Ankur Kumar

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Education

Indian Institute of Science, Education and Research, Bhopal June 2025
B.S. Data Science and Engineering *Current CPI: 9.03/10*

St. Paul's School (Hauz Khas, New Delhi) March 2021
Senior Secondary School *Percentage: 97.0%*

St. Paul's School (Hauz Khas, New Delhi) March 2019
Secondary School *Percentage: 94.4%*

Coursework

Courses: Advanced Deep Learning, Reinforcement Learning, Natural Language Processing, Applied Accelerated Artificial Intelligence, Machine Learning, Deep Learning, Artificial Intelligence, Computer Vision, Data Science in Practice (Python), Database Management, Data Structures & Algorithms, Discrete Math, Linear Algebra, Calculus, Probability & Statistics, Econometrics, Game Theory, Complex Variable, Theory of Computation, Number Theory

Skills

Languages: Python(Intermediate), C(Intermediate) - 3 star on CodeChef
Tools: Git/GitHub, VS Code, Stata, MATLAB, SQL, Google Collab, Jupyter Notebook, Latex
Python Packages & Framework: Pytorch, Tensorflow, Scikit-learn, pandas, numpy, Theano, scipy, Matplotlib
Operating Systems: Linux, Windows, MacOS
Soft Skills: Communication, Teamwork, Analytical and Problem-solving, Leadership

Expirence

BS Thesis: Multi-attribute bias mitigation | *Dr. Vinod K. Kurmi* April 2025

- The thesis explores multi-attribute bias mitigation in deep learning, particularly in computer vision. It highlights how biases arise due to spurious correlations and underrepresentation, leading to unfair model predictions.
- A novel weighted bias addition (BAdd) technique was used for Bias mitigation. On CMNIST, BAdd improved accuracy from 57.9% (Vanilla) to 89.0% (q=0.95 bias ratio), while weighted BAdd further increased it to 89.3%. In CelebA, BAdd improved bias-conflicting accuracy for "Wearing Lipstick" from 91.1% (Vanilla) to 95.1%, but weighted BAdd variants did not consistently outperform it.
- The study also found that bias is encoded in latent space directions, with cosine similarity between image and bias vectors remaining stable at 0.598 (q=0.99). These findings highlight the need for advanced techniques that modify vector directions for effective bias mitigation.

Summer Intern at IISERB - Unlearning methods for Bias mitigation | *Dr. Vinod K. Kurmi* July 2024

- Focused on fairness in AI through machine unlearning techniques for bias mitigation. Explored various debiasing methods, including Fast Model Debiasing, Feature Sieve, and Right Reason Class Artifact Compensation (RR-ClArC).
- Developed a novel approach using clustering-based class activation vectors to improve bias mitigation. Experiments on Celeb-A and BFFHQ datasets showed some improvements. Worked on unsupervised bias mitigation, aiming to reduce bias without requiring labeled biased attributes.
- Extracted style features from convolution layers, capturing texture and statistical properties of the data, and leveraged clustering techniques to generate pseudo labels. This structured approach enabled more precise identification of biased attributes, enhancing model generalization.

Deep Learning Semester Project - Bias Identification and mitigation | *Dr. Vinod K. Kurmi* April 2024

- Verified that a vanilla 3 layered MLP model trained on the Colored MNIST dataset exhibited bias using identification metrics like demographic parity and equal opportunity.
- To mitigate this bias, I explored in-processing techniques, particularly fine-tuning with QLoRA.

Projects

Multi-Agent Reinforcement Learning (MARL) for token pruning | *Dr. P.B. Sujit* Nov 2024

- This project explores Multi-Agent Reinforcement Learning (MARL) for token pruning in Vision Transformers (ViTs) to reduce computational costs while maintaining accuracy.
- Two agents—Attention Agent and Similarity Agent—use Proximal Policy Optimization (PPO) to selectively prune redundant tokens.
- The MARL-based approach reduces GFLOPs from 1.17 to 0.65 while maintaining 74.54% accuracy, significantly outperforming greedy (55.12% accuracy) and random pruning (68.38% accuracy).

Identifying Glitches in Gravitation Waves | *Scikit-learn, numpy, pandas, Matplotlib* | *Dr. Tanmay Basu* Nov 2023

- The project aimed to construct diverse machine learning models for addressing a supervised learning problem characterized by classification tasks.
- Various machine learning models were assessed for their performance in the project, including Decision Tree, Random Forest, Support Vector Machine (SVM), Multi-Layer Perceptron (MLP), and logistic regression.
- Evaluation metrics such as precision, recall, and F1 score were used to measure the model's performance in glitch identification. An accuracy of 95% was achieved.

Real estate cost prognostication | *Scikit-learn, Pandas, Numpy* | *Dr. Bhavna Rajasekaran* Nov 2023

- Develop a machine learning model for predicting real estate costs, focusing on accurate prognostication to assist potential buyers and sellers.
- Utilize comprehensive real estate datasets having property features and location details data to train the model effectively. Various Data cleaning methods were utilized to get a modified dataset for model training.
- Implement advanced regression algorithms, such as linear regression and ensemble methods, while incorporating relevant features. Ensemble methods resulted in R2 score of 0.71 and RMSE - 35.5

Achievement

- Achieved an impressive All India Rank of 49 in the GATE DA 2025 examination, backed by a formidable GATE score of 839.
- Achieved an impressive All India Rank of 137 in the GATE DA 2024 examination, backed by a formidable GATE score of 753.
- Achieved outstanding grades in Discrete Mathematics and Signals and Systems, resulting in an impressive 10.0 Semester Performance Index (SPI).
- Qualified nationwide exams like JEE Advanced and IAT (IISER aptitude test). Secured 97 percentile in JEE mains.