Haoli Yin

Updated April 11, 2025

Email: haoli.yin@vanderbilt.edu
Phone: (346) 307 - 4568
Website: https://haoliyin.me
GitHub: https://github.com/Nano1337
LinkedIn: https://linkedin.com/in/haoliyin
Twitter: https://twitter.com/HaoliYin

Research Interests

My research interest mainly focuses on incorporating rich information from multiple modalities, times, and views to create a better structured understanding of the world and the objects contained within it. In particular, I've been tackling practical and real-world challenges in various application domains such as multi-sensor fusion and video completion. I currently focus on the following problems:

- Multi-Sensor Fusion: Multimodal Classification, Retrieval, & Re-Identification
- Video Completion: Optical Flow, Domain Transfer, Style Transfer

Education

Vanderbilt University — Nashville, Tennessee
M.Sc. in Computer Science — May 2025

Vanderbilt University — Nashville, Tennessee
B.S. in Computer Science and Mathematics — May 2024
GPA: 3.98
Relevant Coursework: Algorithms, Computer Networking, Data Structures, Systems, Linear Algebra, Machine Learning, Multivariable Calculus, Operating Systems, Probability and Statistics, Programming Languages, Representation Learning

Experience

DatologyAI — June. 2024 - Present
Member of Technical Staff

- Orchestrated data pipeline at ***multi-billion sample scale***, curating image-text multimodal datasets to ***speed up CLIP pretraining by >10x*** to reach the same performance as the uncurated raw data baseline and ***>2x*** vs CLIPScore filtering
- Ported the OpenCLIP repository for internal use, enabling ***multi-node, multi-gpu distributed training*** with SLURM and implemented comprehensive eval suite. Monitored CLIP pretraining in WandB and managed artifact storage with AWS S3.
- Fine-tuned Multimodal Data Filtering Networks for improved scoring and curating ***multimodal pretraining datasets***
- Led a ***synthetic data generation*** project to leverage vLLM, improving pretraining time by 40% and avg eval performance by up to 50%.

Modern Intelligence — Jan. 2023 – Dec 2023
AI Research Scientist Intern

- Authored two manuscripts and developed the Gradual Fusion Transformer, which achieved ***state-of-the-art performance*** in multimodal vehicle re-identification benchmarks, reduced transformer model size by ***62%***, and introduced a novel ***multimodal contrastive learning*** objective, thereby establishing a unique market differentiator for the company.
- Led ***3-day sprints***, swiftly evolving ideas into fully-realized experiments with intern team, catalyzing project momentum.
- Engineered a robust, modular ***PyTorch infrastructure***, harnessing Lightning Fabric for ***multi-GPU training*** to supercharge model training speed by ***400%***, advancing overall project timeline.
- Authored a ***custom job scheduler*** with a user-centric interface, optimizing load balancing and training run management, improving resource utilization by ***40%***

Bowden Biomedical Optics Lab @ Vanderbilt University Nov 2021 – Present
Research Assistant, Computer Science

- Spearheaded deep learning research on specular reflection restoration in white-light endoscopy videos as ***first author*** in Bowden Biomedical Optics Lab, achieving state-of-the-art results with ASPP model for segmentation (92.8% Dice Score, 52.3% sensitivity increase over U-net models) and flow-guided video completion pipeline leveraging ***optical flow*** estimation and ***vision transformer*** models (16.8% PSNR and 10.1% SSIM improvements over spatial inpainting methods).
- Project areas include 3D hollow organ model reconstruction, ***video artifact restoration***, and a current project of using GAN models for semantically aware ***modality transfer*** to enhance sensitivity of bladder cancer detection.

Yoomi Health Sept. 2022 – Feb. 2023
Machine Learning Engineer

- Spearheaded research initiatives as ***third hire*** in pre-seed physical therapy startup, delivering a state-of-the-art ***pose estimation model*** with ***98% mAP*** using the EfficientFormerV2 transformer backbone for ***mobile optimization***.
- Pioneered efficient in-browser ***edge-deployment*** of the core 2D pose estimation model using ***TF.js*** and ***int8 quantization***, achieving real-time inference optimization and driving significant improvements in ***speed and performance***.
- Leveraged networking to secure startup demo with ***Mark Cuban***, resulting in $46k pre-seed funding win.

