Aakash Agarwal

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Education

- **University of Pennsylvania, United States** *May 2025*
  Masters of Science in Electrical and Systems Engineering CGPA: 4.0/4.0
- **International Institute of Information Technology, India** *June 2023*
  Bachelors of Technology in Electronics and Communication Engineering CGPA: 9.15/10

Technical Skills

Programming Languages: Python, SQL, MATLAB, Java, C++, C
Frameworks and Tools: Pytorch, Tensorflow, Pandas, Stable-Baselines, Numpy, Scipy, Sk-learn, Data Visualisation and Analysis, EDA, Machine Learning, Object Oriented Programming, Convex Optimization, Jupyter Notebook, Deep Learning, Github, Amazon AWS

Experience

- **Linköping University** *Jan 2023 - June 2023*
  Research Intern - Prof. Zheng Chen Linköping, Sweden
  – Developed a novel broadcast method based on random activation of network nodes for solving decentralized stochastic gradient descent algorithm.
  – Implemented the algorithm and compared different quantization techniques for compressed communication.
- **York University** *May 2022 - August 2022*
  MITACS Globalink Research Intern- Prof. Ping Wang, Presented in ICCC, China Toronto, Canada
  – Developed an efficient caching policy using Proximal Policy Optimization (PPO) in an IoT Network based scenario, which helps meet the standard quality of service requirement while bypassing the limitations of the IoT network
  – Increased the caching efficiency of the edge node by over 50% compared to currently used LRU and LFU methods
- **ITU- AI for Good Hackathon** *August 2021 - December 2021*
  Summer Research - Prof. Rajarshi Mahapatra, published in ITU-JFET Raipur, India
  – Built a hardware efficient neural network model for modulation classification in communication systems.
  – Proposed novel Deep Learning architecture using multiple blocks of convolutional and RNN layers
  – Achieved over 99% compression in the model complexity by implementing iterative pruning and low quantization based training methodology.

Personal Projects

- **End-to-End Uber Ride Fare Price Prediction System with CI/CD Pipeline** *Jan '24 - May '24*
  Python, scikit-learn, Amazon AWS, Github actions
  – Developed and deployed an end-to-end machine learning pipeline for predicting Uber fares, including data ingestion, transformation, model training and prediction.
  – Implemented and evaluated multiple regression algorithms to find the best-performing model and used hyper-parameters tuning techniques like grid search and cross-validation to improve model performance and generalization.
  – Implemented a Continuous Integration/Continuous Deployment (CI/CD) pipeline using GitHub Actions for automating the build, testing, and deployment processes on Amazon Elastic Container Registry (ECR) and used Amazon Elastic Compute Cloud (EC2) instance, for hosting of the ML model.
- **Eye Tumour Classification Application using Deep Neural Networks** *May '22 - May '22*
  Python, Tensorflow, Tensorflow-lite, Android
  – **Computer Vision Phase**
  – Implemented EfficientNet v2 architecture on the New York Eye Cancer Center database for image classification to achieve accuracy over 97%.
  – Several data augmentation techniques (shearing, zooming, flipping, scaling, rotation, etc) were used for robust learning.
  – **Mobile Application Phase**
  – For deployment on edge device the model is quantized to 8 bits of precision to achieve 3x lower latency.
  – Tensorflow-lite is used to convert the model into edge device suitable and is then integrated in an android application.
  – Accuracy achieved on the mobile application is 96% which is due to loss in the computational complexity.
- **Real-Time Fault Diagnosis and Prognostics in ECG Sensor Data | Published in IEEE** *Aug' 21 - Nov '21*
  Python, scikit-learn, RaspberryPI
  – I implemented a real-time ault detection and prognostic system for ECG sensor.
  – Explored and compared different machine learning algorithms for the detection of faults. These algorithms included, KNN, SVM, Decision Tree and Naive Bayes. Statistical time domain features were used.
  – Achieved an accuracy of over 95% for the real time fault detection and an RMSE value of 0.02 for fault prognosis.

Other Publications

- F. Nikia, P. Wang, **A. Agarwal**, Z. Wang, R., Adib, "Edge Caching Based on Deep Reinforcement Learning and Transfer Learning", IEEE Internet of Things Journal. [Submitted]
- **A. Agarwal**, D. Das, "mDLSpiro: Hardware Efficient Deep Learning based Mobile Spirometry", INDISCON '22 IEEE India Council International Sub-Sections Conference.
- S. Alluri, **A. Agarwal**, A. Varshney, D. Das, "AStERisk*:Automatic Mental Stress Detection based on Electrocardiogram for Real-Time Heart Risk Prediction using 1-D CNN", ICML workshop on "Computer Approaches to Mental Health", 2021 [Presented]