NINAD DAITHANKAR

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EDUCATION

University of Illinois Urbana-Champaign   Urbana, IL
Master of Science - Computer Science – GPA: 3.87/4   *Aug 2024 – Dec 2025*

Savitribai Phule Pune University   Pune, India
Bachelor of Science - Computer Science – GPA: 9.1/10   *Aug 2017 – May 2021*

PUBLICATIONS

- [*Manuscript Preparation*] Alexi Gladstone, Avery Qian, Shivanshu Shekhar, **Ninad Daithankar**, Yilun Du, Heng Ji, Tong Zhang. " *Energy Outscales Diffusion and Flow* " **TMLR 2026** (planned).

- [*Manuscript Preparation*] **Ninad Daithankar***, Alexi Gladstone*, Heng Ji. "*Temporal Difference Enables Self-Supervised Learning Without Strong Assumptions*". *Equal contribution.

RESEARCH EXPERIENCE

Research Intern (Video Understanding) – Blender Lab   May 2025 – Aug 2025
CS Dept. - University of Illinois Urbana-Champaign   *Urbana, IL*

- Developed an SSL-based video learning method that uses vision transformer based frame and motion encoders to learn strong representations from raw videos
- Improved training stability of motion representations using teacher models, cross attention and RoPE
- Preprocessed Ego4D and rewrote the dataloader to improve throughput from 0.51 it/s to 26.3 it/s ($50\times$ faster)
- Surveyed and compared motion/SSL methods (optical flow, motion vectors, MAE, DINOv2, BYOL, iBOT, I-JEPA, V-JEPA) to guide architecture and loss design

Graduate Research Assistant – Prof. Heng Ji   Sept 2024 – Dec 2025
CS Dept. - University of Illinois Urbana-Champaign   *Urbana, IL*

- Refactored V-JEPA PyTorch codebase into PyTorch Lightning and reproduced KNN accuracy
- Built online distributed KNN, linear and attentive probe evals to run on ImageNet in <5 minutes
- Implemented online attention score visualizations for understanding global semantic structure in embeddings
- Built an HDF5 feature store for 40M+ frames (SSV2/Ego4D), enabling $4\times$ faster training throughput on HPC clusters while using pretrained models

INDUSTRY EXPERIENCE

Software Engineer – Data Virtualization   Aug 2021 – July 2024
eQ Technologic Inc.   *Pune, India*

- Researched, designed, and implemented a new connector for Deltek OpenPlan (for data integration at a Fortune 100 aerospace customer) as a Java + Python system, leveraging its OLE APIs using pywin32 and pywinauto
- Designed and implemented 'XSD metadata parsing' and 'embedded objects support' for generalizing Java and REST API based Costpoint connector from initial 10 modules to over 100+ modules in Deltek Costpoint
- Designed and implemented 'returning attributes' feature for the generic JDBC connector to reduce latency of consecutive 'write + read' operations by 50pct for databases like Oracle, Teradata and MySQL
- Implemented functionality for Java based Bitbucket connector to support Bitbucket Datacenter REST APIs

Software Development Engineer – Intern   Jan 2020 – Apr 2020
Edgelytics   *Pune, India*

- Developed a web-app using React and Bootstrap for digitization of Standard Operating Procedures (SOP) for a Fortune 500 pharmaceutical client
- Redesigned the front-end using React and Bootstrap for a Django based Cloud IoT device dashboard

Relevant Projects

Improving System-2 Thinking in Energy Based Transformers | PyTorch, PyTorch Lightning, Wandb.ai | **Blog Link**
- Investigated MCMC-step ramp-up strategies in Energy-Based Transformers, designing linear / exponential schedulers that stabilize long "System-2" reasoning chains without harming validation perplexity

Energy-Based Dense Re-Ranking | PyTorch, PyTorch Lightning, Wandb.ai
- Experimented with a 2-layer MLP energy head that boosts BERT-DPR MRR@10 from $0.340 \rightarrow 0.371$ with minimal extra latency

Immunization against Diffusion-Based Image Editing | PyTorch, PyTorch Lightning, Wandb.ai
- Implemented immunization approaches from the papers *Distraction is All You Need: Memory-Efficient Image Immunization against Diffusion-Based Image Editing* and *Optimization-Free Image Immunization Against Diffusion-Based Editing*
- Implemented stable diffusion pipeline, timestep universal gradient and immunizer networks for adding subtle perturbations

