Rushikesh Pawar

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Education

M.Tech. in Computational and Data Science **2023 – 2025**
Indian Institute of Science, Bengaluru *CGPA: 9.40/10*

B.Tech. in Mechanical Engineering **2017 – 2021**
College of Engineering, Pune *CGPA: 8.51/10*

Relevant Coursework (*ongoing courses)

- Numerical Optimization (A+)
- Numerical Linear Algebra (A+)
- Machine Learning (A)
- Natural Language Processing (A+)
- Deep Learning for computer vision (A)
- Deep Generative Models/ADRL*

Work Experience

Applied Scientist Intern, Amazon **May 2024 – July 2024**

- Leveraged LLMs with in-context learning & Retrieval-Augmented Generation (**RAG**) to automate SOP for escalations.
- Worked with noisy, unlabelled, semi-structured data & reduced manual efforts by **55**% with further scope of up to 80%.

Projects

Graph Neural Network based framework for accelerating geometry optimization of atomic systems **ongoing**

- Exploring Finetuning & **Knowledge Distillation** with **equivariant** message passing networks.

Fine-tuning Llama 3.1 8B with QLoRA **Sep 2024**

- Utilized the PEFT library and QLoRA method to fine-tune the Llama 3.1 8B model on the SAMSum dataset for dialogue summarization. Evaluated model performance using **ROUGE** and **BERTScore**.

Defining and Testing Essential Number Properties for LMs **May 2024**

- Conducted a comprehensive study on the numerical abilities GPT-3.5 Turbo, Gemini 1.0 Pro, & Llama 2 (quantized).
- Defined essential numerical properties, designed & conducted experiments to assess models' number handling proficiency.

Weakly Supervised Visual Prompt Extraction for Medical Image Segmentation **May 2024**

- Utilized **transfer learning** with ResNet models using classification labels from the BUSI dataset to train a classifier.
- Investigated **CAMs** (GradCAM, GradCAM++) to extract different types of prompts for the foundation model **SAM**.

Novel Indian Name Generator and English-to-Hindi Name Translator **March 2024**

- Trained Neural **N-gram** and **RNN**-based language models on an Indian names dataset to generate novel Indian names.
- Implemented a **Seq2Seq** model using **LSTM**-based encoder-decoder architecture with **attention** mechanism and **Byte-Pair Encoding tokenizer** to translate names from English to Hindi.

Credit Card Fraud Detection **Jan 2024**

- Performed Exploratory Data Analysis, Explored Undersampling and **SMOTE** to handle problem of **class imbalance**.
- Compared performance of **Logistic Regression**, KNN classifier, SVM, **Random Forest** and XGBoost.

Relevant Academic Assignments and Self Projects

ML, DL, and Optimization Algorithms Implemented from Scratch **Sept 2023 - Sep 2024**

- Implemented line search methods (Gradient Descent and Newton's method), **Poisson Regression**, Logistic Regression, Gaussian Mixture Model, GDA, Soft SVM Classifier, and **CNN with dilation & back-propagation** using **NumPy**. Built a **Spam SMS Classifier** using the **Naive Bayes** algorithm with **Bag of Words** representation using Numpy.
- Implemented and trained **Word2Vec** Skipgram on WikiText2 dataset and a multi-head attention **Vision Transformer** based classifier on CIFAR-10 using **PyTorch**.
- Implemented and trained **DCGAN**, Wasserstein GAN, C-GAN and implemented latent space traversal methods. Implemented a Denoising Diffusion Probabilistic Model from **SinMDM** with **UNet** architecture to generate novel dance movements from a single initial sequence.
- Executed **Polynomial Regression** using **QR Factorization** and **Normal Equation**, Image compression using **Singular Value Decomposition (SVD)**, and page rank prediction using Power Iteration algorithm.

Technical Skills

Programming Languages and Libraries: Python, C++, Numpy, Pandas, Matplotlib, PyTorch, Sci-kit Learn
Technical: Estimation Theory, Machine Learning, Deep Learning, NLP, Computer Vision, Generative Models

Academic Accomplishments

- Secured **Class Rank 2** in the first year of M.Tech.
- Teaching Assistant for the graduate-level course DS284: Numerical Linear Algebra (Aug 2024) at IISc.
- Awarded with **Axis Bank M.Tech Fellowship** in IISc and Schindler Igniting Minds Scholarship in B.Tech at COEP.
- **Published a Research Paper** in International Journal of Prognostics and Health Management. Research Paper
- **AIR 21** in Mechanical Engineering Paper GATE 2023. All Maharashtra **General rank 7** in MHT-CET 2017.