Akriti Jain

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Research Interests

My research focuses on improving the reliability and efficiency of language models to bridge the gap between their capabilities and user needs. I am particularly interested in uncertainty quantification and how it can enable more controllable and verifiable generation, especially in multi-step reasoning and information-seeking tasks.

Education

Indian Institute of Technology Roorkee **Oct 2020 – May 2024**
B.Tech in Electrical Engineering (Gold Medalist) | Class Rank: 1/175 | GPA: 9.348/10.00 *Roorkee, India*

Publications

- **[EMNLP 2025] Akriti Jain**, Pritika Ramu, Aparna Garimella, Apoorv Saxena. *Doc2Chart: Intent-Driven Zero-Shot Chart Generation from Documents.* In Proceedings of the 2025 Conference on Empirical Methods in Natural Language Processing, pages 34936–34951. [LINK]
- **[EMNLP 2025] Akriti Jain***, Saransh Sharma*, Koyel Mukherjee, Soumyabrata Pal. *FiRST: Finetuning Router-Selective Transformers for Input-Adaptive Latency Reduction.* In Findings of the Association for Computational Linguistics: EMNLP 2025, pages 21957–21975. [LINK]
- **[EACL 2026] Akriti Jain**, Aparna Garimella. *Knowing What's Missing: Assessing Information Sufficiency in Question Answering.* Accepted at Findings of the European Chapter of the Association for Computational Linguistics, 2026. [LINK]
- **[IJCNLP-AACL 2025] Akriti Jain**, Aparna Garimella. *Modeling Contextual Passage Utility for Multihop Question Answering.* Accepted at International Joint Conference on Natural Language Processing & Asia-Pacific Chapter of the Association for Computational Linguistics, 2025. [LINK]
- **Akriti Jain**, Anish Mulay, Divyansh Verma, Aishani Pandey, Pritika Ramu, Aparna Garimella. *Decisive: Guiding User Decisions with Optimal Preference Elicitation from Unstructured Documents.* Under review at ACL ARR January 2026.
- Jeonghyun Park, Ingeol Baek, Seunghyun Yoon, Haeun Jang, Aparna Garimella, **Akriti Jain**, Nedim Lipka, Hwanhee Lee. *MIRAGE: Multi-hop Reasoning with Ambiguity Evaluation for Illusory Queries.* Under review at the International Conference on Learning Representations (ICLR), 2026. [LINK]

Experience

Research Associate, Multimodal Content Experiences Lab, Adobe Research **June 2024 – Present**
Group: Document Experiences | Mentors: Dr. Aparna Garimella, Dr. Koyel Mukherjee *Bangalore, India*

- Worked on enabling effective information consumption from large document collections by developing methods for factual grounding, assessing the quality and sufficiency of retrieved information, and aligning model outputs with user goals.
- Developed a rule-based token compression method that was adopted in production settings, reducing latency and costs by 15%.
- Delivered an internal talk on LLM alignment and response calibration, titled: "Are LLMs inherently people-pleasers?"
- Published 3 papers and successfully filed 3 patents with additional manuscripts currently under review.

Research Intern, Multimodal Content Experiences Lab, Adobe Research **May 2023 – July 2023**
Topic: Multimodal LLMs for Design Generation and Editing | Mentor: Dr. Apoorv Saxena *Bangalore, India*

- Engineered a compressed JSON format for design templates, reducing token count by 7× while maintaining visual quality.
- Fine-tuned a LLaMA-based MLLM on design completion using novel BERT-like masking strategies on Adobe Express templates, achieving a 3× IoU improvement on bounding box prediction and enabling text-prompt-based element suggestions.
- Received a selective Pre-Placement Offer (PPO) for performance, awarded to only two members of the intern cohort.

Selected Projects

Attention-Guided Evidence Selection for Multi-Hop Question Answering *Adobe Research*

- Developed a framework to identify evidence spans using cross-attention patterns between questions and document chunks and uncovered key interpretability insights into how models aggregate and connect information during multi-hop reasoning.
- Designed a KL-divergence-based filtering mechanism to detect context insufficiency and trigger external retrieval or web search, and applied neighbor-aware peak detection to isolate high-confidence evidence spans from attention distributions.

Intent-Driven Zero-Shot Chart Generation from Documents *Adobe Research*

- Proposed a framework for generating visualizations from unstructured text by interpreting user intent to select relevant data.
- Designed CHARTEVAL, a novel attribution-based metric evaluating chart accuracy through source-data alignment.
- Curated a new benchmark dataset of 1,242 <intent, chart, document> tuples from financial and scientific domains.

Input-Adaptive Layer Skipping for Efficient LLM Inference *Adobe Research*

- Developed a lightweight framework for dynamically skipping transformer layers in LLMs, achieving 10–20% latency reduction.
- Implemented sequence-level routing during prefill, ensuring KV-cache compatibility and eliminating recomputation overhead.
- Integrated LoRA fine-tuning to compensate for skipping-induced quality loss, maintaining 80–95% of base model performance.

