

MOHIT AGARWALA

Education

Year	Degree	Institute	GPA(10)/Marks(%)
2022	M.Tech in Communication & Signal Processing	IIT Bombay	8.34
2018	B.Tech in Electronics & Communication	Heritage Institute of Technology, Kolkata	7.85
2014	Senior School	DAV Public School, Midnapur	86.80%
2012	High School	Splendour High School, Kharagpur	89.28%

Areas of Interest

Machine Learning, Optimization, Data Science, Deep Learning in Image & Speech Processing

Research Experience

- Jan 2022–
Ongoing **Dailizing & clustering of Non-daily Trains using Machine Learning**, INDIAN RAILWAYS.
Developed algorithm for optimized weekly scheduling of trains in GQD network using unsupervised methods
- Resolved train reversals and misdirection classifications from the SATSANG data
 - Clustering & visualization of trains in GQD using representation learning methods e.g, t-SNE, PCA
 - Identified under-utilized paths for further processing to increase throughput of the Indian Railway Network
- Jul 2020–
Aug 2021 **Geolife Trajectory & Google Cluster Data Analysis for Content Caching**, STOCHASTIC SYSTEMS LAB, GRADUATE RESEARCH ASSISTANT, IIT BOMBAY.
- Proposed a Dynamic Policy, α -Retro Renting, and provided its performance guarantees at the Edge Server
 - Developed tools for pre-processing and map simulation from 180+ GPS Taxi Data of Beijing City
 - Implemented K-means clustering using Voronoi tessellation to the original city map
 - Found several regimes where α -RR greatly improves cost-efficiency and, in the worst case, it is 6-optimal
- Jun 2021–
Ongoing **On Latency & QoS in Haptics Simulation using Video Streaming over Wi-Fi**, MASTER'S THESIS.
- Studied Operator/Tele-Operator-Based Haptics application to perform low latency tasks in a wired medium
 - Built a reliable UDP Protocol for Multi-media applications in C++/Python from scratch
 - Measured one-way latency & implemented packet marking in a congested environment for priority access

Key ML Projects

- Aug 2020–
Dec 2020 **Facial Emotion Recognition using Deep Learning**, Prof. Preethi Jyothi, CSE Dept., IIT Bombay.
- Used FER-13 dataset which comprises a total of 35887 pre-cropped, 48-by-48-pixel grayscale images
 - Trained various CNN models like VGG-16, Inception, AlexNet and studied evolution of their performance
 - Deployed our best model, VGG-16, with 5 emotions for real-time prediction using openCV cascade classifier
- Jan 2021–
Apr 2021 **Speech to Sign-Language for the Hearing-Impaired**, Prof. Preethi Jyothi, CSE Dept., IIT Bombay.
- Trained Convolutional Neural Network on RAVDESS audio samples to detect emotion from speech
 - Used a Conformer-based pre-trained model from ESPNET-model zoo, for Speech2Text conversion
 - Created a streamlit based UI to record audio and display the corresponding predicted text and emotion
- Aug 2020–
Dec 2020 **Employee Attrition Classification**, Prof. Amit Sethi, EE Dept., IIT Bombay.
- Objective : To predict whether an employee will leave the company or not based on 33 information points
 - Extracted relevant and less correlated features and applied One-Hot Encoding for multi-classes features
 - Achieved an accuracy of 88.47% by training SVM (Support vector machine) classifier on IBM HR dataset

- Jan 2021– **Speech Recognition using End-to-End ASR**, Prof. Preethi Jyothi, CSE Dept., IIT Bombay.
- Apr 2021
- Designed an LSTM-based Recurrent Neural Network using MFCC features as inputs at each timeframe
 - Used a Language Model(LM) with beam search decoding to avoid misspelled words in predictions
 - Used Softmax output layer that gives a probability distribution over characters for each timeframe
- Aug 2020– **Predicting Release Year of Songs**, Prof. Preethi Jyothi, CSE Dept., IIT Bombay.
- Dec 2020
- Objective : Predict the release year of a song from a set of timbre-based audio features extracted from it
 - Implemented a Feed-Forward Neural Network for regression task using NumPy from scratch
 - Performed different data pre-processing steps like feature scaling, selection etc. to improve overall accuracy
 - Limited RMSE to 11.15 by performing Mini-Batch GD & using ADAM Optimizer on MSD Dataset
- Aug 2020– **Digital Photography Flash No-Flash Image Pairs**, Prof. Suyash Awate, CSE Dept., IIT Bombay.
- Dec 2020
- Implemented denoising and detail transfer to merge the ambient qualities of the no-flash image with the high-frequency flash detail, using cross-bilateral filtering
 - Performed white-balancing to change the color tone of ambient images, continuous flash to adjust flash intensity interactively, and red-eye removal to repair artifacts in the flash image

Conference Publications

- Icccn '21 V. S. C. L. Narayana, **M. Agarwala**, N. Karamchandani and S. Moharir, "Online Partial Service Hosting at the Edge," 2021 International Conference on Computer Communications and Networks (ICCCN), 2021, pp. 1-9, doi: 10.1109/ICCCN52240.2021.9522218.
- Tompecs '22 V. S. C. L. Narayana, **M. Agarwala**, N. Karamchandani and S. Moharir, "On Renting Edge Resources for Partial Service Hosting", JOURNAL PREPRINT.

Relevant Courses

- Completed Foundations of Machine Learning, Automatic Speech Recognition, DSP & its Applications, Statistical Signal Analysis, Digital Image Processing, Optimization, Communication Networks, Real Analysis
- Ongoing Deep Learning in Natural Language Processing, AI Data & Policy

Technical Skills

- Languages Python, C/C++, Matlab/GNU Octave
- Frameworks Keras, PyTorch, Tensorflow, Pandas, Matplotlib, NumPy, Scikit-learn
- Utilities Anaconda, Git, Vim, LaTeX, Jupyter Notebook | Operating system : Linux, Windows

Positions of Responsibility

- Mar 2020– **SHALA**, Stay Home & Learn AI, TEACHING ASSISTANT.
- Jun 2020 Part of a team of academics, industry experts, and students working in data science, machine learning, and deep learning to teach a course on these topics to interested students for free during the pandemic
- Nov 2019– **Institute Interview Coordinator**, IPT, IIT BOMBAY.
- Dec 2019 Coordinated with a team of 250+ members for interviews of 1600+ students. Assisted in conducting Pre-placement Talks and Tests for 15+ firms
- Aug 2019– **Mess Councillor**, HOSTEL COUNCIL TEAM, IIT BOMBAY.
- Apr 2020 Supervised, coordinated & managed the planning & execution of food needs for 600+ hostel students. With the zero-waste management system, we were able to provide high-quality meals at a low cost. Organized & participated in various cultural, technical, and sports events for Hostel-4 IIT Bombay

Miscellaneous

- Secured 98.86 percentile in GATE-19(Electronics & Communication Engineering) among 104782 candidates
- Awarded Hostel Organization Special Mention for exemplary contribution to Hostel-4 throughout the year
- Won Gem of the General Championship (MDGC-2019) Hostel-4, IIT Bombay, as part of the Dramatics team
- Completed a short course on "State of the Art Microcontroller" organized by Dept. of CSE, IIT Kharagpur
- Participated in short course on "Python for 5G MU, Massive MIMO, and mmWave MIMO" by IIT Kanpur
- Interests and Hobbies:** Cricket, Badminton, Table tennis, Listening to music