# Harsh Mankodiya

• +1 (602)-517-6750 • hmankodi@asu.edu • linkedin.com/in/harshmankodiya • github.com/hmankodiya

## Education

**Arizona State University** **August 2023 - May 2025**
***Master of Science, Computer Science: GPA 3.70*** *Tempe, USA*
***Courses:*** *NLP, Statistical Learning, Artificial Intelligence, Data Mining*

**Institute of Technology, Nirma University** **August 2019 - May 2023**
***Bachelor of Technology, Computer Science Engineering*** *Ahmedabad, India*
***Courses:*** *Machine Learning, Deep Learning, Data Structures, Linear Algebra, Calculus, Probability and Statistics*

## Professional Experience

**Cellino Biotech** **May 2024 - August 2024**
***Machine Learning Intern*** *Cambridge, USA*
- Developed a PoC for a central embedding model for patch selection, anomaly detection, cell segmentation.
- Fine-tuned **DinoV2** using **Vision Transformer** based heads for downstream 2D-segmentation tasks, achieving average F1-Score of **82%**. Utilized **Weights & Biases** for experiment tracking, artifact logging and hyperparameter sweep.
- Streamlined dataset preparation for ML pipelines by integrating **Google Cloud APIs** with **PyTorch Dataset** utilities to convert **Zarr arrays** to **Tensors** and implemented **local caching** to boost data loading throughput.
- Decomposed embeddings using **t-SNE**, leveraged **GMM clustering** for zero-shot cell artifact detection. Optimized with **JAX** for inference, achieving a **10x** speedup.
- Containerized the inference pipeline with **Docker**, developed automated testing using **PyTest** and **BASH**.

**Lens Lab, Arizona State University** **August 2023 - May 2024**
***Research Assistant*** *Tempe, USA*
- Integrated eXplainable AI techniques with RL agents in **Gymnasium** environments to enhance decision explainability.
- Trained **PPO** using **StableBaselines3** with **VAE**-based feature extraction for image stream processing.
- Leveraged **Multi-Modal CLIP** models for **zero-shot segmentation** and concept sampling for policy rollouts.
- Published findings at **NeurIPS 2024 SATA Workshop**, focusing on explainability in robotic decision-making.

**Bosch** **January 2023 - May 2023**
***Research Intern*** *Bangalore, India*
- Designed a **GradCAM-based Knowledge Distillation** pipeline to train **SegNet** and **U-Net** models for image segmentation, achieving **IoU** scores exceeding 85% on multiple datasets using **NVIDIA DGX A100** systems.

**Samyak Infotech Pvt Ltd** **May 2022 - July 2022**
***Machine Learning Intern*** *Ahmedabad, India*
- Fine-tuned **BERT**-based **LayoutLM**, for information extraction from business invoices, achieving **F1-score of 81%**.
- Summarized long invoices by using **T5 Transformer** and obtained a strong **BERTScore** of **0.95**
- Performed **KMeans clustering** on layout-aware embeddings to organize invoices into structurally similar groups reducing manual annotation effort by **10%**.

**Amazon Summer School of Code** **June 2022 - July 2022**
***Machine Learning Apprenticeship*** *Remote*
- Explored key machine learning architectures: **DNNs**, **Transformers**, **GANs** through lectures and code assignments.

## Relevant Projects

**Continual Knowledge Expansion for Book Retrieval Systems** | *Python, FAISS, HuggingFace* **Dec 2024**
- Developed a pipeline to continuously ingest and embed new book content, enabling a **RAG** system to stay updated.
- Utilized **DPR** and **FAISS** to extract new knowledge chunks from book sections, improving retrieval precision.
- Implemented a **Curriculum Learning**-based pretraining strategy, reducing perplexity of **Pythia-2.8B** and **LLaMA2-7B** by **20%** compared to vanilla pretraining.

**Enhancing Instruction-Following Capabilities of Llama** | *Python, PyTorch, HuggingFace* **Dec 2024**
- Fine-tuned **LLaMA2-7B** on the high-quality **LIMA** dataset using **QLoRA** and **LoRA** methods, enabling efficient instruction adaptation under **4-bit quantization** with only **0.6%** trainable parameters.
- Improved generation quality on instructive open-ended tasks minimizing hallucinations.

## Technical Skills

**Languages** - Python, C++, Shell, Docker, Git
**ML Frameworks** - PyTorch, HuggingFace, Jax, TensorFlow, scikit-learn, XGBoost, Stable-Baseline3, Gym, LangChain, LangGraph, Ollama
**Python Libraries** - NumPy, SciPy, Pandas, OpenCV, Pillow, Zarr, Dask, Seaborn, Matplotlib, Plotly, W&B, MLFlow, PySpark
**ML Techniques** - LLMs, RAG, Knowledge Distillation, Reinforcement Learning, SSL, CLIP, Image Captioning, Image Classification, Image Segmentation, VAE, GANs, Style Transfer