

Education

Northwestern University

Master of Science in Computer Science, **GPA: 4.0/4.0**

Coursework: Machine Learning, Statistics, Deep Learning Foundations, Advanced Deep Learning, Data Science Seminar, Statistical Language Modeling, Algorithms, Social Network Analytics

Labs/Groups: REALM Lab, MAGICS Lab, AI Journal Club

Evanston, Illinois

Sep 2019 – Mar 2021

K.J Somaiya College of Engineering

Bachelor of Technology in Computer Engineering, **GPA: 8.99/10**

Coursework: Machine Learning, Neural Nets, Image Analysis, Artificial Intelligence, Data Structures, Algorithms, Operating System

Mumbai, India

Aug 2015 – May 2019

Work Experience

NU Earth

Research Specialist | Prof. Suzan Van Der Lee

Evanston, Illinois

Nov 2022 – Apr 2024

- Developed an unsupervised clustering method and an attention-based transformer architecture for detecting seismic events in time series data of urban areas.
- Developed multiple optimization algorithms, including an Ensemble Genetic Algorithm, clustering-based methods, and deep learning techniques, to select a small subset of rows from a large matrix that maximizes sensitivity volume.
- Developed Earthtunes, an android app which allows users to listen to normally inaudible sounds within the Earth.

Alchera Labs

Applied Scientist

San Diego, California

Jul 2021 – Oct 2022

- Developed an early detection system using computer vision for detecting wildfire smoke with 91.6% accuracy. The system is actively being used in the USA to monitor near real-time data from hundreds of cameras daily.
- Investigated the emergence and role of class-selective neurons in deep neural networks on image data through mechanistic interpretability and demonstrated that class selectivity is essential for successful training.

CIERA

Researcher | Prof. Vicky Kalogera's Group

Evanston, Illinois

Jun 2020 – Jun 2021

Earthquake Detective | Prof. Suzan Van Der Lee

- Compiled and processed the first comprehensive ML benchmark dataset of potentially triggered earthquakes and tremors with 130k+ time series and image data samples.
- Developed an ML model that uses Wavelet Scattering and Image Convolutions to detect low amplitude earthquake and tremor signals with 90.4% accuracy.
- Developed a retirement algorithm to effectively retire labeled seismic samples on Earthquake Detective - a crowdsourcing platform.

Northwestern University

Graduate Research Assistant | Dr. Prem Seetharaman

Evanston, Illinois

Jan 2020 – Jun 2020

- Developed Otoworld, an interactive environment for training Reinforcement Learning agents for Computer Audition.
- Agents trained in this environment implicitly learn to separate audio sources by learning to maximize the reward of "turning off" these sources.
- Developed an RL agent with a Monaural Separation Model, Spatial Feature Extractor, and a Q-Network to navigate this environment.

- Developed a few-shot facial recognition system that can be trained to a high accuracy (90-100%) using only 3 samples per class.

- Developed depth mapping, lane detection, and object detection modules for an assistive driving system.
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Publications

Conference Papers

1. **O. Ranadive**, J. Kim, S. Lee, Y. Cha, H. Park, M. Cho, and Y. K. Hwang, "Image-based early detection system for wildfires," in *Tackling Climate Change with Machine Learning workshop, Thirty-sixth Conference on Neural Information Processing Systems (NeurIPS'22)*, Dec. 2022.
2. **O. Ranadive**, S. van der Lee, V. Tang, and K. Chao, "Applying machine learning to crowd-sourced data from earthquake detective," in *AI for Earth Sciences Workshop, Thirty-fourth Conference on Neural Information Processing Systems (NeurIPS'20)*, Dec. 2020.
3. **O. Ranadive**, G. Gasser, D. Terpay, and P. Seetharaman, "Otoworld: Towards learning to separate by learning to move," in *Self Supervision in Audio and Speech Workshop, 37th International Conference on Machine Learning, Vienna, Austria (ICML'20)*, Jul. 2020.
4. K. Joisher, S. Khan, and **O. Ranadive**, "Simulation environment for development and testing of autonomous learning agents," in *2nd International Conference on Advances in Science & Technology (ICAST'19)*, Apr. 2019.

Journal Articles

1. **O. Ranadive**, N. Thakurdesai, A. S. Morcos, M. L. Leavitt, and S. Deny, "On the special role of class-selective neurons in early training," *Transactions on Machine Learning Research (TMLR)*, 2023.
2. **O. Ranadive** and D. Thakkar, "K-shot learning for face recognition," *International Journal of Computer Applications 181 (18) (IJCA)*, pp. 43–48, Sep. 2018.

