Akshay Raman

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Education

- **New York University, Courant** — New York, United States
  Master of Science in Computer Science, AI Specialization — *Sep. 2023 - May 2025*
  - **GPA: 4.0/4.0**
  - **Master's Capstone Project:** Continual Credit Assignment in Reinforcement Learning. Report
- **Vellore Institute of Technology** — Tamil Nadu, India
  Bachelor of Technology in Computer Science and Engineering — *Sep. 2019 - Jul. 2023*
  - **GPA: 9.3/10.0**
  - **Undergraduate Thesis:** Neural Optimal Transport. Report

Technical Skills

Programming Languages: Python, C, C++, Java, R, MATLAB, Bash/Shell Scripting, SQL, LaTeX

Frameworks & Libraries: PyTorch, JAX, TensorFlow, Hugging Face, Gymnasium, W&B, NumPy, SciPy, Pandas, OpenCV

Tools & Platforms: Git/GitHub, Unix/Linux, HPC, Slurm, Singularity, Docker, Flask, OpenMP, MPI, CUDA

Domains: Machine Learning, Deep Learning, Natural Language Processing, Computer Vision, Reinforcement Learning, Multimodal Learning, AI for Science

Professional Experience

- **AI for Vision Science Lab, Columbia University** — New York, United States
  Machine Learning Researcher — *Mar. 2025 - Present*
  - Trained a **vision-language model (VLM)** on a sparse multi-task dataset (∼5k samples) achieving **91% accuracy** in disease diagnosis and biomarker identification.
  - Engineered a **prompt-based inference framework** for multi-task clinical analysis (diagnosis, biomarker identification, VQA) to generate structured data from a single model.
- **Data, Intelligence, Computation in Engineering Lab, NYU** — New York, United States
  Graduate Research Assistant — *Sep. 2024 - Mar. 2025*
  - Developed a **data curation pipeline** to mitigate bias by removing spurious images (10% of dataset), improving model generalization on out-of-distribution dataset.
  - Investigated techniques such as **training data shifts, synthetic dataset generation** on ImageNet improving model accuracy over baseline.
- **AI for Science Group, University of Ottawa** — Ontario, Canada
  Mitacs Globalink Research Intern — *Jun. 2022 - Sep. 2022*
  - Prototyped a deep neural network solver for amortized **Wasserstein OT** in TensorFlow, accelerating the Sinkhorn algorithm **by 2x** on MNIST.
  - Simulated atomic dissociation for N-electron systems using an OT solver, predicting potential energy curves **within 5%** of theoretical values.
  - **Led interactive seminars** for the research team on ML fundamentals and advanced NumPy for high-performance scientific computing.

Publications

[1] Khan, R. et al. (including Raman, A.) **Use of artificial intelligence algorithms to predict systemic diseases from retinal images**. *WIREs Data Mining and Knowledge Discovery*, *13*(5), 2023.

Projects

1. **Scalable CLIP-based Geolocation via Hierarchical Embedding Search** Link
Python, PyTorch, Scikit-learn, Datasets
   - Developed a CLIP-based geolocation model trained on over **4M+ images** from the MediaEval-16 dataset, achieving 70% country-level prediction accuracy.
   - Engineered a novel hierarchical clustering algorithm to **accelerate model inference by ∼100x**, reducing the search space from 100k+ GPS points to ∼1k while maintaining competitive accuracy.

2. **Fine-Tuning Video Diffusion Models for 3D-Consistent Multi-view Generation** Link
Python, PyTorch, Transformers, DeepSpeed, WandB
   - Fine-tuned a **video diffusion model (SVD)** to generate geometrically consistent, multi-view renderings from a single input image.
   - Demonstrated that a **curated high-quality 1% subset** (10K objects) of the Objaverse dataset achieved performance comparable to full-scale training (1M+ objects).

3. **Meta-Learning Framework for Continual Robotic Control** Link
Python, JAX, OpenAI Gym, MuJoCo Environment, SciPy
   - Implemented a **continual learning agent** in JAX, achieving a 92% average success rate on the CW10 robotics benchmark.
   - Designed a **Meta-Critic** architecture that maintained high performance (83% success rate) in a randomized, non-sequential task setting.

Teaching Experience

NYU CSCI-UA.0202 **Operating Systems** *Course Assistant* Spring 2025
NYU CSCI-GA.3033 **Graphical Processing Units (GPUs)** *Grading Assistant* Fall 2024
NYU CSCI-GA.3033 **Multicore Processors** *Grading Assistant* Spring 2024
NYU CSCI-UA.0480 **Parallel Computing** *Grading Assistant* Fall 2023