Video-sync by visual indexing using CLIP embeddings | PyTorch, NumPy, Django
- Used OpenAI's CLIP embeddings to develop a visual indexing system to match frames from a target video to multiple source videos and make a new video from it
- Created a synced video of the same environment on UIUC campus but in different seasons (sunny, rain, snow)

Object insertion using Gradient-Domain Fusion | NumPy, OpenCV, Scikit Learn
- Implemented object insertion where an object is extracted from one image and placed in another
- Used Poisson Blending to enforce smoothness and seamlessly blend the object from source image into target image

Technical Skills

Deep Learning: PyTorch, PyTorch Lightning, Hugging Face, TensorFlow, JupyterLab/Colab, Wandb.ai, Scikit Learn, NumPy, Matplotlib
Languages: Python, Java, Javascript, C/C++, SQL, HTML, CSS, Go
Frameworks: React, Node.js, Django, JDBC, JUnit
Developer Tools: Git, Docker, Slurm, VS Code, PyCharm, IntelliJ, Subversion, Bitbucket, Jenkins, Linux
Databases: Oracle, MySQL, Teradata, MongoDB, SQLite, Neo4j
HPC Platforms: UIUC Research Computing (NCSA Delta, NCSA Delta AI)

Academic Experience

Course Assistant – CS 222: Software Design Lab Sept 2024 – Dec 2025
Siebel School of Computing and Data Science - UIUC *Urbana, IL*

- Assisted Prof. Michael Woodley by mentoring students and grading weekly quizzes for 44 students each week
- Mentored 7 teams (total 28 CS undergraduate students) in developing their team projects for the lab
- For Fall 24, team 'WhereAmI' developed a computer vision web-app with ResNet50 backbone for recognizing buildings on UIUC campus and team 'Shmoney' worked on stock market prediction using LSTMs and yfinance APIs
- For Spring 25, team 'SmartRide' developed a smart bicycle navigation system with health metric tracking and team 'GuessQuest' developed an interactive guessing game website

Volunteer Service

Graphic Designer – Cybertimes Aug 2019 – Jan 2020
CS Department - Sinhgad College of Engineering *Pune, India*

- Designed six articles using Adobe Photoshop and Lightroom for the Computer Science Departments annual technology magazine

Web Developer – TIME Quiz Aug 2018 – Jan 2020
St. Teresa's Convent Higher Sec. School *Jalgaon, India*

- Designed and developed a web-app using React and custom CSS for years 2018, 2019 & 2020 iterations of the annual state-level interschool quiz contest held by my former school

Graduate Coursework (UIUC)

- BCOG 458: Advances in Brain & Cognitive Science by Prof. John Hummel
- CS 598: Deep Generative Models by Prof. Arindam Banerjee
- CS 591: Biologically Plausible AI by Prof. ChengXiang Zhai
- CS 546: Advanced Natural Language Processing by Prof. Dilek Hakkani Tur
- CS 510: Advanced Information Retrieval by Prof. ChengXiang Zhai
- CS 444: Deep Learning for Computer Vision by Prof. Saurabh Gupta
- CS 447: Natural Language Processing by Prof. Julia Hockenheimer
- CS 445: Computational Photography by Prof. Yuxiong Wang
- CS 425: Distributed Systems by Prof. Indranil Gupta, Prof. Ram Kesavan

Relevant Undergraduate Coursework (SPPU)

- CS 201: Data Structures
- CS 202: Database Management System
- CS 203: Object-Oriented Programming
- CS 206: Algorithm Design and Analysis
- CS 304: Artificial Intelligence
- CS 404: Data Warehousing and Data Mining
- CS 414: Big Data Analytics

Online Courses & Certifications

- Deep Learning Specialization (by Andrew Ng)
  - * Neural Networks and Deep Learning
  - * Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization
  - * Structuring Machine Learning Projects
  - * Convolutional Neural Networks
  - * Sequence Models
- Machine Learning - Stanford University (CS229 Lectures by Andrew Ng)
- Reinforcement Learning - Google Deepmind (by David Silver)