ADITYA V KALLAPPA

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OBJECTIVE

Innovative **Deep Learning Researcher** with hands-on experience in **NLP**, **Computer Vision (CV)**, and **Generative AI**. Specialized in developing and fine-tuning **Large Language Models (LLMs)**, custom tokenizers, and AI benchmarks for multilingual and multimodal applications. Skilled in **pretraining, alignment, distributed training (DeepSpeed, FSDP), and efficiency optimization (PEFT, LoRA, Quantization)**. Passionate about advancing AI for Indic languages, optimizing LLM instruction following, reasoning, and alignment with human preferences to drive real-world impact.

TECHNICAL SKILLS

Languages: Python, C/C++ (Basics)
Tools & Libraries: PyTorch, CUDA, NumPy, Pandas, HuggingFace Transformers, Datasets
Key Expertise: Machine Learning (ML), Deep Learning (DL), LLMs, CV, NLP, Generative AI, Distributed Training, Linux, PEFT(LoRA), CUDA, vLLM

WORK EXPERIENCE

Data Scientist 2, Krutrim SI Designs Ltd., Bengaluru, KA, India   April 2024 - Present

- **Krutrim-2 LLM:** Continually pretrained the Mistral-Nemo (MN) 12B model on high-quality English, Indic, Math, and Coding datasets to enhance support for Indian languages. The model outperforms MN-12B-Instruct across English, multilingual, and coding benchmarks, demonstrating significant gains in fluency, coherence, and reasoning [krutrim-ai-labs/Krutrim-2-instruct]
- **Synthetic Data & SFT:** Designed and implemented pipelines to generate **synthetic data** for Indic languages, ensuring data diversity and linguistic coverage. Performed Supervised Fine-Tuning (**SFT**) on Krutrim-2 LLM using curated high-quality English and Indic datasets, incorporating domain adaptation and task-specific optimizations. The model delivers best-in-class performance on Indic tasks, surpassing models **5-10x** its size in fluency, accuracy, and generalization [Reference]
- **Alignment & Preference Optimization:** Implemented Direct Preference Optimization (**DPO**) for English and Indic languages, aligning LLMs with human preferences to enhance response quality, cultural nuance, and multilingual robustness. Improved dialogue coherence, contextual accuracy, model self-identity, and instruction following for real-world applications.
- **Model Deployment & Inference:** Gained experience working with **vLLM** for efficient model inference and hosting, optimizing performance for large-scale LLM deployments

Data Scientist - 1, Krutrim SI Designs Ltd., Bengaluru, KA, India   July 2023 - March 2024

- **Krutrim-1 LLM:** Key contributor to India's first multilingual LLM, trained from scratch on **2.2T** tokens. Designed a robust pretraining pipeline, integrating custom architectures, **GQA**, and **ALiBi** [krutrim-ai-labs/Krutrim-1-instruct]
- **Large-Scale Data Processing:** Worked on large-scale data cleaning and preprocessing of petabytes of text data, ensuring high-quality inputs for model training. Used **CC-Net**, **RefinedWeb**, and custom filtering techniques to remove noise, deduplicate content, and enhance linguistic diversity, optimizing data efficiency, consistency, and relevance for training
- **Tokenizer Development**: Led the development of an in-house tokenizer optimized for English and Indic languages using **BPE algorithm** with **SentencePiece**, achieving a fertility score of **1.5** for English and **< 2** for Indic languages [Reference]

Data Scientist - 1, Ola Cabs, Bengaluru, KA, India   July 2022 - June 2023

- **SFT & LLM Fine-Tuning**: Led SFT experiments using **DeepSpeed ZERO-3** on various LLMs for customer care automation
- **Cell Defect Detection**: Built a detection system with a custom model with **ResNet** architecture achieving **95%** accuracy
- **Traffic Sign Detection & Classification**: Delivered detection (**~88%**) and classification (**~85%**) models using YOLOv5

PUBLICATIONS & RESEARCH

Kallappa, A. et al. (2025). Krutrim LLM: Multilingual Foundational Model for over a Billion People. *arXiv Preprint*, arXiv:2502.09642

Kallappa, A., Nagar, S., & Varma, G. (2023). FInC Flow: Fast and Invertible k × k Convolutions for Normalizing Flows. *VISAPP 2023 (Vol. 5)*, pp. 338-348. DOI: 10.5220/001187660000341

BharatBench: Comprehensive Multilingual Multimodal Evaluations of Foundation AI models for Indian Languages (2025). [KrutrimAI Team] Technical Report available at: BharatBench Report

EDUCATION

Master of Science (By Research), Electronics and Communication Engineering, Specialization in **AI**   **2019 – 2023**
The International Institute of Information Technology – Hyderabad (IIIT H), Hyderabad, India

Bachelor of Engineering, Electronics and Communication Engineering   **2013 – 2017**
B V Bhoomaraddi College Of Engineering & Technology (BVBCET), Hubballi, India