Harsh Mankodiya

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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 proof of concept for a central embedding model for patch selection, anomaly detection, cell segmentation and cell classification.
- Fine-tuned **DinoV2** using **Vision Transformer** based heads for downstream segmentation tasks, achieving average F1-Score of **82%**. Utilized **Weights & Biases** for experiment tracking, artifact logging and hyperparameter sweep.
- Performed embeddings decomposition using **t-SNE** and **PCA** and employed **GMM clustering** to perform zero-shot cell artifact detection.
- Integrated **GCP** API calls with **PyTorch Dataset** utilities to streamline **Zarr** to **Tensor** conversion. Added a local caching mechanism improving throughput.
- Automated the retrieval of artifact metadata from a **PostgreSQL** database and integrated it into the pipeline for validating clustering efficacy and artifact detection workflows.
- Containerized the inference pipeline with **Docker**, enabling real-time data processing and easy integration with cloud-based services.

Lens Lab, Arizona State University **August 2023 - May 2024**
Research Assistant *Tempe, USA*
- Integrated **eXplainable AI** techniques with autonomous vehicle agents to enhance post-hoc explainability within **Carla**, **Unity DonkeyGym**, and **Gymnasium** simulation environments.
- Trained **Proximal Policy Optimization**, using **StableBaselines3**, incorporating **VAE**-based feature extraction to process image streams.
- Utilized the pre-trained **CLIP** models to generate **zero-shot** segmentation masks, enabling efficient concept sampling across multiple policy rollouts.
- Led the project, culminating in a publication at the **NeurIPS 2024 SATA Workshop**, focusing on integrating explainability into decision-making processes for autonomous robotic systems.

Bosch **January 2023 - May 2023**
Research Intern *Bangalore, India*
- Formulated working principal for **GradCAM** and **GradCAM++** based **gray-box adversarial training** for **image segmentation models**.
- Utilized **PyTorch Lightning** to automate **data-processing**, **model training**, **evaluation**, and **inference** and implemented experiment tracking using **MLFlow**.
- Trained **SegNet** and **U-Net** backbone based segmentation models on multiple datasets achieveing high relative **IoU** scores over **85%**.

Relevant Projects

Multilingual Sentiment Classification using LLMs | *Python, PyTorch, HuggingFace* **Dec 2024**
- Conducted **PEFT** on **Llama2-7B**, utilizing **Quantized Low-Rank Adaptation (Q-LoRA)** to achieve **4-bit quantization**, reducing trainable parameters by approximately **0.60%**.
- Fine-tuned **Llama2-7B** on just **2%** of a multilingual sentiment dataset spanning 12 languages, categorized into three classes: positive, neutral, and negative.
- Witnessed **30%** increase in **test AUC** and a **20%** increase in **test accuracy**.
- Performed a comparative analysis by fine-tuning **GPT2** and **BERT**, highlighting their relative performance.

Technical Skills

Languages - Python, C++, Shell, C, MATLAB, SQL, JavaScript, JAVA, Docker, Git, Linux
ML Frameworks - PyTorch, Lightning, Jax, TensorFlow, scikit-learn, Stable-Baseline3, HuggingFace, Keras, ONNX, Gym, Flax, Einops, XGBoost
Python Libraries - NumPy, SciPy, Pandas, Albumentations, OpenCV, Pillow, ImageIO, Zarr, Dask, Seaborn, Matplotlib, Plotly, W&B, MLFlow, PySpark.
ML Techniques - Image Classification, Image Segmentation, GradCAM, TCAV, GANs, VAE, Style Transfer, Image Captioning, CLIP, Machine Translation, Text Classification, Language Models, Knowledge Distillation, Reinforcement Learning.