Nidhin Harilal

FOURTH-YEAR PHD STUDENT, CU BOULDER

✉ nidhin.harilal@colorado.edu | 🏠 cryptonymous9.github.io | 🎓 Google Scholar

Research Summary

I am a pre-final year PhD student and, my research interests lies on advancing self-supervised learning with an emphasis on robustness and explainability. My key prior works include exploring how diffusion guided synthetic images help in pre-training self-supervised learning (SSL) and developing techniques to avoid catastrophic forgetting in SSL models. Towards Explainable AI, I am exploring label-free influence functions for data attribution in SSL models. Alongside, I enjoy contributing to AI for Climate initiatives, where I'm developing self-supervised methods to enhance the spatiotemporal resolution of climate data.

Education

University of Colorado, Boulder *GPA - 4.0/4.0*
Ph.D & MS in CS advised by Dr. Claire Monteleoni *Aug. 2021 - May 2026 (Expected)*

Indian Institute of Technology Gandhinagar *GPA - 8.51/10*
B.Tech. (with Honours) in CSE | 🏆 Dean's List *July 2017 - July 2021*

Experiences

INRIA, Paris *May. 2024 - Aug. 2024*
Research Intern at AI for Climate Change and Environmental Sustainability (ARCHES) *Advisor: Dr. Claire Monteleoni*

University of Colorado, Boulder *Jan. 2022 - Present*
Research Assistant (Currently funded by NSF iHARP) *Advisor: Dr. Claire Monteleoni*

Northeastern University, Boston *Jul. 2020 - Dec. 2020*
Research Intern at Sustainability and Data Sciences (SDS) Lab *Advisor: Dr. Auroop R. Ganguly*

Indian Institute of Technology, Gandhinagar *May. 2019 - Dec. 2019*
Research Assistant at Machine Intelligence and Resilience (MIR) Lab *Advisor: Dr. Udit Bhatia*

Capgemini Technology Services, Ahmedabad *GJ, India*
Machine Learning Intern *Apr. 2019 - Jun. 2019*

Invited Talks

Aug. 2024	**Google DeepMind, Paris,** 'Spatiotemporal Representations: Translating Advances in Vision to Geospatial Datasets'
Feb. 2023	**AAAI: AI for Climate Science,** 'Semi-supervised spatiotemporal downscaling of climate projections'
July 2022	**Eastern European Machine Learning (EEML) Summer School,** 'Generating High-resolution Climate Change Projections'

Research Papers
* indicates equal contribution

PEER-REVIEWED

MixDiff: Mixing Natural and Synthetic Images for Robust Self-Supervised Representations (PDF ⬈)
Reza Akbarian*, <u>Nidhin Harilal</u>*, Claire Monteleoni and Maziar Raissi.
Accepted at *IEEE/CVF Winter Conference on Applications of Computer Vision* (WACV) 2025.

Influence Estimation for Self-Supervised Learning (PDF ⬈)
Reza Akbarian*, <u>Nidhin Harilal</u>*, Amit Rege*, and Claire Monteleoni.
In *NeurIPS 2024 - Self-supervised Learning: Theory and Practice*

Parameter Efficient Fine-tuning of Self-supervised ViTs without Catastrophic Forgetting (PDF ⬈)
Reza Akbarian*, <u>Nidhin Harilal</u>*, Claire Monteleoni, and Maziar Raissi.
In *Proceedings of the IEEE/CVF CVPR 2024 - Efficient Large Vision Models (eLVM)*

EnhancedSD: Downscaling Solar Irradiance from Climate Model Projections. (PDF ⬈)
Nidhin Harilal, B. M Hodge, Claire Monteleoni, and Aneesh Subramanian.
In *NeurIPS 2022 - Tackling Climate Change with Machine Learning (Climate Change AI)*

Image Caption Generator using Siamese Graph Convolutional Networks and LSTM. (PDF ⬈)
Athul Kumar, Aarchi Agrawal, KS Ashin Shanly, Sudip Das, and Nidhin Harilal
In *5th Joint International Conference on Data Science & Management of Data* (9th ACM IKDD CODS and 27th COMAD) 2022

HDRVideo-GAN: Deep Generative HDR Video Reconstruction. (PDF ⬈)
Mrinal Anand*, Nidhin Harilal*, Chandan Kumar*, and Shanmuganathan Raman
In *Proceedings of 12th Indian Conference on Computer Vision, Graphics and Image Processing* (ICVGIP) 2021

Augmented ConvLSTMs for Generating High-Resolution Climate Change Projections. (PDF ⬈)
Nidhin Harilal, Mayank Singh, Udit Bhatia
In *IEEE Access, Volume 9.* 2021

CARO: An Empathetic Chatbot for People with Major Depression. (PDF ⬈)
Nidhin Harilal, Rushil Shah, Saumitra Sharma, and Vedanta Bhutani
In *3rd Joint International Conference on Data Science & Management of Data* (7th ACM IKDD CoDS and 25th COMAD) 2020

Preprints/Manuscripts

Where Did Your Model Learn That? Label-free Influence for Self-supervised Learning
Nidhin Harilal*, Amit Kiran Rege*, Reza Akbarian, Maziar Raissi and Claire Monteleoni.
In submission to *CVPR* 2025.

STint: Self-supervised Temporal Interpolation for Geospatial Data (PDF ⬈)
Nidhin Harilal, B. M Hodge, Aneesh Subramanian and Claire Monteleoni.
ArXiv preprint *arXiv:2309.00059.* 2023. In submission to ECML.

Bayesian Deep Learning Hyperparameter Search for Robust Function Mapping to Polynomials with Noise. (PDF ⬈)
Nidhin Harilal, Udit Bhatia, and Auroop Ganguly
ArXiv preprint *arXiv:2106.12532.* 2021

Awards and Honors

Nov. 2024	**Bell Foundation Research Fellowship,** at CU Boulder.
Jul. 2024	**iHARP Polar Informatics Fellowship,** at CU Boulder.
Feb. 2022	**Early Career Professional Development Fellowship,** at CU Boulder.
Nov 2021	**Awtar and Teji Singh Graduate Fellowship,** at CU Boulder.
Nov. 2020	**Journal Publication Award,** at IIT Gandhinagar.
2018-19	**Dean's List for excellent academic performance,** at IIT Gandhinagar.
Aug. 2014	**National Winner for CBSE All India Science Exhibition,** at New Delhi.

Teaching & Services

Reviewer for prominent ML conferences such as WACV 2021, WACV 2022, NeurIPS 2023, NeurIPS 2024, ICLR 2025.

Teaching Assistant, CSCI 5622: Machine learning (Spring 2024) and CSCI 4622: Machine learning (Fall 2022) at CU Boulder.

Teaching Assistant, ES 654: ML (Spring 2021) and ES 102: Intro to computing (Fall 2020) at IIT Gandhinagar.

Mentor for Academic Discussion Hours (Fall 2019-20) at IIT Gandhinagar, assisting freshmen with academic workload challenges.

Organizer of *HackRush*, IIT Gandhinagar's annual intra-college hackathon (2018, '19, '20, '21).

Relevant Skills

Programming	[Extensive] Machine Learning (PyTorch, Tensorflow, JAX), Shell Scripting
	[Basic] C++, R, PySpark, Web (Django, Flask), HTML/CSS
Workflow	High-Performance Computing (Slurm), Cloud Platforms (GCP, AWS), Containerization (Docker)
Design	LaTeX, Vector graphics (InkScape), Adobe Suite (Illustrator, Lightroom)