biomedical Engineering: Machine Learning & Data Science Focus 2019-2021

Advisor: Dr. Joshua Vogelstein

Thesis: Hands-On Network Machine Learning

dean's list, highest honors, GPA 3.95/4.0

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.

TEXTBOOK

Hands-on Network Machine Learning: Eric Bridgeford, **Alexander R. Loftus**, Joshua Vogelstein. Cambridge University Press publishing contract, 2025.

Spectral representation theory on networks. 530 pages, 147 figures.

PUBLICATIONS & POSTERS

* indicates equal contribution

NNsight and NDIF: Democratizing Access to Foundation Model Internals: **A.R. Loftus***, J. Fiotto-Kaufman*, et al. Paper, arxiv, 2024. Preprint for ICLR submission.

Explore large model internals easily.

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

Wrote half the paper, designed poster.

A low-resource reliable pipeline to democratize multi-modal connectome estimation and analysis: J. Chung, R. Lawrence, **A.R. Loftus**, et al. Paper, Nature Methods, 2022. Under review.

Wrote infrastructure for the codebase. [Code](#) on github.

Role of CAMKII in Associative Conditioning and GLR-1 Expression in C. Elegans: M. Pribic, **A.R. Loftus**, et al. Society for Neuroscience Poster, 2017

Conducted most of the later experiments.

TALKS

State of the Art in Knowledge Editing: **A.R. Loftus**, 2023

Current techniques in multimodal knowledge localization and editing

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.

For 100 people at the AI/ML San Diego meetup.

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.

Effects of an unc-43 (CaMKII) Gene Deletion on Short-Term Memory for Associative Conditioning in *C. elegans*: *A.R. Loftus*, Psychfest 2017.

Mechanistic understanding of roundworm neural circuitry.

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

MIT EECS GAAP

MIT mentorship program 2023

AWS Research Grant

\$10,00 grant for computational research 2019

EXPERIENCE

Data Scientist

Creyon Bio San Diego, CA 2023

ESP Embeddings: Developed contrastive feature representation learning approach for electrostatic potential data. Resulted in 10x improvement over previous method in l^2 -norm reconstruction accuracy.

Neuron Toxicity Detection: Built deconvolution and segmentation pipeline to detect toxicity in neurons.

Machine Learning Research Engineer

Blue Halo Rockville, MD 2021-2023

Conditional Image Generation with Generative Adversarial Networks: Augment datasets with diffusion images.

Detecting Objects with Enhanced Yolo and Knowledge Graphs: Predicted network semantic properties of objects in videos.

Geometric Multi-Resolution Analysis: Used a manifold on news data to create a hierarchically clustered semantic space.

Research Assistant

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

Network Machine Learning: Publishing contracts offered by both Springer Publishing and Cambridge University Press.

Open-Source Contributor to Microsoft network ML package Graspologic: Built dimensionality reduction models on networks.

Primary maintainer & Developer of brain network estimation pipeline: Diffusion MRI to graphs pipeline. AWS cloud-computing integration with pytest CI/CD infrastructure. Eliminated 1000 lines of code and halved computation time.

Assistant Director

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

Assistant Director: Administrator for a STEM education camp which taught C++, Python, Java, game design, and robotics at the University of Washington. Managed 8-12 instructors with 80-120 students per week.

Research Assistant

Western Washington University Bellingham, WA 2015-2018

Associative learning in C. elegans: Python automation pipeline resulted in 5 days of work cut down to minutes. Resulted in research presented at the Society for Neuroscience, 2017.

TEACHING EXPERIENCE

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

SKILLS SUMMARY

Languages: Python, R, Rust, Bash, CSS, Mojo, English, Broken Spanish

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

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

OTHER / FUN

Gaming: Starcraft 2 grandmaster and tournament winner in high school. Server First raid winner in World of Warcraft, off-tank. Second richest player on my server of 10,000 players.

Music: Fingerstyle guitarist. Played at open mic nights.

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