Rohit **AGARWAL**

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Interests

Scalable AI Models, Online Learning, Varying Feature Space, Time Series, Large Language Models

Skills

- Python, R, C++, LaTeX
- Docker, Azure, Linux, VS Code
- PyTorch, Keras, Tensorflow, Sklearn, Pandas, Matplotlib
- Communication, Team Collaboration, Management

Awards

Visiting researcher grant for 3 months stay at NUS, Singapore, 2023

Merit Cum Means scholarship awarded by IIT (ISM), 2017, 18 & 19

Director scholarship for excellence in academics, 2017 & 18

Science Academies' Summer Research Fellowship, 2018

Achievements

Runner-up, Digital Life Norway mini-MBA. | Certificate 15-19 Apr 2024

Gold Medalist, Maths Department, IIT (ISM) Dhanbad, 2015-20

All India Rank 5017, IIT JEE Advance among 150k+ candidates, 2015

International Rank 23 and 19 in Level 1 and 2 of the International Olympiad of Mathematics, 2014

Office Bearer

Board Member, Digital Life Norway - Junior Research Group, 2023-Present

Board Member, Tromsøstudentenes Idrettslag Volleyball, 2022-23.

General Sports Secretary, IIT (ISM) Dhanbad, 2018-19.

Other Interests

Sports: Volleyball, Cricket, Hiking, Badminton, Running, Cycling

Others: Leadership, Management, Finance, Cooking, Reading

Languages: English, Nepali, Bengali, Norwegian (beginner), Hindi (native)

Education

Doctor of Philosophy in Artificial Intelligence June (2021–2025)
UiT The Arctic University of Norway, Tromsø
◇ Thesis Title: Scalable AI for modeling complex dynamic systems.
◇ Developing machine learning architectures and concepts to model varying feature space in online learning.

Integrated Master in Mathematics and Computing June (2015–2020)
IIT (ISM), Dhanbad | Degree | *Gold Medalist* GPA: 9.49/10
◇ Thesis Title: Deep Learning for Streaming Classification.
◇ Proposed a deep learning model based on the hedge algorithm and online gradient descent to model dimension-varying inputs in online learning.
◇ Keywords: Python, Tensorflow, Keras, Multi-Layer Perceptron (MLP)

Work Experience

Visiting Researcher, *NUS*, Singapore. May–August 2023
◇ Performed in-depth analysis of haphazard inputs. Implemented all the non-open-sourced models and established datasets and models taxonomy.
◇ Keywords: Python, PyTorch, TDigest, Numpy, Sklearn.

Software Engineer, *Adobe*, Bangalore, India. Aug 2020–May 2021
◇ Part of the internal cloud operations team of Adobe, dealing with deploying various applications and day-to-day operations.
◇ Keywords: Kubernetes, AWS, Azure, Puppet, Terraform, Ansible, Chef, CI/CD.

Research Intern, *UiT*, Tromsø, Norway. | Certificate Feb–July 2020
◇ Developed a scalable architecture for streaming classification tasks.
◇ Developed a pipeline for simulating mitochondria and their motion.
◇ Keywords: Python, Keras, Tensorflow, MLP, Homographic Transformation.

Intern, *Adobe*, Bangalore, India. | Certificate May–July 2019
◇ Cloud storage prediction of enterprises and individual customers of Adobe.
◇ Keywords: Python, Keras, Tensorflow, ARIMA, LSTM, Encoder Decoder.

Research Intern, *NIBMG*, Kalyani, India. | Certificate May–July 2018
◇ Predicting the SNPs associated with a disease by analyzing their characteristics using classical machine learning methods. Report with Code
◇ Keywords: R, Glm, Rpart, Regression, CART, Fisher's Exact Test.

Activities

Co-Supervisor, Master Student 2022-2023
◇ Aaron Celeste, Department of Computer Science, UiT Tromsø | Link

Teaching Assistant, Department of Computer Science, UiT Tromsø
◇ Cloud and Big Data Technology Fall (2021, 22, 23, 24)
◇ Artificial Intelligence, AI - Methods and Applications Spring (2023, 24)

Reviewer: ICASSP 2024, ICDEC 2023, Nordic Machine Intelligence 2023.

Program Committee: ICONIP 2023.

