

HARSH BENAHALKAR

hb2776@columbia.edu • (347) 421-4084 • linkedin/in/harsh-benahalkar • github.com/benahalkar

EDUCATION

Columbia University

New York, NY

M.S in Electrical Engineering with GPA: 4.0/4.0

Expected Dec 2024

Courses: Statistical Machine Learning, Applied Machine Learning, Neural Networks and Deep Learning, Deep Learning on the Edge, Natural Language Processing, Big Data Analytics, Large Scale Stream Processing.

Dwarkadas J. Sanghvi College of Engineering - DJSCOE

Mumbai, India

B.E. in Electronics and Telecommunication Engineering with GPA: 9.13/10.0

Aug 2017 - May 2021

Courses: Neural Networks and Fuzzy Logic, Databases, Image Processing, Machine Vision, and Signal Processing.

SKILLS

Languages: Python, R, Linux, Spark, CUDA, C#, C++, C, Bash, Java, MATLAB, NodeJS, Node-Red.

Frameworks: TensorFlow, Keras, PyTorch, SQL Airflow, Hadoop, OpenCV, D3, scikit-learn, Numpy, pandas, Flask.

Tools: Google Cloud Platform, AWS, Git, Hugging Face, Modelshare AI, Solidworks, Altium, Eagle, Arduino.

Systems: MQTT, FTP, OPC-UA, Network IP (IPv4/IPv6), ATMEL, ESP32, STM32, LPC, Orange-Pi, Raspberry-Pi.

PROJECTS

Merchant Recommendation: Columbia University – Applied Machine Learning

Oct 2023 - Dec 2023

- Implemented a scikit-based machine learning pipeline to aggregate merchant and customer purchases datasets. The pipeline analyzed historical and current credit card transactions, along with merchant information to recommend personalized offers.
- Leveraged Boruta, RFE, and RFA algorithms to perform feature selection. Evaluated models included XGBoost, LightGBM, and Linear regressor. XGBoost was concluded as the best-performing model with an error of 3.63.

MLP-mixer: Columbia University - Neural Networks and Deep Learning

Oct 2023 - Dec 2023

- Recreated the paper “MLP-Mixer: An all-MLP Architecture for Vision” using Tensorflow, to perform Image Classification on ImageNet and utilize MLPs to achieve accuracies comparable to pre-trained CNNs such as ViT and VGG16.
- Achieved an accuracy of 45.43% using MLP mixer while the accuracies of ViT and VGG16 were 50.53% and 40.36% respectively.

Flight Data Analytics: Columbia University - Big Data Analytics

Oct 2023 - Dec 2023

- Designed a PySpark ETL pipeline to collect and compute 15 flight parameters from live streaming aviationstack API and historical FlightRadar24 API data sources, integrated with weather data sources to quantify weather conditions on 1000+ flight points.
- Hosted application and Plotly user interface on Google Cloud Platform, with real-time visualization on an interactive world map. Used Airflow and cloud to facilitate regular updates of flight data at 6-hour intervals.

Student Performance Evaluation: Columbia University - Statistical Machine Learning

Oct 2023 - Dec 2023

- Developed an R application to perform exploratory data analysis and feature engineering on a Student Performance dataset with 22 features and 70k data points, and to perform prediction and compare model efficacies.
- Evaluated SVM, Naive Bayes, Decision Tree, K-means, Neural Network, XGBoost, Random Forest, and Linear regressor models to achieve accuracy of 93%.

Formula SAE (FSAE) DJS Racing Electric Team: DJSCOE

Apr 2018 - May 2021

- Spearheaded Data Acquisition systems as department lead, updating C-language signal algorithms on self-designed STM32 CAN boards, and improved data integrity and transmission speed by 32%. Team's reliance on expensive OEM modules was thus eliminated.
- Competed at national-level competition Formula Bharat with a competition pool of 67 teams, in January 2020, and was awarded for creating the most cost-and-manufacturing efficient race car.

WORK EXPERIENCE

Advanced Control Data Machines

Mumbai, India

Embedded Linux Software Developer

Jun 2021 - April 2023

- Deployed 7 HMI Industrial-IoT devices with computer vision software with a USB camera, for a cake manufacturer. Utilized Python-OpenCV, K-means clustering, Tkinter, and V4L2 protocol, to distinguish between 15 pastry flavors.
- Played a key role in conceptualizing and writing a bash-language program to automate the software, hardware, and network setup of all company-wide Linux devices, reducing production time from 3 hours to just 22 minutes.
- Engineered a TCP-IP web UI application using Noded-JS and SQL, for a pneumatic glove integrity test system to monitor 3 4-20mA GPIO and 1 CAN RFID signal data. Generated output states with 97% accuracy, and individual certificates for each test.
- Trained 6 new joiners of the startup, and equipped them with company stack expertise, especially Python, Linux, and hardware.
- Created and tested hardware for 4G modem, super-capacitor brownout, SMPS, MODBUS, and analog circuits using test bench setup.

Taxir Aviation

Mumbai, India

Electronic and Mechanical Intern

April 2021 - June 2021

- Remodeled the C++ code of a MEMS-accelerometer sensor to detect drone free-falls and deploy parachutes via servo.
- Performed PCB design, validation, and soldering for the company's prototype to deploy the entire hardware in a confined space.