Himanshu Gupta

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Experience

Applied Science — Amazon Business Nov'23 - Present
Applied Scientist —Full time *San Francisco Bay Area, California*

- **Email Automation**: Increased sales rep efficiency by **45K hours** annually ($120M revenue impact) through LLM-powered email automation (fine-tuned 7B models, DPO for alignment).
- **RAG Chatbot**: Developed and implemented a **RAG chatbot** using langchain to automate responses to common sales representative queries, saving 20,000 hours annually and generating $55 million in yearly cost reductions (previously handled manually through a 1,000-document corpus).

Foundation Modelling — Krutrim Aug'23 - Nov'23
Applied Scientist, LLM — Co-op *Palo Alto, California*

- **Multilingual Foundation Model**: Led a team that created a **multi-lingual 7B foundation model** focused on Indic languages. Was responsible for the curation of high quality pre-training data, instruction tuning and evaluation of the model and obtained results **comparable with Llama2**. Also developed a new tokenizer to accommodate non-Latin scripts to reduce **token to word ratio to 1.2**. [Media Coverage]

Cognition and Intelligence Labs — Arizona State University Jan'22 - Aug' 23
Graduate Research Assistant — Supervised by Prof. Chitta Baral *School of Computing and AI, ASU*

- **Instruction Tuning LLMs:** Incorporated data-specific instructions into large language models and surpassed State-of-the-Art performance via instruction learning tasks using approx. **6% of the training data set**. [11]
- **Novelty Detection and Accommodation:** Devised a real-world setting to detect and accommodate novelties for Authorship Attribution. Developed six novelty detection methods to develop a benchmark. **ACL'23** [10]
- **Commonsense Reasoning:** Created numerical feasibility dataset to demonstrate the subpar performance of large language models like GPT-3 and T5. Also demonstrated models' inability to ingest knowledge. **EACL'23** [9]
- **Targeted Dataset Generation:** Developed a multi-step a low bias high diversity synthetic data generation strategy to create high quality synthetic dataset. Also employed self-correction method to generate noise-free labels [12].
- **Causal Learning for LLMs:** Developed finetuning method forcing causal LMs to learn answers by eliminating auto regression over question tokens. Also modified GSM 8K dataset to give steps in causal ordering manner resulting in improvement.

Artificial Intelligence Labs — American Express July'19 - Dec' 21
AI Researcher in Document AI Team — Supervised by Dr. Himanshu S. Bhatt *Bangalore, India*

- **Information Extraction on Documents:** Created a Zero Shot question generation algorithm for extracting contextual information from LLC annual reports to **reduce throughput time by ∼90%. NeurIPS'22** [8]
- **Question Generation and Retrieval System:** Used Attention-enhanced Graph Neural Network for generating questions, fine tuned for financial documents - achieved **0.4 BLEU score** (generative quality metric). **Patented**
- **Bank Statement Parser:** Created a real-time parser to automate the annotation of bank statements, that **took 72 hours** earlier (manual). The parser brought down annual costs by **$1.2 Million.** [**Patented**]
- **Product Analytics:** Created an AI ops pipeline that helped quantify the monetary impact of the organization wide ML platform and had a monthly throughput of **∼1.5 Million** lines of code. **Patented**

Covenant University July'18 - Dec'18
Remote Research Intern — Supervised by Prof. Sanjay Misra *Dept. of EIE, Covenant University*

- **Grade Prediction:** Created an ANN model with **92% accuracy** to predict students performance. Obtained similar results with a better training cost to performance ratio using Naive Bayes. **Publications:** [3],[7]
- **Heart Disease Diagnosis:** Studied the effects of Decision Trees and K-Nearest Neighbours for early detection of heart diseases. Used feature extraction to **reduce the training time by 37%**. **Publication:** [6]

BITS Pilani Jan'18 - Dec'18

Undergraduate Research Assistant — Supervised by Prof. Bhanu Murthy and Prof. Lov Kumar *Hyderabad,India*

- **Code Smell Detection using Machine Learning:** Studied the effects of different feature embedding techniques on Extreme Learning Machines to obtain **98% accuracy**. **Publications:** [4], [5], [1]
- **Attacker profiling in DDoS Attacks:** Analyzed the **0.5 million** SSH logs obtained via monitoring DDoS attack. Used clustering approaches on real time attributes to demonstrate that attack was coordinated. **Publication:** [2]

