Omkar Ranadive

omkar-ranadive.github.io
omkar.ranadive@u.northwestern.edu
Omkar-Ranadive · omkar-ranadive

Education

Northwestern University Evanston, Illinois
Master of Science in Computer Science, **GPA: 4.0/4.0** *Sep 2019 – Mar 2021*
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

K.J Somaiya College of Engineering Mumbai, India
Bachelor of Technology in Computer Engineering, **GPA: 8.99/10** *Aug 2015 – May 2019*
Coursework: Machine Learning, Neural Nets, Image Analysis, Artificial Intelligence, Data Structures, Algorithms, Operating System

Work Experience

Machine Medicine London, England
Machine Learning Engineer *Sep 2024 – Present*

- Developed a pipeline for chaining ML workflows on GCP using Metaflow, Kubernetes, and Argo Workflows.
- Built a Dash-based web app enabling users to upload videos, execute and analyze ML workflows on them, leveraging Firestore DB and GCP Buckets for data management.
- Developing a foundational deep learning model for neurological disorders.

NU Earth Evanston, Illinois
Research Specialist | Prof. Suzan Van Der Lee *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 San Diego, California
Applied Scientist *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 Evanston, Illinois
Researcher | Prof. Vicky Kalogera's Group *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 Evanston, Illinois
Graduate Research Assistant | Dr. Prem Seetharaman *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.

K.J Somaiya College of Engineering Mumbai, India
Research Intern | Prof. Grishma Sharma *Jan 2018 – Apr 2018*

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

Accelo Innovation Mumbai, India
Machine Learning Intern *Aug 2017 – Oct 2017*

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

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. S. van der Lee, M. Sita, V. Agaba, G. P. Babirye, **O. Ranadive**, and C. Ciardelli, "Estimating faulting mechanisms from single-seismometer body waves," in *AGU Fall Meeting Abstracts **(AGU)***, Dec. 2024.
2. A. M. Thomas, **O. Ranadive**, and S. van der Lee, "Characterizing seismic data in a noisy urban environment," in *AGU Fall Meeting Abstracts **(AGU)***, Dec. 2024.
3. 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.
4. 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.
5. 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.

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, Dash

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

DevOps: AWS, GCP, Kubernetes, Docker, Metaflow, Argo Workflows, Git, Jira, Confluence

Databases: PostgreSQL, MySQL, MongoDB, Firestore

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*

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*

Media Coverage

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

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*

Mentoring

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

Service

- Reviewer, Transactions on Machine Learning Research (TMLR) *2024 - Present*
- Reviewer, Geophysical Journal International *2024*
- Reviewer, PeerJ Computer Science Journal *2022*
- Council Member, Computer Society of India *2016-2017*