Chesta Pahuja | **19I190008**
Industrial Engineering & Operations Research | **M.Sc.**
Indian Institute of Technology Bombay | **Gender: Female**
DOB: 02-03-1998

Examination	University	Institute	Year	CPI / %
Post Graduation	IIT Bombay	IIT Bombay	2022	8.71
Graduation	Delhi University	Hansraj College	2018	7.865
Graduation Specialization: Mathematics				
Intermediate	CBSE	Maharaja Agrasen Model School	2015	96.25%
Matriculation	CBSE	Maharaja Agrasen Model School	2013	10

SCHOLASTIC ACHIEVEMENTS

- **Winner** of the **Programming Challenge** Contest of Advanced Deep Learning course, IIT-Bombay *(2021)*
- Among the **top-5** students in the M.Sc'19-22 batch, **IEOR** department, IIT-Bombay *(2021)*
- Secured **All India Rank 59** in IIT-JAM Mathematical Statistics *(2019)*
- Awarded **Topper of the School** trophy by Maharaja Agrasen Model School for academic excellence in Class XII *(2015)*
- Secured **Rank 1** in Economics Olympiad by Delhi Council of Economics and Financial Education (DCEFE) *(2014)*
- Awarded scholarship by **CBSE** for CGPA **10/10** in class **X** *(2013)*
- Cleared **CT-1** (score-**93%**), **CT-3** (score-**85%**) and **CT-5** (score-**77%**) from Institute and Faculty of Actuaries, **IFoA, UK**

RESEARCH PROJECTS

Intelligent Reflecting Surfaces for 6G Networks | *Guide: Prof. Manjesh Hanawal. IEOR, IIT-B* *Spring'21*

- **First** public implementation of the paper "Deep Reinforcement Learning Based Intelligent Reflecting Surface for Secure Wireless Communications" by Weng et. al, **programmed** and **simulated** IRS-aided **MISO-downlink** environment
- Optimized IRS's **phase-shift** design using **DDPG** algorithm (unifying Deep Q-Learning,Policy Gradient) to maximize **SNR**
- **Proposed** and **implemented modification** to the **IRS-DDPG** framework to **learn** unknown channel gains between IRS-User with phase-shift control for a more **realistic** approach, **simulated** other channels with Rician and Rayleigh fading models

Compound scaling and Feature Fusion in CNNs | *Guide: Prof. Balamurugan Palaniappan. IEOR, IIT-B* *Fall'20*

- Performed image classification using **ILSVRC 2019 SOTA EfficientNets**, fine-tuned on **Stanford Cars**, **CIFAR-10**, explored transfer learning capabilities for object detection on **custom** Google **Open Images V4** dataset, writing custom dataloaders
- Conducted the experiments using single **NVIDIA Tesla K80** GPU on **Google Cloud** with results **at-par** with original work
- Implemented FPN, **Bi-FPN** & examined activation maps from intermediate layers to prove hierarchical abstraction in CNNs

Adversarial Deep Learning | *Guide: Prof. P. Balamurugan, IEOR, IIT-B* *Ongoing*

- Encompassed basics of state-of-the-art black-box & white-box **attacks** and **defenses** to build more **robust** & secure NNs
- Planning to devise new algorithms for **distribution** attacks in **dynamic data**

KEY PROJECTS

Conversational AI for COVID-19 Support *Spring'21*

Guide: Prof. Pushpak Bhattacharya | Course Project | Deep Learning for Natural Language Processing, CSE IIT-B

- Developed a **full-stack** web application with a **Transformer**-based conversational agent (**voicebot**) in **CUDA** environment
- **Automated** doctor's usual responses to COVID-19 symptoms & queries by enabling bot to hold voice/text dialogues w/ users
- Web UI was built using **HTML** and **Flask, ngrok** APIs with **real-time** speech recognition and **Text-to-Speech** synthesis for voice conversations, integrated with **backend** developed using **BART** model, fine-tuned on COVID-Dialogue-Dataset-English

Isometric Learning for Visual Recognition *Spring'21*

Guide: Prof. P Balamurugan | Course Project | Advanced Deep Learning, IEOR, IIT-B

- Used isometric learning to simplify the complexity in training of **very deep NNs**, without batch-norm and skip connections
- **Improved** accuracy/mean IoU by **0.85%** for segmentation on **Brain MRI** dataset - **proposed** and implemented **ISO-UNet**
- **First** public implementation of **R-ISONet + FasterRCNN** framework based on "Deep Isometric Learning for Visual Recognition" by Hozhi et. al. for Object Detection trained on **COCO** dataset on **GPU** with CUDA environment

Movie Recommendation System using Federated Learning *Spring'21*

Guide: Prof. Manjesh Hanawal | Course Project | Online Machine Learning, IEOR, IIT-B

- Implemented **PF-MAB** framework integrating **Federated Learning** with **personalization** & **Multi-Armed-Bandit** problem
- Reduced regret by **6x**, **re-designed** PF-MAB with **cross-device FL** to imitate **real-world** scenario where some clients may

- **drop or fail** to connect; developed a movie recommendation system using this framework and MovieLens dataset
- **Personalized** movie recommendations based on both locally and globally best movie genre **learnt** for **individual clients**

