

Ashutosh Kumar

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EDUCATION

Rochester Institute of Technology

Master of Science in Artificial Intelligence

Rochester, NY

August 2023 – Expected May 2025

Indian Institute of Technology Roorkee

Bachelor of Technology in Engineering Physics

Uttarakhand, India

August 2019 – May 2023

EXPERIENCE

Graduate Research Assistant

Health Systems Engineering Laboratory, RIT

May 2024 – Present

Rochester, NY

- Developing a data fusion pipeline to integrate static and time-dependent data using Temporal Fusion Transformers
- Implemented expectation-maximization algorithm to fill data gaps of epidemiological indicators of a disease

Deep Learning & MLOps Intern

CogXR Labs

August 2022 – May 2023

Delhi, India

- Achieved a mean AUC score of 0.878 across eight classes of anomalies in Chest X-rays and deployed on Vertex AI
- Built a cross-entropy-based custom loss function to handle data imbalance commonality in the medical AI domain

Research Assistant

Artificial Intelligence & Robotics Lab, Indian Institute of Science

May 2022 – July 2022

Bangalore, India

- Built a CNN-attention-based architecture using weighted patches of multi-scale feature maps for object detection
- Conducted a literature review on object detection in low and high-resolution, and underwater mine-detection

Research Assistant

Robotics Research Centre, IIIT Hyderabad

August 2021 – December 2021

Hyderabad, India

- Built a deep-learning model for airborne-drone detection and built an Unreal Engine simulation using MS AirSim
- Built a web application for YOLOv3 filter visualization and feature mapping, aiding in analyzing transfer learning

PROJECTS

HPT: A Universal Evaluation Framework for LLMs | *Paper, Code*

January 2024 – June 2024

- Designed and implemented the Hierarchical Prompting Taxonomy (HPT) and Hierarchical Prompt Frameworks (HPFs), providing a robust and efficient method for evaluating LLMs based on task complexity.
- Developed Adaptive HPF, enabling dynamic selection of the most effective prompting strategies, significantly enhancing LLM performance across various datasets and tasks by leveraging a robust LLM.
- Introduced the HP-Score, a novel metric for evaluating agent performance on diverse datasets, offering detailed insights into LLM problem-solving capabilities like question-answering, summarization, and translation.

MoonMetaSync | *Poster, Code*

September 2023 – December 2024

- Built a custom image registration module, IntFeat, from scratch that combines key points and descriptors of SIFT, ORB for high-contrast lunar images in a single feature space using linear algebra and PCA.
- Built a Python package, *SyncVision* for image processing and supports SIFT, ORB, and IntFeat.
- Performed theoretical failure analysis of multiple interpolation techniques on high- vs low-contrast satellite images.

TECHNICAL SKILLS

Languages: Python, MATLAB, AMPL

Frameworks: PyTorch, Tensorflow, Keras, Scikit-learn, Caffe

Developer Tools: Git, Docker, Anaconda, Google Cloud Platform, VS Code, Docker, Streamlit, Hugging Face

PUBLICATIONS

Budagam, D., KJ, S., Kumar, A., Jain, V., & Chadha, A. (2024). **Hierarchical Prompting Taxonomy: A Universal Evaluation Framework for Large Language Models**. ArXiv. /abs/2406.12644

Kumar, A., Murthy, S. V., Singh, S., & Ragupathy, S. (2024). **The Ethics of Interaction: Mitigating Security Threats in LLMs**. ArXiv. /abs/2401.12273