GURUSHA JUNEJA

Research Fellow, Microsoft Research
Electrical Engineering and Computer Science
Indian Institute Of Technology, Delhi, India

Email: gurushajuneja@gmail.com
Phone: +91 8377064625
WebPage: gurusha01.github.io

ACADEMIC QUALIFICATIONS

Year	Degree/Certificate	CGPA/%
2019-2023	Bachelors Electrical Engineering with Minor in Computer Science, IIT Delhi	9.4/10
2017-19	Senior School, Class XII (CBSE)	96.6%

PUBLICATIONS

- **Language Models Separately Tuned for Decomposition and Solution Improve Complex Reasoning** **[EMNLP'23]**
  Gurusha Juneja, Subhabrata Dutta, Soumen Chakrabarti, Sunny Manchanda, Tanmoy Chakraborty
  The 2023 Conference on Empirical Methods in Natural Language Processing
- **A Universal Prompt Generator for Large Language Models** **[R0-FoMo@NeurIPS'23]**
  Gurusha Juneja, Amit Sharma
  37th Conference on Neural Information Processing Systems
  R0-FoMo:Robustness of Few-shot and Zero-shot Learning in Large Foundation Models ***[Soptlight]***
- **A Reliable Hand-Object-Interaction Data Generation Framework** **[Digital Human@AAAI'24]**
  Gurusha Juneja, Sukrit Kumar
  38th Annual AAAI Conference on Artificial Intelligence
  Workshop on digital human ***[Oral]***

WORK EXPERIENCE

- **Research Fellow** *Microsoft Research* *(July'23-Present)*
  Universal Prompt Generator
  - Developed an optimal prompt generation technique that generates solver specific optimized human-like prompt given small description of task. Developed a method to optimize a model given language as feedback from a larger language model
  - Observed over 11% improvement over human-optimized and state-of-the-art prompt optimization techniques.
- **Research Assistant** *Laboratory for Computational Social Systems* *(March'23-June'23)*
  Enhancing Multi-Step Reasoning in Language Models via Reinforcement Learning
  - Identified shortcomings in current LLMs solving multi-step problems requiring mathematical reasoning; Developed a question decomposition model, trained using reinforcement learning, to assist the LLM while solving the question.
  - Improved the performance of a smaller model: GPT-3.5 to a orders of magintude larger model: GPT - 4.
- **Research Assistant** *Laboratory for Computational Social Systems* *(Dec'22-Present)*
  Understanding Reasoning Capabilities of Transformers
  - Investigated the in-context reasoning abilities of transformers; Designed a series of experiments to identify the underlying mechanisms that govern their ability to solve such problems
  - Conducted a probing analysis for each layer of a transformer-based model and concluded transformer-based models lack the ability to reason in context.
- **Student Researcher** *Laboratory for Computational Social Systems* *(Oct'22-Present)*
  Implicit Hate Explanation in Memes
  - Curated a **benchmark dataset** at the unification of Facebook HateMeme and Hate Speech datasets, consisting of memes with implicit hate, identified sub-categories of implicit hate in memes, and the regions responsible in text and image.
  - Developed a multi-modal deep generative framework with **attention weights trained** using region annotations, to analyze image portions and text to detect subtle harm.
- **Undergraduate Researcher** *Machine Intelligence Signals and Networks Lab* *(Aug'22 - Dec'22)*
  Structure Preserving Graph Coarsening
  - Reduced running time of machine learning algorithms on graphs proposed novel optimization algorithm for graph coarsening
  - Developed efficient and theoretically convergent algorithm that captures structural and spectral properties of graph.
  - Achieved **10-fold reduction** in running time of machine learning algorithm and over **5% improvement** in accuracy on neural tasks.
- **Software Engineer Intern** *Microsoft India (R & D) Pvt. Ltd., Bengaluru* *(June'22 - Jul'22)*
  Azure Cloud - Limitless Storage
  - Worked on cluster management Tool to manage resource groups and provide limitless storage; Provided robustness to azure cloud cluster management system by fetching migration statistics and emitting to a database.
  - Reduced time required to detect fault from **3 days to 15 minutes**; Developed front-end API call to display data on a web portal and Added extensions to increase functionality.