GAN for Pun-Generation *Fall'20*

Guide: Prof. P Balamurugan | Course Project | Deep Learning: Theory & Practice, IEOR, IIT-B

- Developed a **constrained LM**: **asynchronously** generates backward & forward sentences to integrate with target pun word
- Used two **encoder-decoder** architectures with **LSTMs** with **Joint Beam Search** decoding, trained on **Wikipedia** dumps
- Processed Wikipedia text from **30** pages w/ **NLTK**, sense tagged w/ SemEval-2017 dataset & **pywsd**, vocabulary size-**30000**
- Built a **WSD** model with **bi-directional LSTM** , integrated with the Language model to form a **GAN**, trained using **RL**

Various Image Processing Algorithms *Fall'20*

Guide: Prof. Suyash Awate and Prof. Ajit Rajawade | Course Project | Digital Image Processing, CSE, IIT-B

- Implemented Segmentation, Corner Detection, Blurs, Sharpening, Filtering, Histogram (**CLAHE**) algorithms in **MATLAB**
- Built a **mini facial recognition system** using Singular Value Decomposition (**SVD**) on **Yale** Face database

Sentiment Analysis *Spring'21*

Guide: Prof. Pushpak Bhattacharya | Course Project | Deep Learning for Natural Language Processing, CSE, IIT-B

- Implemented Transformer, GRU, Bi-GRU, LSTM, Bi-LSTM, RNN for sentiment analysis on dataset of **60000** reviews & ratings
- Handled **imbalanced data** using **SMOTE**, undersampling and over sampling, while integrating **explainability** of ML models

News Authenticity Detector *Spring'20*

Guide: Prof. Biplap Banerjee | Course Project | Machine Learning for Remote Sensing, CSRE, IIT-B

- Built a *Fake News detector* which **detects fake news** articles with **94.48 % accuracy** using **Tf-Idf** Vectorizer & Passive Aggressive classifier, trained with **6335** news articles; the **online** learning model updates itself vastly as new data is added
- Implemented various combinations of Classifiers- MultinomialNB, Passive Aggressive, LR, KNN & Vectorizers -Count,Tf-Idf

COVID-19 Vaccine Distribution *Spring'21*

Guide: Prof. Narayan Rangaraj | Course Project | Quantitative models for Supply Chain Management, IEOR, IIT-B

- Formulated a **blueprint** *Integer Programming* **cost-optimization model** for distribution of **COVID-19** vaccine, with randomly generated data on **IITB Campus**; solved using **p-median** and **p-center** approaches in **AMPL**
- Analysed bottlenecks in **cold-chain** and **storage** facilities in vaccine distribution system within India

SKILL SET & RELEVANT COURSES

Technical skills	Proficient in ***Programming Languages:*** Python, MATLAB, AMPL, R, Mathematica ***Tools*** & ***Environment:*** PyTorch, TensorFlow, Keras, CUDA, NumPy, Pandas, Flask,NLTK, LIME, Pyomo, SCILAB, LaTeX, HTML, Illustrator | ***Solvers:*** CPLEX, GUROBI, GECODE | ***OS:*** Windows, Linux
Computer Science	Machine Learning, Deep Learning, Digital Image Processing, Data Structures and Algorithms
Operations Research	Optimization models & Techniques, Probability Models & Stochastic Processes, Theory of Games
Mathematics(major)	Probability & Statistics, **Linear Algebra**, Differential Equations, **Calculus**, **Economics (minor)**
Actuarial Science	**CM-1**: Actuarial Statistics , **CS-1**: Actuarial Mathematics

POSITIONS OF RESPONSIBILITY

Teaching Assistantship| IE507: Modeling and Computation Lab| *Instructor:* Prof. P Balamurugan *(July'21-Present)*

- **Mentoring** and grading assignments (Data analysis & ML, simulating random processes) for a class of **50+** students

Core Team Member | **LEAN IN** *group* *(2016-17)*

(An international organisation focused on empowering women and eliminating gender inequalities at workplaces and real life)

- Participated in and organized activities to engage, enhance and empower the *LEAN IN community*

Creative and Managerial Team | *Identity, Annual Departmental Fest, Hansraj College, Delhi University* *(2015-18)*

- Responsible for planning, organizing and creative decoration of various events for the annual fest

Senior Coordinator| *Neenv, Human Resource Development Cell, Hansraj College, Delhi University* (*2016-17*)

- Creative & Editorial Team: Assisted in editing, writing reports and write-ups, designing & creative decoration for events

Academic Captain | *Maharaja Agrasen Model School* *(2013-14)*

- Responsible for providing strong academic leadership, preparing academic strategy for the term for 180+students

MISCELLANEOUS

Online	Completed **3/5 certifications** in Deep Learning Specialization offered by **Deeplearning.AI** by Andrew NG *(2020)*
Seminar	Delivered Webinar on algorithms to solve the **Set Cover Problem** | IEOR, IIT-Bombay *(2020)*
Social	**Volunteered** at **NGO, UNICEF**, PratYek| *Data Analytics* *(2020)*
Anchor	**PG Sports Orientation**, 2019 with footfall of over **1200** students | **IEOR Day**, 2021 with over **100** attendees
Sports	Represented **IEOR** in **Badminton**, Post Graduate General Championship, IIT-Bombay *(2019)*