ADITYA PARASHAR

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EDUCATION

University of Massachusetts, Amherst *Expected graduation: Dec 2024*
MS, Computer Science
Courses: *Advanced NLP, Distributed & Operating Systems, Algorithms for Data Science, Reinforcement Learning, Probabilistic Graphical Models*

Indian Institute of Technology(IIT), Guwahati *2014 - 2018*
Bachelor of Technology, Mechanical Engineering (Minor in Mathematics)
Courses: *Computational Fluid Dynamics, Scientific Computing, Mathematical Statistics*

EXPERIENCE

Oracle *June - Sept 2024*
Research Intern, Machine Learning Research Group, Oracle Labs [under review at a conference] *Boston, MA*
- Defined the task of operations research (OR) problem re-formulation and **constructed a benchmark dataset** of 1,946 data points spanning 7 constraint types, designed to evaluate LLMs' handling of formulation changes through what-if questions.
- Conducted an empirical analysis showing Llama 3.1's performance drops by over **44%** as the number of decision variables increases to 30, highlighting limitations in LLMs' counterfactual reasoning and OR-based mathematical reasoning abilities.

Google *Feb - May 2024*
Graduate Student Researcher *Amherst, MA*
- Implemented **arithmetic sampling**, an embarrassingly parallel strategy for enhancing diversity of **multi-sample inference** from LLMs, achieving a **3-5%** increase in mathematical reasoning task performance.
- Evaluated this in conjunction with self-consistency based decoding for reasoning tasks and with minimum bayes risk (MBR) decoding for machine translation tasks.

UMass BioNLP lab *June 2023 - May 2024*
Graduate Research Assistant, Prof. Hong Yu *Amherst, MA*
- Engineered a USMLE (United States Medical Licensing Examination) question generation system using a **self-refining** LLM (GPT-3+) framework, generating **758** high-quality questions with an iterative critique and correction feedback loop.
- Introduced the **LLM-as-judge metric** to reduce expert involvement in question quality assessment, streamlining evaluation through 10 key expert-aligned criteria and achieved a **79.8%** win rate compared to GPT-4 baselines in human evaluations.

Language Technology Research Centre, IIIT-Hyderabad *Sept 2022 - Jan 2023*
Research Intern, with the guidance of Dr. Sukhada, IIT BHU *Hyderabad, India*
- Worked on interlingua-based **machine translation**, involving the development of language-independent Universal Semantics Representation (**USR**) datasets for Hindi and Sanskrit by parsing multilingual data.
- Collaborated with linguists to develop algorithms for USR **graph linearization**, enhancing model (MT5 and BART) performance for sentence generation through **finetuning**.

Agility E Services *July 2018 - Sept 2022*
Software Engineer (Technology Specialist) *Hyderabad, India*
- Developed a multi-tenant **Integration Platform as a Service (IPaaS)** for automated data sync between cloud and on-premises applications, implementing a Windows service for job scheduling and deployment through a customizable installer.
- Enhanced IPaaS security by implementing role-based access controls and safeguarding Azure services (Service Bus, PostgreSQL, App Services) with Microsoft Sentinel.
- Migrated an inventory purchase and order management web application from a monolithic to a **microservices** architecture, integrating **CI/CD** pipelines for enhanced reliability and scalability.
- Implemented the command and query responsibility segregation (**CQRS**) design pattern within the platform, ensuring better scalability, workload synchronization and management.

PROJECTS

Disentangling test-time decoding strategies for open-source LLMs *Fall 2024*
Graduate Student researcher (IESL), with Prof. Andrew Mccallum
- Developed a comprehensive framework for evaluating test-time decoding strategies for zero-shot inference with open-source LLMs, including an inverse consistency-based decoding technique.
- Conducted extensive analysis using task-specific metrics to identify correlations between probability normalization techniques and task performance, spanning a taxonomy of benchmarks and LLMs.

Literalizing figurative language using in-context learning *Spring 2023*
Adv. NLP course project, with Prof. Mohit Iyyer
- Developed an end-to-end pipeline to generate literal translations for figurative English sentences.
- Labeled the figurative sentence type using a fine-tuned classification model, then leveraged in-context learning (ICL) with example selection for instruction, few-shot and chain-of-thought prompting.

TECHNICAL SKILLS

Programming Languages	Python, C#, Java, Typescript, Javascript, SQL, Bash
Deep learning & Data Science	Pytorch, HF Transformers, CUDA, JAX, NumPy, SciPy, Pandas, SLURM (GPUs)
Software Development Frameworks	Angular, .NET Core, RabbitMQ, Miscrosoft Azure