Kamalesh Kumar

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Education

University of Massachusetts Amherst **Sep. 2024 – May 2026**
Master of Science in Computer Science (GPA 4.00/4.00) *Amherst, MA*

Indian Institute of Technology (IIT) Madras **Jul. 2020 – May 2024**
B.Tech in Civil Engineering, Minor in Artificial Intelligence & Machine Learning *Chennai, India*

Relevant Coursework: Advanced Machine Learning, Algorithmic Game Theory & Fairness, Robotics, Systems for Data Science, Reinforcement Learning (RL), Multi-Armed Bandits, Computational Cognition, Non-Linear Optimization.

Publications

- Breaking Free from Hand-Crafted Rewards: A Genetic Programming Framework for End-Goal-Driven **Reinforcement Learning** (*under review at AAMAS'26*)
- SketchCleanGAN: A generative network for improving 3D CAD model retrieval systems (*Computer & Graphics'24*) [DOI]
- SketchCADGAN: A generative approach for query sketch completion of 3D CAD models. (*Computer & Graphics'23*) [DOI]

Technical Skills

Languages: Python, C++, MATLAB, LaTeX, C, SQL
Libraries: PyTorch, TensorFlow, JAX, vLLM, triton, Megatron-LM, TRL, VeRL, DeepSpeed, TensorRT-LLM, OpenCV
Technologies/Frameworks: ROS, Ray, Linux, Git, Spark, Flink, Hadoop, Docker, Azure

Experience

Machine Learning Intern **May 2025 – Aug. 2025**
KLA Corporation *Milpitas, CA*

- Leveraged continual learning advances to tackle catastrophic forgetting in deep learning based wafer inspection models.
- Performed initial experiments that lead to a ∼71% drop in the defect count and a ∼52% improvement in precision.
- Collaborated with cross-functional teams to leverage recent research in gradient-replay, adapter & LoRA fine-tuning.

Research Intern (RL) **May 2024 – Aug. 2024**
Mitacs Globalink *Antigonish, Canada*

- Worked on genetic programming (GP) to discover novel reward functions in RL using the DEAP framework.
- Parallelized PPO training across reward populations using Ray + PyTorch, and scaled training to multiple cores.
- Showed the ability of GP in discovering better performing reward functions in MuJoCo and other Gym environments.

Research Intern (RL) **May 2023 – Aug. 2023**
Paris AI Research Institute *Paris, France*

- Investigated state, action, & kernel perturbing adversaries in RL, and showed theoretical equivalences between them.
- Proved connections between optimal transport distance, optimal couplings, and adversarial risk in RL

Projects

Cost-efficient Agentic LLM Workflows via Reinforcement Learning | UMass Amherst **Dec. 2024 – present**

- Ideated a Pareto-frontier–based framework to optimize agentic LLM workflows under accuracy–latency constraints.
- Enabling query-adaptive workflow selection by composing sub-agent cost–accuracy trade-offs and cost-aware RL.

Continual Reinforcement Learning with Average Reward Criterion | UMass Amherst **Feb. 2025 – May 2025**

- Investigated non-stationary environments in reset-free, continual RL settings requiring lifelong agent adaptation.
- Showed theoretical connections with average-reward POMDPs for modeling partial observability in infinite-horizon tasks.

Autonomous Object Following Robot using ROS and DeepSORT | UMass Amherst **Feb. 2025 – May 2025**

- Built a ROS-based object-following robot using YOLO-v3 and DeepSORT for real-time tracking and re-identification.
- Designed a Dockerized ROS Noetic environment on Triton enabling CUDA-accelerated inference, and real-time control.

Real-Time Fake News Detection in Articles Using Apache Flink | UMass Amherst **Sep. 2024 – Dec. 2024**

- Developed a real-time streaming pipeline with Apache Flink and ONNX-optimized DistilBERT for fake news detection.
- Optimized system performance for throughput, latency, fault tolerance, and resource efficiency in a scalable deployment.

Improving Sketch Queries for Robust Retrieval of 3D CAD Models | IIT Madras **Aug. 2022 – Dec. 2023**

- Designed a two-stage cascaded GAN architecture to facilitate sketch completion of incomplete query sketches.
- Proposed a novel three-branch factorization based on conditional Wasserstein Generative Adversarial Network (GAN) to clean defective sketches and thus improvised a dataset of 58000 CAD sketches.