Assessing Information Quality for Robust Question Answering *Adobe Research*

- Fine-tuned a lightweight model to score passage utility based on inter-passage dependencies for multi-hop QA, leveraging reasoning traces as training signal to improve both reranking and answer generation over relevance-based methods.
- Designed a framework to determine if source content is sufficient to answer a question by identifying information gaps through self-consistency, achieving 12% improvement on inferential QA and over 90% accuracy on faithfulness benchmarks.

Command Recognition from Dysarthric Speech using Quantized DNN (under Prof. Manoj Tripathy) *IIT Roorkee*

- Developed a command-recognition system for dysarthric speech by building and training a deep neural network.
- Achieved up to 79.31% accuracy for low-intelligibility speakers through speaker-adaptive transfer learning.
- Applied post-training quantization to compress the model to 492 KB for TinyML deployment on Raspberry Pi with I2S MEMS microphone, enabling a portable assistive device for real-time offline inference on resource-constrained embedded hardware.

Reinforcement Learning for Stock Trading Applications (under Prof. G. N. Pillai) *IIT Roorkee*

- Developed and evaluated reinforcement-learning agents designed to learn profitable trading strategies in a simulated market environment using Advantage Actor-Critic (A2C) and Proximal Policy Optimization (PPO) algorithms.
- Utilized OpenAI Gym and the gym-anytrading environment to model market dynamics and validate agent performance.

Patents

[1] **Akriti Jain**, Pritika Ramu, Aparna Garimella. *Generating Charts from Documents Based on User Intent and Document Data.* (US Patent App. P13973-US)

[2] **Akriti Jain**, Saransh Sharma, Koyel Mukherjee, Soumyabrata Pal, Aayush Acharya, Saud Iqbal. *Skipping Layers in Large Language Models Utilizing Layer-Specific Routers with Low Rank Adapters.* (US Patent App. P13522-US)

[3] **Akriti Jain**, Aparna Garimella. *A Method to Assess Information Sufficiency in Question Answering.* (US Patent App. P14529-US)

[4] **Akriti Jain**, Aparna Garimella. *A Method to Assess the Utility of Retrieved Passages for Multi-hop QA.* [Approved for filing]

[5] Anish Mulay, Divyansh Verma, Aishani Pandey, **Akriti Jain**, Pritika Ramu, Aparna Garimella. *A Method to Guide User Decisions with Optimal Preference Elicitation from Unstructured Documents.* [Approved for filing]

Teaching and Mentorship

Mentor: Adobe Research. Supervised 3 undergraduate interns and collaborated with 1 PhD intern on research projects during summer internship season; co-led university collaborations with University of Maryland and Chung-Ang University.

Undergraduate Teaching Assistant: *Introduction to C++ (EEN-103)*, Academic Reinforcement Program, IIT Roorkee. Guided >50 freshers through C++ fundamentals and OOPs concepts, conducted regular weekly doubt-clearing sessions.

Student Mentor: Student Mentorship Program, IIT Roorkee. Provided guidance to 5 first-year undergraduate students through academic coursework, internship and placement preparation, and overall adjustment to university campus life.

Skills

Languages: Python, C, C++, SQL, VHDL
ML/DS Frameworks: PyTorch, TensorFlow, Transformers, OpenCV, Librosa

Honours and Awards

Department Gold Medal, IIT Roorkee – Awarded for achieving the highest academic standing in Electrical Engineering.

Durga Award, IIT Roorkee – Awarded for excellent overall performance amongst all graduating B.Tech female students.

Air Cmdr Shyam Chand Mehra Scholarship, IIT Roorkee – Received for three consecutive years (2021–24), awarded annually to the student with the highest CGPA among 170+ students in the Electrical Engineering department.

1st Position in Rapid Chess Tournament, IIT Roorkee – Secured in Club Open for two consecutive years (2022, 2023).

JEE Advanced 2020 – Top 2.7% (among 150k candidates); **JEE Main 2020** – Top 0.5% (among 858k candidates).

Relevant Courses

Data Structures and Algorithms, Introduction to C++, Applied Machine Learning, Linear Algebra, Economics, Deep Learning, Operating Systems

Positions of Responsibility

Secretary, IIT Roorkee Chess Club: Headed a team of 30+ members, fostering a collaborative environment for the promotion of campus chess culture. Coordinated with chess clubs at other IITs to facilitate inter-college tournaments.

PR and Fundraising Volunteer, Girl Up Uthaan: Organized several awareness and donation drives for underprivileged children with 20+ contributors. Planned live sessions to spread awareness on mental health, menstrual hygiene etc.