Lynntech Inc May 2022 – August 2022
Data Science Research Intern

- Designed and implemented a ***GPU-accelerated*** state estimation engine using C++ and MAGMA (CUDA wrapper), ***reducing runtime by 21.8%*** compared to the MATLAB baseline.
- Developed over 20 GPU-accelerated ***linear algebra utility functions*** with unit tests using C++.
- Validated the effectiveness of 20+ ***adversarial ML patterns*** on 30+ state-of-the-art ***PyTorch classification models*** using Anaconda, Jupyter Notebook, NumPy, OpenCV, and Pandas

Arion Blue LLC December 2020 – May 2021
Software Engineering Intern

- Coordinated metadata collection on a Software-Defined Network with information from ***20+ literature reviews***
- Trained a ***Proximal Policy Optimization*** reinforcement learning model on a custom environment to predict the best ***Azure Files*** storage tier to place data based on daily size and read/write frequencies
- Optimized file archival process and minimized data storage costs by ***74%*** during backtesting

Summer STEM Institute June 2020 – August 2020
Data Science Researcher

- Built an ***explainable AI*** pipeline to assess prostate tumor detection from mpMRI scans with Logistic Regression, SVM, Random Forest, XGBoost, and PyTorch CNN with saliency mapping for each of three prostate zones.

- ***Published paper*** "Prostate Lesion Detection and Salient Feature Assessment Using Zone-Based Classifiers" in the Summer STEM Institute Journal, selected as 1 of 10 papers out of 80+ submissions

Conference Publications/Talks

[C3] ***UniCat: Crafting a Stronger Fusion Baseline for Multimodal Re-Identification***
Jennifer Crawford, **Haoli Yin**, Luke McDermott, Daniel Cummings
Unifying Representations in Neural Models **(UniReps) Workshop NeurIPS 2023**
arXiv: 2310.18812, 2023

[C2] ***Digital Staining of Unpaired White and Blue Light Cystoscopy Videos for Bladder Cancer Detection in the Clinic***
Shuang Chang, **Haoli Yin**, Kristen Scarpato, Amy Luckenbaugh, Sam Chang, Soheil Kolouri, Audrey Bowden.
Medical Imaging in Deep Learning **(MIDL) 2023**, Nashville, TN

[C1] ***SpecReFlow: A Specular Reflection Restoration Framework using Flow-Guided Video Completion***
Haoli Yin, Rachel Eimen, Daniel Moyer, Audrey Bowden.
Under Review for SPIE Journal of Medical Imaging.
SPIE Photonics West 2023, San Francisco, CA
Oral Presentation for Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XXI

Preprints

[P2] ***GraFT: Gradual Fusion Transformer for Multimodal Re-Identification***
Haoli Yin, Jiayao Li, Eva Schiller, Luke McDermott, Daniel Cummings.
Under Review. Previously Borderline reviews at WACV 2024 Round 2.
arXiv:2310.16856, 2023

[P1] ***Prostate Lesion Detection and Salient Feature Assessment Using Zone-Based Classifiers***
Haoli Yin and Nithin Buduma. arXiv:2208.11522, 2020

Reviewer Services

International Conferences:
2023 *Neural Information Processing Systems* (NeurIPS)

Honors and Scholarships

Neo Scholar	*2024*
Goldwater Scholar	2023
Google CS Research Mentorship Program	2023
Cornelius Vanderbilt Scholar	2021
Equitable Excellence $10k Scholarship	2021
National Merit Scholar	2021
Coca-Cola Scholarship Semifinalist	2020
Science Olympiad National Medalist	2019-2021
USA Biology Olympiad Semifinalist	2018-2020

Leadership

VandyHacks February 2022 – Present
Sponsorship Assistant Director
- Spearhead the coordination of cold calls and lead the management of existing sponsor relations to exceed our goal of raising ***$80,000 in funding*** for Vanderbilt's fall hackathon event

- Represent VandyHacks organization at conferences and networking events, ***increasing lead generation by 40%*** while building strong partnerships with potential sponsors for future events.

Vanderbilt Commodore Orchestra August 2021 – Present
Viola Section Leader

- ***Scheduled and led*** viola section practices, fostering a collaborative environment that improved the overall quality of performances.
- Provide motivation and ***coaching*** to slower members, ensuring that all members are able to play to their full potential.
- Collaborated with fellow section leaders to enhance the overall ***cohesion and excellence*** of the orchestra.

References

Matthew Leavitt, Chief Scientist, DatologyAI, US
Email: matthew@datologyai.com

Prof. Audrey Bowden, Associate Professor, Vanderbilt University, US
Email: a.bowden@vanderbilt.edu

Dr. Daniel Cummings, Staff AI Research Scientist, Modern Intelligence, US
Email: daniel@modernintelligence.ai