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 2023 - 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
- **Ongoing Work**: Enhancing model alignment with human preferences and improving Indic reasoning and user satisfaction

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**
Bachelor of Engineering, Electronics and Communication Engineering **2013 - 2017**