Publications

Large Language Models

- **Humanity's Last Exam** — Preprint [Paper]
  Scale AI team, ...Chris Harjadi **Himanshu Gupta**, Stephen Malina....
- **PolyMATH: A Challenging Multi-modal Mathematical Reasoning Benchmark** — Preprint [Paper]
  Himanshu Gupta*, Shreyas Verma*, Ujjwala Anantheswaran*, Kevin Scaria*, Mihir Parmar, Swaroop Mishra, Chitta Baral
- **Investigating the robustness of LLMs on math word problems** — Preprint [Paper]
  Ujjwala Anantheswaran*, **Himanshu Gupta***, Kevin Scaria*, Shreyas Verma, Chitta Baral, Swaroop Mishra
- **TarGEN: Targeted Data Generation with Large Language Models** — COLM 2024 [Paper]
  Himanshu Gupta, Kevin Scaria, Ujjwala Anantheswaran, Shreyas Verma, Mihir Parmar, Saurabh Arjun Sawant, Swaroop Mishra, Chitta Baral
- **Investigating the robustness of LLMs on math word problems** — Preprint
  Ujjwala Anantheswaran*, **Himanshu Gupta***, Kevin Scaria*, Shreyas Verma, Chitta Baral, Swaroop Mishra
- **InstructABSA: Instruction learning for aspect based sentiment analysis** — NAACL 2024 [Paper]
  Kevin Scaria, **Himanshu Gupta**, Siddharth Goyal, Saurabh Arjun Sawant, Swaroop Mishra, Chitta Baral
- **EDM3: Event Detection as Multi-task Text Generation** — *SEM NAACL 2024 [Paper]
  Ujjwala Anantheswaran, **Himanshu Gupta**, Mihir Parmar, Kuntal Kumar Pal, Chitta Baral
- **"Len or index or count, anything but v1": Predicting Variable Names in Decompilation Output with Transfer Learning** — IEEE S&P 2023 [Paper]
  Kuntal Kumar Pal, Ati Priya Bajaj, Pratyay Banerjee, Audrey Dutcher, Mutsumi Nakamura, Zion Leonahenahe Basque, **Himanshu Gupta**, Saurabh Arjun Sawant, Ujjwala Anantheswaran, Yan Shoshitaishvili, Adam Doupé, Chitta Baral, Ruoyu Wang
- **A Unified Evaluation Framework for Novelty Detection and Accommodation in NLP with an Instantiation in Authorship Attribution** — ACL 23 Findings [Paper]
  Neeraj Varshney*, **Himanshu Gupta***, Eric Robertson, Bing Liu, Chitta Baral
- **Context-NER: Contextual Phrase Generation at Scale** — NeurIPS ESNLP Workshop [Paper]
  Himanshu Gupta, Shreyas Verma, Swaroop Mishra, Santosh Mashetty
- **"John is 50 years old, can his son be 65?" Evaluating NLP Models' Understanding of Feasibility** — EACL 2023 [Paper]
  Himanshu Gupta, Neeraj Varshney, Swaroop Mishra, Kuntal Kumar Pal, Saurabh Arjun Sawant, Kevin Scaria, Siddharth Goyal, Chitta Baral
- **LongBoX: Evaluating Transformers on Long-Sequence Clinical Tasks** — Preprint [Paper]
  Mihir Parmar, Aakanksha Naik, **Himanshu Gupta**, Disha Agrawal, Chitta Baral
- **Instruction Tuned Models are Quick Learners** — Preprint [Paper]
  Himanshu Gupta, Saurabh Arjun Sawant, Swaroop Mishra, Mutsumi Nakamura, Arindam Mitra, Santosh Mashetty, Chitta Baral

Other Machine Learning Publications

- **Computational Intelligence Approaches for Heart Disease Detection** — The 4th International Conference on Recent Innovations in Computing (ICRIC-2021) [Paper]
  Roseline Oluwaseun Ogundokun, Sanjay Misra, Peter Ogirima Sadiku, **Himanshu Gupta**, Robertas Damasevicius, Rytis Maskeliunas
- **Prediction of Students performance with Artificial Neural Network using Demographic Traits** — The 4th International Conference on Recent Innovations in Computing (ICRIC-2021) [Paper]
  Adeniyi Jide Kehinde, Abidemi Emmanuel Adeniyi, Roseline Oluwaseun Ogundokun, **Himanshu Gupta**, Sanjay Misra
- **Empirical Analysis on Effectiveness of NLP Methods for Predicting Code Smell** — The 2021 International Conference on Computational Science and Its Applications [Paper]
  Himanshu Gupta, Abhiram Anand Gulanikar, Lov Kumar, Neti Lalita Bhanu Murthy

