ASHWINI MURALIDHARAN

https://ashwiinii.github.io/ | linkedin.com/in/ashwini-muralidharan/ | amurali5@ncsu.edu | +1(669) 278-8612

SUMMARY

A graduate from North Carolina State University actively pursuing full-time opportunities as a **Data Scientist/Machine Learning Engineer**. Proficient in **Python, R, SQL**, and skilled in frameworks like **Scikit-learn, TensorFlow, Keras, PyTorch, PySpark, OpenCV etc**. Specialized in **Computational Intelligence**, and adept at applying sophisticated data analytics and machine learning algorithms across any domain.

EDUCATION

North Carolina State University   *Raleigh, NC, United States*
Masters in Electrical Engineering: GPA: 3.83/4.0   *Aug 2022 - May 2024*
Academic Achievements: Recipient of the **Graduate Student Support Plan (GSSP)**, a highly competitive support package providing standard tuition coverage for one semester, in recognition of academic excellence.
Relevant Coursework: Neural Networks, Topics in Data Science, Automated Learning and Data Analysis, Digital Imaging Systems, Internet Protocols, Cloud Computing, Computer Vision

SKILLS

- **Languages:** Python, SQL, Matlab, C++, SQL, Tableau, R
- **Frameworks and Platforms:** PyTorch, TensorFlow, Keras, Scikit-learn, Numpy, Pandas, OpenCV, AWS, Docker, Kubernetes

WORK EXPERIENCE

Department of Electrical and Computer Engineering   *North Carolina State University, Raleigh, USA*
Natural Language Processing Engineer   *Jun 2024 - Present*
- **Skills: Natural Language Processing | Retrieval-Augmented Generation (RAG) | Python3 | PyTorch**
- Presently engaged in engineering a **Retrieval-Augmented Generation (RAG)** system using **large language models (LLMs)** to perform **semantic analysis of application resumes**, accurately extracting and summarizing key achievements of applicants with the ECE department at NCSU.
- Executing extensive **data preprocessing and annotation pipelines**, leveraging natural language processing techniques to prepare training datasets.

The Vazquez Research Group   *North Carolina State University, Raleigh, USA*
Biomedical Deep Learning Engineer   *Jun 2023 - Dec 2023*
- **Skills: Biomedical Signal Processing | Deep Learning | Time-series data | PyTorch | Transformers | LSTM | SciPy**
- Developed and integrated **biomedical signal processing pipeline** for cuff-less blood pressure estimation using **ECG signals**. Implemented **filtering, segmentation, hand-crafted feature extraction, data augmentation.** Developed Deep Learning algorithms using LSTMs and Transformer technologies to automate blood pressure estimation for deployment on mobile edge-devices to facilitate real-time prediction.

Native Nibbles   *Bengaluru, India*
Data Science Intern - Predictive Analytics   *May 2021 - Jul 2022*
- **Skills: Data Analytics | Customer Analytics | Python Developer | SQL | Database Management | pandas | scikit-learn**
- Conducted data extraction from various sources, performing comprehensive **cleaning, transformation, and aggregation** of customer and sales data for savories and snacks. Designed a **clustering-based approach using DBSCAN** to decompose the customer behavior prediction task, developing tailored models for each cluster that improved prediction accuracy and processing speed for large datasets.
- Developed and optimized a **COWRF (COA-optimized Weighted Random Forest)** model, achieving a *39.17% increase in processing speed* and a *97.2% accuracy rate*, marking a *4.7% improvement over previous models* to evaluate the impact of promotional activities for snacks and savories, enhancing marketing strategy effectiveness for the products.

Biomedical Engineering Department   *SSN College of Engineering, Chennai, India*
Machine Learning Engineer - Undergraduate Research Assistant   *Jul 2021 – Dec 2021*
- **Skills: Biomedical Signal Processing | Machine Learning | Python3 | Healthcare | PyTorch | SciPy**
- Developed and deployed a **neonatal seizure detection** system using a scalable **ProtoNN**-based machine learning architecture. Achieved *87%* sensitivity and a *243.92 ms* inference time with a model size of *4.84 KB*, enabling rapid and accurate detection on *ultra-edge devices*.
- Presented the research outcomes titled **"Scalable Machine Learning Architecture for Neonatal Seizure Detection on Ultra-Edge Devices"** at the Second International Conference on Artificial Intelligence and Signal Processing (AISP 2022), in collaboration with IEEE. [code-link][paper-link]

SELECTED PROJECTS

Real-time Stress Classification using Deep Learning [code-link]
Biomedical Signal Processing | Deep Learning | Python3 | Healthcare | PyTorch | SciPy
- Developed a **real-time stress monitoring system** for drivers using *VGGNet architecture*, that classifies ECG signals collected real-time from a sensor. The **signal processing, feature extraction, training and testing of the *VGGNet architecture*** were personally carried out by me, resulting in an *82.45% training accuracy*.
- Implemented a system that integrates a real-time ECG sensor with a **Jetson Nano** for inference using the trained *VGGNet architecture* with the results being conveyed through a user-friendly Flask application in real-time.

Self-supervised Image Classification [code-link]
Image Processing | Self-supervised Learning | Python3 | PyTorch
- Developed a **self-supervised *SimCLR model*** using PyTorch Lightning, employing a *ResNet-18 encoder* and a two-layer *MLP projection head*. Implemented advanced data augmentation and adjusted color jitter parameters to enhance training stability and speed on the STL10 dataset.
- Achieved a *92.06% test accuracy* by optimizing with **cosine annealing, SGD, and InfoNCE loss**. Implemented Logistic Regression on feature representations learned from SimCLR on the CIFAR10 dataset to demonstrate robust transferability of learned representations, with a 81% accuracy.

AWS Chatbot [code-link]
AWS Chatbot | Cloud Computing | Deep Learning | Flan-UL2 | Kubernetes
- Architected a cloud-based chatbot using *Flan-UL2* model for real-time, automated customer support, ensuring 24/7 availability, high scalability, and security, and reducing operational costs.
- Implemented and managed an **AWS Elastic Kubernetes Service (EKS)** cluster to support a scalable, high-performance chatbot infrastructure, handling elastic scaling from 4 to 20 pods to maintain seamless user interactions and optimal resource utilization.