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Industrial Engineering & Operations Research
Indian Institute of Technology Bombay

19I190002
M.Sc.
Gender: Male
DOB: 25-03-2000

Examination	University	Institute	Year	CPI / %
Post Graduation	IIT Bombay	IIT Bombay	2022	8.8
Graduation	University of Delhi	Acharya Narendra Dev College	2019	76.65%
Graduation Specialization: Mathematics				
Intermediate	CBSE	Jawahar Navodaya Vidyalaya	2016	92.60%
Matriculation	CBSE	Jawahar Navodaya Vidyalaya	2014	85.50%

SCHOLASTIC ACHIEVEMENTS

- Secured **AIR-17** in Mathematics, IIT-JAM with **99.86** Percentile [2019]
- Selected for **Indian Institute of Science Interview** for Integrated M.Sc.- Ph.D. Mathematics [2019]
- Secured **AIR-702** in B.Sc. Mathematics, Banaras Hindu University Entrance Exam [2016]
- Ranked 3rd among M.Sc. (Batch of 2019-22), Department of Industrial Engineering & Operations Research [2021]

KEY PROJECTS & SEMINARS

Competitive Personalized Pricing

[Jul'20-Dec'20]

Guide : Prof. K.S. Mallikarjuna Rao | M.Sc. Project I

- Studied a model where firms can exercise **Personalized Pricing** and consumers may engage in **Identity Management**
- Discovered that **Active Consumers** can **softened** the competition and there is a chance of **Deadweight Loss**
- Discovered that Identity Management can benefit firms and leads to **Lower Consumer Surplus** and **Social Welfare**

Simheuristics

[Jan'21-May'21]

Guide : Prof. Jayendran Venkateswaran | M.Sc. Project I | Tool : Python

- Studied & implemented a **simulation-based optimization algorithm** for the **Permutation Flow Shop Problem** with **Stochastic Processing Times** and used reliability analysis to analyze the outcomes
- Combined **Monte Carlo simulation** with **Iterated Local Search & NEH metaheuristics** to deal with stochastic behaviour
- Studied hybrid modelling & formulation using **simulation-based optimisation(SbO)** for solving **Job Shop Scheduling**
- Introduced some new decision variables, **controller delays** and **queue priorities**, in the formulation, after which **proposed hybrid approach** outperforms traditional **MIP** for large scale problems with sub-optimal solutions

Studied several topics in Operations Research (Health Care)

[Jan'20-May'20]

Guide : Prof. Ashutosh Mahajan | Seminar

- Queueing models** to **improve patient flow** among different hospital units in effort to reduce related **congestions & delays**
- Discharge decisions** under uncertainty in **capacity-constrained high-risk setting: ICU with patient readmission**
- Designing **outpatient appointment schedule**, establishing **dynamic priority rules** for admitting patients into **Diagnostic Medical Facilities** like Magnetic Resonance Image Centers

COURSE PROJECTS

Attentive Normalization for Conditional Image Generation

[Jul'20-Dec'20]

Guide : Prof. P. Balamurugan | Course Project | Tool : Python (TensorFlow)

- Proposed **Attentive Normalization** to capture visual distant relationship during image generation in **convolutional-GAN**
- Composed of **Semantic Layout Learning** and **Regional Normalization** and has a low computational complexity
- Outperforms **SA-GAN (FID-18.65)** in class-conditional image generation task on **ImageNet (128x128)** with **FID-17.84**

Personalized Word Predictor

[Jul'20-Dec'20]

Guide : Prof. Asim Tewari | Course Project | Tool : Python (TensorFlow)

- Proposed and implemented a personalized word predictor by using **LSTM based Recurrent Neural Network Model**
- Used **4-Gram Accuracy Metric** for testing, **Batch Processing** and **Categorical Cross Entropy** as loss function in the model
- Created **Marketing Video, Presentation and Brochure** for the **Purpose of Marketing** of our model

Solving Discrete Lot-Sizing and Scheduling by Simulated Annealing and MIP

[Jan'21-May'21]

Guide : Prof. Ashutosh Mahajan | Course Project | Tool : Python, AMPL(Couenne)

- Proposed a **Simulated Annealing (SA)** approach together with a **statistically-principled tuning** procedure to solve **discrete single-machine, multi-item lot-sizing and scheduling problem**
- Implemented **Pochet & Wolsey MILP models** and the **metaheuristic search method** efficiently in **Python & AMPL**
- Proposed method is able to find a nearly-optimal solution, also for instances for which MILPs not converging in given time

Investigated an M,L Inventory system by Simulation

[Jan'21-May'21]

Guide : Prof. Jayendran Venkateswaran | Course Project | Tool : Python

- Used simulation to investigate an **(M,L) Inventory System** in both **periodic & continuous review** case with **backordering**
- Estimated** long run **mean monthly cost** and **profit** with a **90% confidence interval** such that **Cycle Service Level $\geq 92\%$**
- Found that **CSL is maximum** when **M - L is minimum**, outdated product & backordering cost have negative impact on **profit**

