Anwoy Chatterjee

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Education

- **Indian Institute of Technology, Delhi** — New Delhi, India
  Doctor of Philosophy *in* ***Electrical Engineering****; GPA: 10/10* — *July 2023 - Present*
  - **Areas of specialization**: Natural Language Processing, Large Language Models
  - **Prospective thesis**: *"Towards Robust Post-Training Adaptation of LLMs"*
  - Supported by **Google PhD Fellowship**
  - **Courses Credited**: Deep Learning for NLP, Cloud Computing

- **Indian Institute of Technology, Delhi** — New Delhi, India
  Master of Technology *in* ***Machine Intelligence and Data Science****; GPA: 8.808/10* — *Aug 2022 - June 2023*
  - Transitioned to PhD
  - **Ranked 1^{st} in the program on the basis of GPA**
  - **Courses Credited**: Artificial Intelligence, Machine Learning, Data Mining, Mathematical Foundations of AI, Computer Vision, Stochastic Control and Reinforcement Learning, AI for Earth Observation, Ethical Considerations in AI

- **Indian Institute of Technology (BHU), Varanasi** — Varanasi, India
  Bachelor of Technology *in* ***Computer Science and Engineering****; GPA: 9.72/10* — *Aug 2018 - May 2022*
  - B.Tech Thesis: "Trajectory prediction of dynamic agents around an autonomous vehicle using GNNs"
  - **Ranked 2^{nd} (among 75 graduates) in the department on the basis of GPA**

Skills Summary

- **Programming Languages**: Python, C++, C, Java, SQL, Unix scripting
- **Libraries & Frameworks**: PyTorch, PyTorch Geometric, TensorFlow, Keras, Scikit-Learn, Numpy, Pandas, OpenCV
- **Tools**: Springboot, Git, MySQL

Publications

[C2] **Anwoy Chatterjee**, H S V N S Kowndinya Renduchintala, Sumit Bhatia, Tanmoy Chakraborty,"*POSIX: A Prompt Sensitivity Index For Large Language Models*", **EMNLP 2024 (Findings)**, arXiv:2410.02185, September 2024.

[C1] **Anwoy Chatterjee**, Eshaan Tanwar, Subhabrata Dutta, Tanmoy Chakraborty,"*Language Models can Exploit Cross-Task In-context Learning for Data-Scarce Novel Tasks*", **ACL 2024 (Main)**, arXiv:2405.10548, May 2024.

Experience

- **Research Intern** — Adobe Inc.
  Media and Data Science Research Lab, Adobe India — *Jan 2025 - Present*
  - Working on developing robust and efficient post-training strategies for enhancing the reasoning abilities of existing models.

- **Research Intern** — Adobe Inc.
  Media and Data Science Research Lab, Adobe India; ***Mentor*** *- Dr. Sumit Bhatia* — *May 2024 - Aug 2024*
  - Worked on analyzing and quantifying the sensitivity of LLMs to alterations in the input prompt.
  - Also looked into the possibility of utilizing the aspect of prompt sensitivity index as an augmented loss during pre-training of LLMs.
  - **A part of the work done during the internship was published at EMNLP'24**.

Selected Research Projects

- **Studying the effect of instruction tuning loss on generalization** — Adobe & IIT Delhi
  Ongoing PhD Project; ***Supervisors*** *- Prof. Tanmoy Chakraborty and Dr. Sumit Bhatia* — *Nov 2024 - Present*
  - We observe that the standard instruction tuning loss often yields suboptimal performance across benchmarks and limited robustness to input prompt variations.
  - We also observe that assigning a low-to-moderate weight to prompt tokens coupled with a moderately high weight to response tokens yields best-performing models across various settings – this simple modification alone achieves an average gain of $\sim 9.23\%$ over the conventional loss across five models, three training datasets and four benchmarks.
  - We are currently working on developing a novel instruction tuning loss with dynamic token weighting to enhance both generalization and robustness of the language models.

- **Investigating and quantifying the sensitivity of LLMs towards prompt perturbations** Adobe & IIT Delhi
  Ongoing PhD Project; ***Supervisors*** *- Prof. Tanmoy Chakraborty and Dr. Sumit Bhatia* *Jan 2024 - Present*
  - LLMs are observed to generate varied outputs on slightly changing the input prompt. This is often concerning for end users, as finding the optimal prompt is non-trivial for naive users.
  - We first developed POSIX, an index to quantify the prompt sensitivity of an LLM on a benchmark – the work was published at **EMNLP'24**.
  - We are currently looking into the internal activations of LLMs to get an idea of the role of neurons and attention heads in different layers towards the sensitivity to different kinds of prompt perturbations.

