Nidhin **Harilal**

Deep Learning · Computer Vision · Climate Science

(+1) 720-761-4063 | nidhin.harilal@colorado.edu | cryptonymous9.github.io | cryptonymous9 | nidhin-harilal

Education

University of Colorado, Boulder — *CO, USA*

Ph.D in Computer Science [CPI: 4.0/4.0] — *2021 - Present*

- Advised by Dr. Claire Monteleoni

Indian Institute of Technology Gandhinagar — *GJ, India*

B.Tech. (with Honours) in Computer Science and Engineering [CPI: 8.51/10] — *2017 - 2021*

- Degree of Honours: 20 additional credits on ML and data science-related courses

Publications

Peer-reviewed

5. **EnhancedSD: Predicting Solar Power Reanalysis from Climate Projections via Image Super-Resolution**
   Nidhin Harilal, B. M Hodge, Claire Monteleoni, and Aneesh Subramanian.
   To appear in *NeurIPS 2022 Workshop-Tackling Climate Change with Machine Learning* 2022.
4. **Image Caption Generator using Siamese Graph Convolutional Networks and LSTM**
   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.
3. **HDRVideo-GAN: Deep Generative HDR Video Reconstruction**
   Mrinal Anand*****, Nidhin Harilal*****, Chandan Kumar*****, and Shanmuganathan Raman
   In *Proceedings of 12th Indian Conference on Computer Vision, Graphics and Image Processing* (ICVGIP) 2021
2. **Augmented Convolutional LSTMs for Generation of High-Resolution Climate Change Projections**
   Nidhin Harilal, Mayank Singh, Udit Bhatia
   In *IEEE Access, Volume 9.* 2021
1. **CARO: An Empathetic Chatbot for People with Major Depression**
   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

2. **Effectiveness of the Recent Advances in Capsule Networks**
   Nidhin Harilal, and Rohan Patil
   ArXiv preprint *arXiv:2210.05834*. 2022
1. **Bayesian Deep Learning Hyperparameter Search for Robust Function Mapping to Polynomials with Noise**
   Nidhin Harilal, Udit Bhatia, and Auroop Ganguly
   ArXiv preprint *arXiv:2106.12532*. 2021

***** indicates equal contribution

Honors and Awards

2022 **Registration Grant,** NeurIPS'22
2022 **Selected,** Eastern European Machine Learning Summer School
2021 **Awardee,** Early Career Professional Development Fellowship ($1,000)
2021 **Awardee,** Awtar and Teji Singh Graduate Fellowship ($20,000)
2020 **Travel Grant,** CoDS-COMAD'20 (Hyderabad, India)
2018, '19 **Dean's List,** IIT Gandhinagar
2014 **National Winner,** CBSE All India Annual Science Exhibition

Experiences

University of Colorado, Boulder — *CO, USA*

Graduate Research Assistant (Climate Change Innovation Grants'21) — *Jan. 2022 - Present*

- Developing a deep learning-based framework for spatio-temporal downscaling (a combination of super-resolution and bias correction) to map coarse-scale climate model outputs to fine-scale reanalysis data using space-time super-resolution networks.
- Currently studying the potential of convolution based video interpolation methods on climate model outputs.
- A part of the work to be presented at *NeurIPS'22 Tackling Climate Change Workshop*

Northeastern University, Boston — *MA, USA*

Research Intern (Mentor: Dr. Auroop R. Ganguly) — *Jul. 2020 - Dec. 2020*

- Analysed performance vs complexity trade-offs of Monte-Carlo (MC) dropout bayesian neural networks on varying depth, width and ensembles with a focus on noisy polynomials with varying degrees.
- Devised a loss-landscape based approach for utilizing multiple configurations at once to study optimality in terms of model performance and efficiency in extracting signals from different noisy samples.
- Preprint of the work available here: `arxiv.org/abs/2106.12532`

Indian Institute of Technology, Gandhinagar — *GJ, India*

Summer Research Intern (Mentor: Dr. Udit Bhatia) — *May. 2019 - Jul. 2019*

- Critiqued & found several problems including *Concept Drift* with current machine learning approaches towards statistical downscaling.
- Designed a ConvLSTM based recurrent network which utilized multiple covariates at once with the climate outputs for a reliable downscaling.
- Work published at *IEEE Access, Volume 9*

Capgemini Technology Services, Ahmedabad — *GJ, India*

Project Intern — *Apr. 2019 - Jun. 2019*

- Tuned the *FaceNet* architecture for face recognition on Capgemini employees with the constraint of "one sample per person".
- Developed a Flask-based web-app which takes live video input, showed recognized employee faces and send updates to Firebase.

Key Research Projects

Accelerating Large Network Data Analytics using Graph Neural Networks (GNNs) — *CU Boulder*

CSCI 6502: Big Data Analytics (Course Project) — *2022*

- Investigated the effectiveness of GNNs on approximating various network centrality measures like degree, closeness and betweeness centrality.
- Designed and tested convolutional GNNs on synthetically generated networks dataset consisting ER, BA and Gaussian partition graphs.
- Project repository: Github; Manuscript can be found here.

HDR video reconstrution from LDR sequences with alternating exposures — *IIT Gandhinagar*

Mentor: Dr. Shanmuganathan Raman — *2020*

- Developed a Generative Adversarial Network (GAN) framework for mapping Low-dynamic-range (LDR) videos to High-Dynamic-Range (HDR).
- Designed network utilized a self-supervised network for noise correction, optical-flow module to produce temporally consistent video frames.
- Work has been published at ICVGIP'21

CARO: An Empathetic Chatbot for People with Major Depression — *IIT Gandhinagar*

Mentor: Dr. Mayank Singh — *2019*

- Developed CARO: an attempt to tackle problems like monotonic responses and lacking of medical advice with the current counselling chatbots.
- Designed network can generate empathetic responses with medical advice when needed, making it a counselling chatbot with medical benefits.
- Work has been published at 7th ACM IKDD CoDS and 25th COMAD

Professional service

Teaching

University of Colorado, Boulder — *CO, USA*

Teaching Assistant, Department of Computer Science — *2021-22*

- Course - *CSCI 4460: Machine Learning*

Indian Institute of Technology, Gandhinagar — *GJ, India*

Teaching Assistant, Department of Computer Science & Engineering — *2019-21*

- Course - *ES 654: Machine Learning*
- Course - *ES 102: Introduction to Computing*

Program Committees

2021-22 **Reviewer,** Winter Conference on Applications of Computer Vision (WACV)

2019-21 **Academic Coordinator,** IIT Gandhinagar Students' Council

2017-21 **Event Planner and Problem Setter,** HackRush: IITGN's annual intra-college hackathon

Skills

ML Frameworks	PyTorch, Keras, Tensorflow
Programming	Python, R, C++
Full Stack Development	Flask, Django, Jinja