Abstracts

1. A. M. Thomas, **O. Ranadive**, and S. van der Lee, "Towards detecting small, local earthquakes in greater chicago using single-station data," in *AGU Fall Meeting Abstracts (AGU)*, Dec. 2023.
 2. A. M. Thomas, **O. Ranadive**, and S. van der Lee, "Feature engineering and clustering for single-station seismic waveform classification in an urban environment," in *SSA Annual Meeting (SSA)*, Apr. 2023.
 3. M. P. Flanagan, V. Tang, **O. Ranadive**, A. M. Thomas, and S. van der Lee, "Earthquake detective: Citizen scientists use eyes and ears to classify small seismic events," in *AGU Fall Meeting Abstracts (AGU)*, Dec. 2021.
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Projects

Reinforcement Learning for Complex Financial Time Series Analysis 🔒

- Developed an environment to maintain and process high-frequency trading data using limit order books.
- Developed a double deep q-network agent that leverages this data to make intelligent trading decisions.

Analyzing spread of COVID-19 using Graph Neural Networks 🔒

- Developed an end-to-end pipeline to process COVID-19 data into graph structures and analyze it.
- Predicted future spread in US states using Graph Convolution Network and Message Passing Network, based on census data, time series info, travel data, and distances between US states.

Domain Adaptation using CycleGAN 🔒

- Developed a CycleGAN architecture to map simulated images to real-world images to reduce the domain gap between real-world data and virtual environment data.
- Developed a multi-iterative CycleGAN architecture to enhance the GAN output.

Citizens Police Data Project 🔒

- Analyzed crime trends and complaints against police officers in Chicago area using SQL, Tableau, and D3.JS.
- Created a co-accusal network of officers and used graph analytics to identify key officers.
- Applied NLP on reports to find important keywords and assign severity scores.

Skills

Languages: Python, Java, R, C, C++

Web: Flask, HTML, CSS, PHP, Javascript, AngularJS, Node.js, React, Flutter


Analytics: AWS, Git, Docker, Spark, Tableau, Trifacta, Matplotlib, D3.js, Google Earth Engine, ArcGIS

Databases: PostgreSQL, MySQL, MongoDB









Libraries: Pytorch, Tensorflow, OpenCV, Gym, Numpy, Pandas, SkLearn, NLTK, Keras

Certifications: Deep Learning Specialization (Deeplearning.AI), Machine Learning (Stanford, Coursera)


Teaching

- Invited Lecturer - Machine Learning, ROSES'21, American Geophysical Union  2021
 - Graduate Student Instructor, CS496 - Advanced Deep Learning, Northwestern University 2021
 - Graduate Student Instructor, STAT461 - Statistical Machine Learning, Northwestern University 2021
 - Lecturer, Machine Learning Workshop, CSI, K.J Somaiya College of Engineering 2016
 - Lecturer, Cryptography Workshop, CSI, K.J Somaiya College of Engineering 2016
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Talks

- Tackling Climate Change with Machine Learning Workshop, NeurIPS 2022  Dec 2022
 - Using machine learning to detect wildfires, NICO  Oct 2021
 - MuZero: Learning to plan in unknown environments, AI Journal Club  Feb 2021
 - AI for Earth Sciences Workshop, NeurIPS 2020  Dec 2020
 - Agent57: Surpassing human performance on Atari Games, AI Journal Club  Oct 2020
 - Self-Supervision in Audio and Speech Workshop, ICML 2020  Jul 2020
 - Imagination and Curiosity in Reinforcement Learning, AI Journal Club  May 2020
 - Multi-Agent Reinforcement Learning, AI Journal Club  Feb 2020
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Media Coverage

- Alchera & Sierra Home Health Care Collaboration, TV Interview Apr 2022
 - Earthquake Detection using crowd-sourced data, Data Skeptic Podcast  Dec 2020
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Awards

- Undergraduate Final Year, Rank 2 2019
 - Winner of IEEE Technical Paper Presentation for the paper "Framework for low cost driver-assistance system" 2017
 - Undergraduate highest marks (rank 1) for courses - Machine Learning, Image Analysis, Operating Systems, Communication Skills, Advanced Internet Technology 2015-2019
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Mentoring

- Matthew Khoriaty, Undergraduate Researcher, NU Earth 2024
 - Samarth Shah, Machine Learning Intern, Alchera Labs 2022
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Service

- Reviewer, Geophysical Journal International 2024
- Reviewer, PeerJ Computer Science Journal 2022
- Council Member of Computer Society of India 2016-2017