VIBHHU SHARMA

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Education

Indian Institute of Technology (IIT), Madras , *Chennai, India* *Aug 2019 - Jun 2023*
Bachelor of Technology in Electrical Engineering; ***CGPA: 9.48/10***

Army Public School Kirkee, *Pune, India* *Jun 2017 - May 2019*
Higher Secondary School, Central Board of Secondary Education(CBSE); ***Percentage: 97.6***

The Bishop's Co-Ed School, Kalyaninagar *Pune, India* *Jun 2015 - May 2017*
Secondary School, Indian Certificate of Secondary Education(ICSE); ***Percentage: 97.8***

Scholastic Achievements

- Ranked **6 out of 121** students in the Electrical Engineering Department. *2022*
- Secured **All India Rank 539** in **JEE (Advanced)** out of **200,000+** candidates *2019*
- Secured **All India Rank 421** in **JEE (Mains)** out of **1.5 million+** candidates *2019*
- Recipient of the prestigious **KVPY (Kishore Vaigyanik Protasahan Yojana)** scholarship in the SX stream with an **All India Rank 421** out of **50,000+** students *2019*
- Among the **top 30** students from Maharashtra to clear the **NSEC**, hence qualifying for **INChO**, as a part of the **International Olympiads** selection procedure *2019*
- Among the **top 30** students from Maharashtra to clear the **NSEP**, hence qualifying for **INPhO**, as a part of the **International Olympiads** selection procedure *2019*

Research Experience

Natural Language Counterfactual Generation for Indic Languages | **Bachelor Thesis, IIT Madras** Aug 2022- Present
Guide: Prof. Mitesh Khapra *Chennai, India*

- Developed a **general-purpose counterfactual generator for Indic Languages** that allows for control over both perturbation types and locations.
- Created a dataset of diverse counterfactuals for 11 Indian Languages.

Counterfactual Explanations for Multi-Modal Recommender Systems | **Adobe Research** May 2022-Jul 2022
Guide: Dr. Gaurav Sinha | *Under Review at CHIIR 2023 Paper* *Bangalore, India*

- Devised a method to generate **counterfactual explanations** for recommendations generated by a visual**blackbox recommender system** that utilizes both **image data** for its decision.
- Computed the **minimal meaningful perturbation** to an item's image-embedding that would remove it from a user's recommended list. Used CLIP to connect these perturbed image features to textual features in order to lend meaning to the perturbations.
- Model **outperformed the existing state of the art** on metrics like **Fidelity** and **Explanation Compexity**.

Deep Learning for Extreme Multilabel Classification (XMC) | **Aalto University** Jun 2021-Nov 2021
Guide: Prof. Rohit Babbar *Espoo, Finland*

- Explored and reviewed multiple papers on short-text **Extreme Classification** where the input text is limited to only around 15 words on average.
- Devised a model that made use of a deep **Probabilistic Label Tree** for label clustering and a **Graph Convolutional Network** based on document-document similarity for label ranking.

Key Courses

- **Artificial Intelligence/Machine Learning:** Introduction to Machine Learning | Deep Learning for Imaging | Reinforcement Learning | Multi-Arm Bandits | Information Theory
- **Mathematics:** Probability, Statistics and Stochastic Processes | Linear Algebra | Functions of Several Variables | Series and Matrices | Differential Equations
- **Programming:** Numerical Methods | Design and Analysis of Algorithms | Applied Programming Lab
- **Electrical Engineering** Control Engineering | Microprocessors | Communication Systems | Signals and Systems | Digital Systems | Analog Systems | Sensing Techniques and Sensor Systems,
- **Miscellaneous:** Introduction to Game Theory | French | Principles of Economics

Key Technical Projects

Tabular Data: Deep Learning is not all you need Mar 2022- Apr 2022

Course Project under Prof. Sheetal Kalyani

- Replicated results from the paper "Tabular Data: Deep Learning is not all you need" by Shwartz-Ziv and Armon .
- Implemented XGBoost and deep learning models like TabNet, DNF-Net, NODE and 1D-CNN from scratch on 11 different tabular datasets and compared the results to show the efficacy of tree-based ensemble models on tabular data.

Multi-Armed Bandit in a game of Cricket Mar 2022- Apr 2022

Course Project under Prof. Chandrashekar Lakshmi Narayanan

- Used the Upper-Confidence Bound(UCB) algorithm to decide effective batting and bowling strategies in a game of cricket.

Reinforcement Learning Agent Apr 2021-May 2021

Course Project under Prof. LA Prashanth

- Designed a RL Agent in Python using conventional RL algorithms, primarily Q-learning with exploration.
- **Tested** out the agent successfully in 3 different environments and their noisy counterparts from BSuite in all the environments.

Analysis of Recommendation System May 2020- Jul 2020

vRhythms Software Pvt Ltd [Code] [Report]

- Worked in a team of four to analyze recommendation algorithms' performance on ranking metrics.
- Optimized collaborative filtering & matrix factorization performance on ranking metrics by 22%
- Analyzed models performance against popularity bias & cold start issue using novelty/coverage metrics.

Software Engineer, Team Anveshak Apr 2020- Aug 2021

Mars Rover Team, IIT Madras

- Implemented algorithms for autonomous navigation and path planning (Bug2, Vector Field Histogram, Dynamic Window Approach), and object detection (spiral searching maneuvre, YOLOv3) on a ROS Based Framework for a rover capable of withstanding Mars-like conditions and carrying out scientific tasks effectively.
- Tested approaches to the above tasks extensively using Gazebo and RViz.

Skills

- **Languages**: Python, Java, Bash, C++, MATLAB, C, Octave
- **Web Development**: HTML5, CSS3, Javascript
- **Data Analysis**: MATLAB, Octave, NumPy, Pandas, Matplotlib, Keras, TensorFlow, PyTorch
- **Other Libraries and Tools**: ROS, Eagle, Arduino, LaTeX

Positions of Responsibility

Executive Editor | *The Fifth Estate, IIT Madras* May 2022- Present

- **Oversaw and led a team of 50** correspondents, editors, designers, analysts and coordinators at the official student news media body of IIT Madras
- Supervised the regular rollout of quality written articles, podcasts, research surveys and videos covering campus life at IIT-Madras.

Coordinator and Contingent Member | *Quiz Club, IIT Madras* Apr 2020- Present

- Regularly **participate in and conduct** quizzes both inside and outside the institute as a part of one of the most successful teams in the college quizzing circuit.

Extra Curricular Activities

- Conducted a public workshop on "**Python Algorithms for Robotics**" as a part of Shaastra 2020. *2021*
- Provided quality **mentorship** as a part of Avanti Fellows to **underprivileged students** in JNV Puducherry with regard to their academics and entrance exam preparation.Both have cleared JEE Main-2020 with >**99 percentile**. *2019-20*
- Wrote articles as a **press correspondent** for The Fifth Estate, the official campus publication of IIT Madras. *2020-22*
- Organised a campaign for **Digital Wellness** that included surveying SMEs on their use of digital technology and the assistance they needed as part of the PR team of the Entreprenuership Cell at IIT Madras. *2020*
- Elected as **House Captain** by teachers on the basis of overall academic and extracurricular performance. Led the House in sports and cultural events throughout the year. *2016-17*
- Shortlisted among the top 20 students in the country for Indian contingent selection for **World Schools Debating Championship** *2016*