Optimal pricing in on-demand-service-platform-operations with risk-sensitive customers in the blockchain era

Guide : Prof. Narayan Rangaraj | Course Project

[Jan'21-May'21]

- Applied **mean-risk theory** to analytically explore effects of **risk attitude** of customers on the optimal service pricing decision
- Discovered that, with **homogeneous** consumers, if customers are more **risk averse**, the optimal service price will **drop**
- Applied **blockchain technology** to segmenting the market into **risk seeking, risk averse & risk neutral** customers
- Derived the optimal service price for **common pricing policy** and **customized pricing policy** with & without segmentation

Linear Semantics in Generative Adversarial Networks

[Jul'21-Present]

Guide : Prof. Biplab Banerjee | Course Project | Tool : Python (Pytorch)

- Proposing a **Linear Semantic Extractor (LSE)** to extract **image semantics** modeled by **Generative Adversarial Nets**
- Studying the **class centers** and **cosine similarities** between different classes to provide geometric interpretation of our LSE
- Building applications on few-shot LSEs: **few-shot Semantic-Conditional Sampling, few-shot Semantic Image Editing**

Zero-Shot Text Classification

[Jul'21-Present]

Guide : Prof. Preeti Jyothi | Course Project | Tool : Python

- Leveraging **pre-trained models** learned on large language corpuses and **transfer learning** them on the downstream tasks of **text classification** without learning even a single labeled training instance
- Investigating and implementing two classifier for zero-shot text classification : **TARS classifier & two Transformers models**

News Authenticity Detector with Online Learning

[2021]

Self Project | Tool : Python(SKLearn)

- Proposed a News authenticity detector model using **Tfidf Vectorizer & Passive Aggressive Online Learning Algorithm**
- Authenticated ascendancy of **Passive Aggressive Algorithm** over traditional models like KNN, MNB, Logistic Regression
- Achieved accuracy of **94.48%** using Passive Aggressive Model on **Kaggle BBC-News** dataset best among all other models

TECHNICAL SKILLS

- **Programming Languages** : Python, Julia, R, HTML
- **Softwares** : MS Office, Mathematica, MATLAB, SCILAB
- **Optimization Solvers** : AMPL, Gurobi, CPLEX, Couenne
- **Scripting Platform** : Latex

KEY COURSES

- Deep Learning - Theory & Practice
- Statistical ML & Data Mining
- ML for Remote Sensing - I
- ML for Remote Sensing - II (Ongoing)
- Foundations of ML (Ongoing)
- Economics
- Engineering Statistics
- Probability & Stochastic Processes
- Optimization Techniques
- Operations Analysis
- Service and Infrastructure Systems
- Decision Analysis & Game Theory
- Integer Programming
- Quantitative models for SCM
- Simulation Modeling and Analysis

IEOR Lab | Tool : Python

[Jan'21-May'21]

- Implemented **Numerical Optimization** Schemes, **Stochastic optimization**, variance reduction and acceleration methods, **Machine Learning & Deep Learning** Problems, **Combinatorial Optimization** Problems, **Sampling & Simulation** algorithms

Modeling & Computation Lab | Tool : AMPL, SciLab

[Jul'19-Dec'21]

- Build **Optimization Models**, result interpretation & sensitivity analysis. **Summarized Data** with descriptive statistics, computing statistics, statistical estimation & tests. **Simulation** of reliability, inventory, queueing systems and basic Markov models

POSITIONS OF RESPONSIBILITIES

Department Placement Coordinator

[Jul'21-Present]

Institute Placement Team | IIT Bombay

- Streamlined the placement process for **25+ students** in the IEOB Department and addressed their queries
- Smoothly executed the online **resume verification** process for **1600+** students as a part of a team of **55+ DPCs**
- Pitched the skills & projects of the IEOB students to attract companies from different sectors
- Organizing **20+ activities** at department level to improve **preparation** of students for placements

Teaching Assistant, IIT Bombay

[Jul'21-Present]

Course : Operations Analysis | Instructor : Prof. Narayan Rangaraj

- **Assisting** in evaluating course work for a batch of **240+** students in coordination with the course instructor and **8 TAs**
- Helping in **framing solution** of **assignments** and **quizzes** of the course

EXTRA CURRICULAR ACTIVITIES

- Have an **A-Grade** certificate in **NCC** with **Cadet Rank** in **25 UP Battalion NCC SPN** with **Beta Grade**
- Attended **Data Visualization Bootcamp** & learned **Data Reading, Data Filtering & Data visualization** using **Excel**
- Learned **Object Oriented Programming, Web Scraping & GUI development** using **Python** via course from **WnCC**

HOBBIES

- Playing Cricket as an Allrounder, To do political debates, Listening to music, Travelling, Curiousness towards Mathematics