- **An Empirical Study on Predictability of Software Code Smell Using Deep Learning Models** — 2021 35th International Conference on Advanced Information Networking and Applications (AINA-2021) [Paper]
  Himanshu Gupta, Tanmay Girish Kulkarni, Lov Kumar, Neti Lalita Bhanu Murthy, Aneesh Krishna
- **An Empirical Study to Investigate Data Sampling Techniques for Improving Code-Smell Prediction Using Imbalanced Data** —Third International Conference, ICTA 2020 [Paper]
  Himanshu Gupta, Sanjay Misra, Lov Kumar, NL Bhanu Murthy
- **A Novel Approach Towards Analysis of Attacker Behavior in DDoS Attacks** — International Conference for Machine Learning in Networking, MLN 2019 [Paper]
  Himanshu Gupta, Tanmay Girish Kulkarni, Lov Kumar, Neti Lalita Bhanu Murthy
- **An Empirical Framework for Code Smell Prediction using Extreme Learning Machine** — 2019 9th Annual Information Technology, Electromechanical Engineering and Microelectronics Conference (IEMECON) [Paper]
  Himanshu Gupta, Lov Kumar, Lalita Bhanu Murthy Neti

Patents

- **Automated Question-Answer Generation System for Documents — 17/554.761**
  Himanshu Gupta, Raaed Syed, Tarun Kumar, Tamanna Agrawal, Himanshu Sharad Bhatt
- **Transaction and Ownership Information Document Extraction — 17/534.511**
  Tarun Kumar, **Himanshu Gupta**, Himanshu Sharad Bhatt, Nikhil K Jain, Rahul Ghosh, Vinodh Kumar Rajagopalan Velayudham
- **System and Method for Performing Product Analytics for Machine Learning Platforms — 17/516.126**
  Himanshu Gupta, Krishnaprasad Narayanan, Gaurav Sharma, Rahul Ghosh

Education

Arizona State University (ASU) — Phoenix, USA
Masters in Computer Science (with Thesis)— ***GPA: 4.17/4*** — *Jan'22 – Dec'23*

Birla Institute of Technology and Science, Pilani (BITS Pilani) — Hyderabad, India
BE with Hons. in Electrical and Electronics Engineering— ***GPA: 7.35/10*** — *July'15 – June'19*

Skills and Coursework

Languages & Frameworks: Python, C/C++, SQL, Git, Bash, Latex, ElasticSearch, Apache Spark, Map Reduce
Libraries: PyTorch (Lightning), Transformers, Accelerate, Tensorflow, Numpy, Pandas, Scikit-learn, DeepSpeed
Relevant Coursework: Statistical Machine Learning, Natural Language Processing, Information Retrieval, Algorithms
Online Courses: NLP Nanodegree, Algorithms, Machine Learning, Deep Learning, Mathematics for Machine Learning

Leadership, Honors and Volunteer Experiences

- Served as a **Reviewer** for NAACL 2024, ACL 2024, SDU@AAAI 2024, ICLR 2024, ACL ARR (April, June, August, October, December) 2024 .
- Received **Engineering Graduate Fellowship award**, for academic performance in Masters Study at ASU.
- **Project mentor and supervisor** for 16 Students for CSE 576: Advanced topics in NLP. Responsible for Problem statement delivery, setting up research goals, clearing coding doubts for the project of the students. The Project was 50% of the entire coursework.
- Involved in writing $6 Million grant to IARPA for **Authorship Privacy Research** for CogInt Labs.
- Received **Masters Graduate fellowship** for Spring and Fall 2022 at Arizona State University. The fellowship awards 2/3 fee waiver and a monthly stipend for the semester.
- Awarded the **Best Author Award** for presentation and publication in IEMECON conference 2019. [Link]
- Secured **World Rank 2** among 6000+ teams in HackHarvard Global 2019 Hackathon on the industry based education track. Was invited to **Harvard University** to present the project. [Link]
- Led a team to secure **Organization Rank 5** in the American Express GrowthHack Hackathon 2019.
- Involved in **teaching students** (Python, C++ and Data Structures) and organizing workshops on behalf of the Institution's Programming club and Tech Lead of IEEE Student Chapter (2015-2019).
- Secured a rank of **901** among 1.4 million students PAN India to **receive KVPY fellowship**. [Link]