Public Dissemination

Talk, Large Language Model Workshop, Tromsø 28th Oct 2023
◇ Title: In-context Learning, Fine-tuning and RLHF in LLMs (Link)

Blogs: (1) Challenges of early career researchers (Link); (2) Why PhD: Self-contemplation (Link)

Videos: MABNet; Auxiliary Network

Publications

Total - 13 | Journal - 3 | Conference - 4 | Under Review - 4 | Arxiv - 2

packetLSTM: Dynamic LSTM Framework for Streaming Data with Varying Feature Space
◇ Authors: **R Agarwal**, P Naidu, K Agarwal, A Horsch, D Prasad — Under Review (NeurIPS)
◇ Introduced a scalable recurrent neural network model capable of adapting to a varying feature space in an online learning setting and effectively mitigating catastrophic forgetting.
◇ Keywords: Python, PyTorch, RNN, LSTM, GRU, Varying Feature Space, Online Learning

Online Learning under Haphazard Input Conditions: A Comprehensive Review and Analysis
◇ Authors: **R Agarwal**, A Das, A Horsch, K Agarwal, D Prasad — Under Review (TPAMI) | Code
◇ Comprehensive models and dataset categorization, accompanied by extensive benchmarking and promoting open-source resources.
◇ Keywords: Python, Pytorch, Varying Feature Space, Numpy, Sklearn, Classical ML Models, Neural Networks

Modelling Irregularly Sampled Time Series Without Imputation
◇ Authors: **R Agarwal**, A Sinha, D Prasad, M Clausel, A Horsch, M Constant, X Coubez — Under Review (IEEE TNNLS) | Code
◇ Introduced a novel LSTM-based network coupled with a simple switch approach to handle irregularly sampled time series without imputation.
◇ Keywords: Python, PyTorch, LSTM, Time Series, Missing Data

An UltraMNIST classification benchmark to train CNNs for very large images
◇ Authors: D Gupta, U Bamba, A Thakur, A Gupta, **R Agarwal**, et. al. — Under Review (Scientific Data, Nature)
◇ Presented an UltraMNIST dataset, comprising 56,000 large images with a resolution of 4000 × 4000 resolution for propelling the development of CNNs for large scientific images. Additionally, benchmarked current CNN models on the UltraMNIST dataset.
◇ Keywords: Python, PyTorch, Computer Vision, CNN, FasterRCNN, ResNet

Aux-Drop: Handling Haphazard Inputs in Online Learning Using Auxiliary Dropouts
◇ Authors: **R Agarwal**, D Gupta, A Horsch, DK Prasad — Journal | Code | TMLR 2023
◇ Proposed a novel concept that imparts scalability to any online deep learning architectures, enabling them to handle dimension-varying input streams in an online learning setting.
◇ Keywords: Python, PyTorch, Online Learning, Varying Feature Space, Multilayer Perceptron

MABNet: Master Assistant Buddy Network with Hybrid Learning for Image Retrieval
◇ Authors: **R Agarwal**, G Das, S Aggarwal, A Horsch, D Prasad — Conference | Code | ICASSP 2023
◇ Introduced a hybrid learning network comprising two blocks, where one operates under supervised learning and the other under self-supervised learning, improving the decision boundary.
◇ Keywords: Python, PyTorch, Computer Vision, ViT, ResNet, Supervised Learning, Self-Supervised Learning

SegPC-2021: A challenge & dataset on segmentation of Multiple Myeloma plasma cells from microscopic images
◇ Authors: A Gupta, ..., **R Agarwal**, et. al. — Journal | Code | MIA 2023
◇ Proposed a transformer-assisted convolution network for cell instance segmentation on the SegPC dataset challenge and achieved the third-best result.
◇ Keywords: Python, PyTorch, Instance Segmentation, Computer Vision

Auxiliary Network: Scalable and Agile Online Learning for Dynamic System with Inconsistently Available Inputs
◇ Authors: **R Agarwal**, K Agarwal, A Horsch, D Prasad — Conference | Code | ICONIP 2022
◇ Proposed a neural network architecture designed to dynamically scale according to the dimension variations in the input feature space at any given time instance.
◇ Keywords: Python, PyTorch, Online Learning, Dimension Varying Inputs, Multilayer Perceptron

DSC-IIT ISM at WNUT-2020 Task 2: Detection of COVID-19 informative tweets using RoBERTa
◇ Authors: S Laxmi, **R Agarwal**, A Sinha — Conference | Code | WNUT, ACL 2020
◇ Employed a RoBERTa model to classify tweets related to COVID-19 as informative or uninformative. This model was compared with various conventional and transformer-based models.
◇ Keywords: Python, PyTorch, RoBERTa, BERT, Natural Language Processing

C-Net: Contextual Network for Sarcasm Detection
◇ Authors: A Jena, A Sinha, **R Agarwal** — Conference | Code | FIGLANG, ACL 2020
◇ Proposed a BERT-based architecture to sequentially model context and response sentences, thereby generating probabilities of sarcasm. These probabilities were subsequently fused using exponential smoothing to produce the final prediction.
◇ Keywords: Python, PyTorch, BERT, Exponential Smoothing, Natural Language Processing

Mentioning 10 publications here. For the rest, see google scholar.