Manan Sharma
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Education

Bachelor of Technology | **IIT Bombay** *2017 - 2021*
GPA: *9.24 (major) | 9.60 (minor)* *Mumbai, India*

- Major in Civil Engineering; Dual Minors in Computer Science & Artificial Intelligence
- **Ranked 4th** in outgoing department.

Industry Experience

Data & Applied Scientist 2 | **Microsoft R&D India** *December 2023 - Present*
Bing Ads Organization *Bangalore, India*

- Working on solving problems related to ad creation, matching, filtration and ranking.

Senior Manager - AI & Cross Sell | **Piramal Finance India** *August - December 2023*
Business Intelligence Unit *Bangalore, India*

- Initiated & spearheaded AI micro-services and products' development across variety of use-cases in financial workflows.
- Built infrastructure to support large-scale data processing and massively parallelized model training.

Pre-doctoral Researcher | **Google Research India** *August 2022 - May 2023*
Earth Observation Sciences Group *Bangalore, India*

- Worked on multi-modal models, for soil-moisture estimation on multi-spectral imagery & time-series modalities.
- Built Earth Engine pipelines for large-scale time-series and satellite imagery extraction for spatiotemporal modelling.

Pre-doctoral Research Fellow | **Microsoft Research India** *July 2021 - July 2022*
Machine Learning and Applied Sciences Group *Bangalore, India*

- Proposed a novel piecewise-polynomial filtering algorithm for node classification over graphs and provided rigorous theoretical analysis. Gains of 12% absolute over SoTA. Work accepted at **ECML'22** and **ICLR-GTRL'22**.
- Worked on recommendation algorithms, Bayesian methods for uncertainty quantification for heterogeneous graphs.

Research SWE Intern | **Amazon India** *April - June 2020*
Automated Advertising Team *Bangalore, India*

- Built anomaly detection system, for email recommendation engine to improve reliability of pricing algorithms.
- Created a custom ARIMA, Gaussian Processes, DeepAR ensemble; reported 82% improvement on reliability metrics.

Publications

V. Lingam, C. Ekbote*,* ***M. Sharma****, R.Ragesh, A. Iyer, S. Sellamanickam*; **A Piece-wise Polynomial Filtering Approach for Graph Neural Networks** (* denotes equal contribution)

- *Proceedings of ECML-PKDD '22; Geometrical & Topological Representation Learning Workshop (spotlight), ICLR'22.*

Research Experience

Cross-lingual Zero-shot Task Transfer in MLLMs *Ongoing*
Prof. Preethi Jyothi, CSE *IIT Bombay*

- Proposed sparse-subnetwork extraction approach for task transfer across languages in multilingual-LLMs.
- Experimenting on de-biasing models via self-supervised contrastive task disentanglement.

Zero-shot Cross-task Domain Adaptation with Instructions *May 2021 - March 2022*
Prof. Nanyun Peng, CSE | Research Intern *University of California LA*

- Improved cross-task adaptation on unseen tasks of large language models by instance filtering to improve predictions
- Strengthened BART based models, filtering using RoBERTa classifiers.
- Working on a novel GAN-based data augmentation technique to enhance few-shot QA performance.

Deep Sequential Models and Sensitivity Analysis in Hydrological Modelling *August 2020 - July 2021*
Prof. Riddhi Singh, Civil Engineering Dept | ***Bachelors' Thesis*** *IIT Bombay*

- Designed **LSTM** based Bayesian sequential models for rainfall-runoff prediction in ungauged basins, across the USA.
- Implemented **Bayesian Neural Network**, evaluated model sensitivity via **variational inference** over parameters

Code for selected projects is available at: https://github.com/manan-s

Deep Bayesian Active Learning on Graph Data *Autumn 2020*
Prof. Abir De, CSE Dept | R&D Project *IIT Bombay*

- Worked on active learning on graph data, obtaining mutual information among **Bayesian Graph Convolution Network**'s parameters & label as acquisition function
- Used **MMSBM** for parametric random graph generation and ran **MCMC inference** for approximating the posterior

Multi-label Image Classification using Graph Neural & Attention Networks *Summer 2019*
Prof. Biplab Banerjee, CSRE Dept | Research Project *IIT Bombay*

- Trained multi-layered **graph convolution network**, by formulating convolution, pooling and attention operations as aggregating feature information spatially; achieving a SoTA accuracy of **64%**.

Selected Projects

Blind Super-Resolution Kernel Estimation using Internal-GAN *Spring 2020*
Prof. Suyash Awate, CSE Dept | Course Project *IIT Bombay*

- Implemented a **GAN** variant that predicts the blurring **kernel** of a low-resolution image in a single-shot setting.
- Formulated custom L1 loss & designed **patch regularizer** to efficiently learn implicit kernels.

A Generative Adversarial Approach for Zero-shot Learning for Noisy Texts *Autumn 2019*
Prof. Biplab Banerjee, CSRE Dept | Course Project *IIT Bombay*

- Leveraged GAN generator to additionally generate visual hallucinations from text descriptions.
- Added **visual pivot regularization** for preserving inter-class discrimination, improving accuracy by 6.5% relative.

Scholastic Achievements

- Ranked **4th** in the department, in the batch of 102 students [*2021*]
- Obtained SPI of **perfect 10** in 6th semester; $\geq$ 9.8 SPI in three semesters.
- Among top **99.7 percentile** in JEE-Mains 2017 and top **98.9 percentile** in JEE-Advanced 2017 [*2017*]

Teaching and Reviewing Experiences

- **Reviewer: NeurIPS** (2022), **ICLR** (2022)
- **Teaching Assistantships** *Autumn 2018 - Summer 2021*
  - MA108, Differential Equations, Spring 2021 & 2019
  - MA106, Linear Algebra, Spring 2021
  - MA111, Multidimensional Vector Calculus, Autumn 2020
  - CS101, Computer Programming and Utilization, Autumn & Summer 2019
  - BB101, Physical Biology and Biomedical Engineering, Autumn 2018
- **Mentor | Summer of Science** *Summer 2020*
  - Mentored 3 students on their transition to DSA and Machine Learning.

Technical Skills

Programming	C/C++, Python, R, Julia, SQL, HTML, XML, CSS
Software/Frameworks	MATLAB, OpenCV, Tensorflow, Keras, Pytorch, LaTeX, Git, AWS, OpenGL

Key Courses Undertaken

Machine Learning	Automatic Speech Recognition, Optimization in Machine Learning, Introduction to Stochastic Control, Foundations of Intelligent & Learning Agents, Theoretical Machine Learning, Advanced Machine Learning (Probabilistic Graphical Models), Machine Learning for Remote Sensing 1 & 2, Medical Image Computing, Reinforcement Learning (edX), Deep Learning Specialization (Coursera)
Computer Science	Data Structures & Algorithms, Computer Networks, Operating Systems, Design & Analysis of Algorithms, Cryptography and Number theory, Computer and Network Security
Maths & Statistics	Calculus, Linear Algebra, Differential Equations (ODE; Partial), Probability and Statistics

Note: Unless stated, all the above courses mentioned were done as coursework requirements in IIT Bombay

Extracurricular

- Trained in level-2 **carnatic Violin** (South Indian classical).
- Tutored high-school math to under-privileged children around the IIT area in Powai under Abhyasika.
- Served as a coordinator in **Techfest** and **E-Cell**, helping in planning,organizing and conducting of the events [*2018*]
- Trained in **Abacus** and **Mental arithmetic** for 3 continuous years by UCMAS.