# 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 [under review at a conference]* *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 question generation system using a **self-refining** LLM (GPT-3+) framework, generating **758** high-quality USMLE-style questions with an iterative critique and correction feedback loop.
- Introduced the **LLM-as-judge metric** to reduce expert involvement in assessments improving evaluation ease through 10 key expert-aligned judgement 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.
- Secured the IPaaS by engineering role-based access controls and protecting **Azure** services like service bus, PostgreSQL, and app services using **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

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| **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 |