Arush

Senior Undergraduate
Major: Civil Engineering **Minor**: Industrial and Management Engineering

aarush@iitk.ac.in | +91-7393060602
Arush0113 | arush-74b7511a0

Academic Qualifications

Year	Degree/Certificate	Institute	CPI/%
2019 - Present	B.Tech	Indian Institute of Technology, Kanpur	7.6/10
2019	CBSE(XII)	OPS Vidya Mandir, Karnal	91.4%
2017	CBSE(X)	St. Michael's High School, Patna	10/10

Scholastic Achievements

- Secured **All India Rank 3753** in **JEE Advanced 2019** among the 0.25 million shortlisted candidates
- Secured **All India Rank 4188** in **JEE Mains 2019** among the 1.2 million applicants

Work Experience

- **R&D Intern** | **Siemens Technology and Services, Bangalore** (*May'22 - Jul'22*)
  (Received a Letter of Recommendation from the Mentor for Outstanding Performance during the Summer Internship)
  - Effectuated **Anomaly Detection** and **Identification** using multiple statistical and deep learning methods on **machine** and **plant-based** data
  - Implemented **model-based** and **state-space based PCA** and used **Hotelling's T-squared statistic** for Novelty Detection and Diagnosis
  - Used contribution plots for Fault Identification and **Maximum Likelihood Classification** for calculating score discriminants during **fault diagnosis**
  - Developed **DSVDD** and **DSPSVDD** (Autoencoder-based) models. The optimization consisted of minimizing the hypersphere radius and weight decay in DSVDD with reconstruction errors component added in case of DSPSVDD
  - Built a dynamic Data-based application using the Python **Streamlit** package for a live demo presentation, running on localhost server
  - Achieved average precision scores of **0.909**, **0.910** and **0.924** and average recall scores of **0.953**, **0.842** and **0.954** for DSVDD, DSPSVDD and PCA respectively for the 8 fault cases in machine-based data. Attained average lag values of **less than 1** for the various **step-fault** cases present
- **EEG Pipeline** | **Research Internship** | **PARIMAL Lab, IIT Roorkee** (*May'21 - Dec'21*)
  - Analyzed the **EEG signals** from young and old adults based on the rest and auditory cued reaction time tasks
  - Applied **ICA** and **Signal-Space Projections** for removing the unwanted **ECG** and **EOG** artifacts, and **PCA** for dimensionality reduction
  - Developed customized models using **Keras** package to classify the EEG signals based on reaction time, go/no-go and passive tasks
  - Used **MNE-Python** library to work with **BIDS** files for processing, visualising and interpreting the different Neurological signals received

Key Projects

- **Video Based Vehicle Accident detection** | **Course Project, CE784A** | **Mentor: Prof. Pranamesh Chakraborty** (*Jan'22 - Apr'22*)
  - Built various pipelines for traffic anomaly detection on US streets and highways data and evaluated their performance on Indian conditions
  - Used **YOLOv3 model** (pre-trained on COCO dataset) to minimize the time taken due to training during object detection purposes
  - Implemented **Nearest Neighbor** approach for removing the misclassified bounding boxes and **K-means clustering** in amalgamation with the **Road Segmentation Maps** to localize the potential hotspots where an anomaly may have occurred
- **Education Demographics in US Post-Secondary Institutions** | **Course Project, HSO201A** | **Mentor: Prof. S.K. Mathur** (*Jan'21 - May'21*)
  - Analyzed the various enrolment trends in the Post-Secondary institutions of United States using various **deep learning** methodologies
  - Used **Keras Functional API** to create **Stacked Bidirectional RNN** and **LSTM** architectures for forecasting future enrolment trends
  - Implemented **Sliding Windows Algorithm** to feed the input data into our model for predicting the different trends on an annual basis
- **Transportation Mode detection** | **Course project, CE784A** | **Prof. Pranamesh Chakraborty** (*Feb'22*)
  - Forecasted **mode of transportation** on **accelerometer data** having 56 lakh+ rows by training various shallow Machine Learning models
  - Employed **time window partitioning** on the unique sequences and extracted features keeping window length of 5 seconds
- **Artificial Neural Networks** | **Programming Club** | **IIT Kanpur** (*May'20 - Jul'20*)
  - Implemented several state-of-the-art algorithms of Deep Learning and worked on different kinds of **Neural Networks** further using them for **NLP** tasks such as **Sentiment Analysis** and **Language Translation** and **Computer Vision** tasks like **Image Classification** and **Object Detection**
  - Effectuated algorithms like **Sliding Windows Detection** and **YOLO** for tasks like **Object Detection** & **Localization**, **Style Transfer** etc
  - Used important Python libraries like **Pytorch** and **Tensorflow** to create several Neural Network architectures like **CNNs**, **RNNs** and **LSTMs**
- **ML Kaggle** | **Programming Club** | **IIT Kanpur** (*May'20 - Jul'20*)
  - Developed multiple ML algorithms for forecasting sales and house prices, and created a **Person of Interest Identifier** for **Enron Scandal** data
  - Performed several **Data Analysis** and **Visualization** tasks using **Pandas**, **Numpy** and **Matplotlib**. Used **regexes** for extracting text patterns

Positions of Responsibility

- **Project Mentor** | **Society of Civil Engineering** | **IIT Kanpur** (*Jun'22 - Jul'22*)
  - Mentored **25** students for a **6-week** long project titled '**Computer Vision applications in Transportation Engineering**'
  - Taught basics of **Computer Vision** and **OpenCV** for image and video processing applications in areas of transportation and civil engineering
  - Designed multiple tasks and organized doubt sessions for helping the students apply their concepts to real-world problems in form of assignments
- **Secretary** | **Startup Development, Entrepreneurship Cell** | **IIT Kanpur** (*May'20 - Apr'21*)
  - Successfully organized the Edition of Entrepreneurial Extravaganza, **India's biggest virtual entrepreneurial event**, involving **1.5 lacs+** participants
  - Revamped the Entrepreneurial Lecture Series, **Startup101** to a year-long series of sessions by renowned Entrepreneurs present worldwide
  - Organized the **1st** edition of month long **National Entrepreneurial Bootcamp**, with participation of over **500** enthusiasts from all over India

Technical Skills

Programming Languages: C, C++, Python, Dart	**Deep Learning:** Tensorflow, PyTorch, sklearn, OpenCV
Data Analytics: Numpy, Pandas, Matplotlib, Seaborn, regex	**Tools:** Github, Visual Studio, Anaconda Navigator, Jupyter

Relevant Courses

**ongoing*

Fundamentals of Computing	Financial Econometrics	Introduction to Data Science in Python
Introduction to Electronics	Introduction to Economics	Advanced Statistics for Business Analysis*
Probability and Statistics	Machine Learning, Coursera	Customising Models with Tensorflow 2