- **Cross-task in-context learning in LLMs to solve data-scarce novel tasks** IIT Delhi
  PhD Project; ***Supervisor*** *- Prof. Tanmoy Chakraborty* *Aug 2023 - Feb 2025*
  - We first identified the possibility of cross-task in-context learning (ICL) in LLMs – the work was published at **ACL'24**.
  - We also developed a method to effectively learn task representations, which can be utilized for selecting source tasks to facilitate effective cross-task information transfer in ICL. The work is currently *under submission*.

Selected Course Projects

- **Prediction of traffic at road junctions using graph neural networks**: The project involved development of two GNN-based models - one for prediction of traffic at a node for a timestep by looking at the traffics at its neighbouring nodes for the previous timestep. The other model was to predict the traffic at a node for future f timesteps by looking at the traffic at its neighbouring nodes for the past p timesteps. Got the exposure in working with *PyTorch Geometric and NetworkX.* ***[IIT Delhi ; Nov '22]***
- **Game playing AI agent for Connect4 game**: Designed an AI agent for playing a two-player game by modelling the game's actions as an Adversarial Search Problem. Adversarial search-based agents were implemented using algorithms like Minimax, Alpha-beta Pruning and Expectimax. More specifically, the agent was designed based on *Iterative Deepening Minimax Algorithm with Alpha-Beta Pruning*, and we used a specially tailored heuristic function to evaluate the nodes based on the game's rules. ***[IIT Delhi ; Oct '22]***
- **Departmental store management website (WebApp)**: Designed a website for management of sales, customer and staff records, suppliers, stocks etc. of a Departmental Store. *Spring MVC* framework in *Java* was used for this project. I also used third normal form (3NF) to reduce redundancy in the database. Got the exposure in working with *MySQL, Spring MVC, Java, HTML, CSS and JavaScript.* ***[IIT (BHU), Varanasi ; Nov '20]***
- **Document mining and understanding**: Prepared our own annotated dataset of images. First, for each image, it was tested if it is of a document (using background analysis of the image). Then, for images of documents, the topic of the document was detected. *We prepared a model for Document Classification using Keras (on TensorFlow). We derived our own word embeddings from our dataset for preparing the model.* ***[IIT (BHU), Varanasi ; Sept '20]***
- **Smart attendance monitor (WebApp)**: Designed a *geo-location based attendance registering website secured by face recognition* using *Django framework in Python.* Also got exposure to working with MySQL, HTML, CSS, JavaScript, Ajax and OpenCV. ***[IIT (BHU), Varanasi ; Nov '19]***

Services

- **Conference Reviewer:** ACL Rolling Review (February'25)
- Served as a **Graduate Teaching Assistant** for the following courses:
  - **i.** *ELL881/AIL821 (Large Language Models: Introduction and Recent Advances)* course in Sem-I of 2024-25 at *IIT Delhi*. Responsibilities involve designing course content, assignments, and quizzes, as well as mentoring the students in their course projects.
  - **ii.** *ELL101 (Introduction to Electrical Engineering)* course in Sem-II of 2023-24 at *IIT Delhi*. Served as the Head TA, coordinating 10 other TAs in the course. Designed assignments and quizzes, as well as helped students in their lab experiments.
  - **iii.** *ELL880 (Social Network Analysis)* course in Sem-I of 2023-24 at *IIT Delhi*. Responsibilities involved designing and evaluating assignments and quizzes.
  - **iv.** *MTL101 (Linear Algebra and Differential Equations)* course in Sem-II of 2022-23 at *IIT Delhi*.

Honors and Awards

- Awarded with the **Google PhD Fellowship**, 2024 in the area of **Natural Language Processing**
- Selected as a finalist of **Qualcomm Innovation Fellowship India**, 2024 (39 finalists out of 122 proposals)
- Selected to attend the *Google Research Week*, 2024
- Ranked 2^{nd} in the Department of Computer Science and Engineering, IIT (BHU), among the graduating batch of 2022
- Qualified among the top 2% of the students (about 160,000) appearing for *JEE-Advanced*, 2018
- Selected for the prestigious *KVPY Fellowship* by Government of India (while studying in Class 11) in 2016
- Ranked 9^{th} in West Bengal in *NTSE (National Talent Search Examination)*, 2015