ML PROJECTS

- **Natural Language Inference in Low resource Languages** *(Nov'22)*
  Course project under Prof Mausam
  - Developed a fine-tuning cum transfer learning-based framework for Natural Language Inference tasks on low-resource Indic and Bantu languages. Used data augmentation and adapter-based strategies to increase average **accuracy to 85%**
- **Learning Local Interaction in Cellular Automata using Graph Neural Networks** *(Jan'22 - May'22)*
  Course Project under supervision of Prof. Jayadeva and Prof. Sandeep Kumar
  - Learned the local interaction function of a finite discrete cellular automata using graph convolution neural network given initial and final states in a finite number of steps.
  - Extended the method to learn the function embedding to produce real life patterns like letters from initial chaotic state.
- **Robust Multi Label Classification under data imbalance** *(Sep'22)*
  Course Project under supervision of Prof. Mausam
  - Explored non-neural natural language processing architectures for text categorization to learn the profession label given textual description of person's life. Implemented Naïve Bayes, logistic regression, SVM and got **83% accuracy**.

SCHOLASTIC ACHIEVEMENTS

- **IIT Delhi Endowment Merit Scholarship [2022]:** Awarded to **top 15** female and male students for scholastic excellence
- **Google Research Week [2023]:** Selected among **top 50** applicants to attend Research Week organized by Google Research
- **Summer Undergraduate Research Award (SURA) [2022]**: Conferred grant, shortlisted for the SURA Award awarded to only 34 projects in IITD by the Ministry of Human Resource Development for Animal Habitat Corridor Planning project
- **Joint Entrance Examination (JEE) Advanced [2019]**: Secured all India rank of **1061** from a pool of 1.6 lakh students
- **Kishore Vaigyanik Protsahan Yojana [2017]** : Received AIR **625** in KVPY-SA category among 1,00,000 candidates

CO-SCHOLASTIC ACHIEVEMENTS

- **Facebook Hacker Cup [2020]**: Secured position in the **top 5** percentile among 32000 participants advanced to Round-1
- **Google to I/O for Women [2021]**: Secured a position in the **top 12%** among 6650 participants in Google to I/O
- **Google Code Jam [2021]**: Advanced to Round-1 in an International competition by Google for competitive programming
- **Schneider Go Green[2021]**:**World Finalist** from over 25000 teams, **Women in Energy award** for efficient solar cells
- **Siemens Clean Energy Competition[2021]**:**Global finalist**, won **top performer** award for startup idea in clean energy

RELEVANT COURSES

Computer Vision, Natural Language Processing, Deep Learning, Linear Algebra and Differential Equations, Calculus, Probability and Stochastic Processes, Data Structures And Algorithms, Algorithm Design, Computer Architecture, Mathematical Foundation for Machine Learning, Introduction to Machine Learning, Advanced Machine Learning, Cognitive Perception, Discrete Mathematical Structures

TEACHING ASSISTANCE

- Data Science lab at IIT Delhi- Conducted lectures and interactive sessions on Decision Trees, data visualization etc
- Teaching Assistant for Natural Language Processing, Graduate level course at IIT Delhi with over 80 students

TECHNICAL SKILLS

- **Programming Languages**: **Proficient**: Python, C/C++ **Competent**: CUDA, R, Java, SML
- **Libraries and Frameworks**: PyTorch, Tensorflow, OpenMP, MPI, OpenCV, SDL

EXTRA CURRICULAR ACTIVITIES

- IIT Delhi Office of Career Services Career Mentor, mentored a group of five students for placement season 2024 at IIT Delhi
- Hostel Representative and Research Coordinator of Physics and Astronomy Club. Conducted sessions on flight stability
- Representative of the Algorithms and Coding Club, designed original competitive programming tasks for competitions
- Academic mentor for the subject: Intro to Computer Science for first year students. Conducted weekly sessions

REFERENCES

Dr. Tanmoy Chakraborty	Associate Professor, IIT Delhi
Dr. Amit Sharma	Principal Researcher, Microsoft Research India
Dr. Nagarajan Natrajan	Principal Researcher, Microsoft Research India