# Pratik Shah

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## Education

**Georgia Institute of Technology**, Atlanta, USA [Aug '24 - May '26]
*M.S. in Computer Science (Specialization: Machine Learning)* Overall GPA: **3.87/4.00**

**Indian Institute of Technology (IIT) Bombay**, Mumbai, India [Nov '20 - May '24]
*B.Tech in Mechanical Engineering with Honors | Department Rank* **5** *among 190+ students* Overall GPA: **9.44/10.00**
*Minor in Data Science and Artificial Intelligence*

## Publications

”RANGER: Repository-Scale Agent for Graph-Enhanced Retrieval” Preparing for Submission at **ICLR 2026**

”Lagrangian Index Policy for Restless Bandits with Average Reward” Submitted in **Queueing Systems** Journal *arXiv:2412.12641*

“Reinforcement Learning in non-Markovian Environments” Published in **Systems and Control Letters** Journal vol. 185, 105751

## Work Experience

**Nutanix** | Intern, Member of Technical Staff [May '25 - Aug '25]

- Developed RANGER a repository-scale agent utilising RL-enhanced **GraphRAG** for code tasks | **Provisional Patent & ICLR '26**
- Created a Monte Carlo Tree Search (**MCTS**) based graph retrieval algorithm fusing bi-encoder speed with cross-encoder precision
- Built an **AST**-based tool to construct **Neo4j** knowledge graphs of entire repos, capturing hierarchical and cross-file dependencies
- Developed a dual-stage retriever combining **text2cypher** for entity lookup with the novel MCTS algorithm for graph traversal
- Beat Qwen-3-8B (**SOTA**) semantic retrieval, scoring **6%** higher NDCG@10 on CodeSearchNet (NL→Code benchmark). Got **6%** higher exact match on CrossCodeEval and **5%** higher accuracy on RepoBench for code completion and retrieval over baselines

**Microsoft** | Data Science Intern [May '23 - Jun '23]

- Automated personalized health tips generation using **OpenAI GPT Models** on MSN health pages data | **In Production**
- Implemented an automated **RAG** pipeline from scratch using serverless **Azure Functions**, created **REST** APIs to retrieve contextual data from **Azure SQL**, and leveraged the **OpenAI Completions API** to interact with **GPT-3.5** for generating tips
- Reduced the tip generation time from **2 weeks to 30 minutes** for 100 tips and attained a per-tip cost of ∼ **$0.0015**
- Created a **GPT-3.5** based translation pipeline, expanding coverage from **14** English to all **24** markets, including non-English ones

**Partnership for an Advanced Computing Environment** (PACE) | Graduate Research Assistant [Jan '25 - Present]

- Working on AI inference server with a **LiteLLM** gateway routing requests to **vLLM** servers, scheduled on HPC GPUs via **slurm**
- Enabled **51** courses to use PACE's **HPC clusters** by containerizing ML workloads, configuring shared storage and scheduling jobs
- Developed workshops for the **AI Makerspace**, a university-wide initiative with **Nvidia** for hands-on AI/ML education, covering multi-GPU training (**torchrun**), Llama-2 fine-tuning, and model deployment with **TensorRT** and **Triton Inference Server**

**Data Axle** | Data Science Intern [May '22 - Jul '22]

- Consolidated **50,000** job titles into **1,000** standardized titles using NLP and clustering for the company's lead generation service
- Applied tokenization, **GloVe** vectorization, dimensionality reduction (**PCA, t-SNE**), and **K-means** clustering to group job titles

## Research Projects

**Lagrangian Index Policy (LIP) for Restless Bandits With Average Reward** | [Jul '23 - Dec '24]

- Designed an index policy for restless bandits to optimize long-run rewards, with applications in resource allocation and scheduling
- LIP requires **no indexability conditions** and the proposed tabular and NN-based reinforcement learning schemes for model-free setting require significantly **less memory and time** than the Whittle Index Policy (WIP), which is the standard in this domain
- The new policy is **asymptotically optimal** and applicable to both Whittle Indexable and Non-Whittle Indexable problems

**Reinforcement Learning in Non-Markovian Environments** [Dec '22 - Sep '23]

- Designed a new RL agent, the Non-Markovian Q Agent (NMQ), to tackle environments where past information is crucial
- The NMQ agent uses an **autoencoder**-based scheme to tackle non-Markovianity by learning a latent state space for a Deep Q-Network (**DQN**). Modified **OpenAI Gym** environments like CartPole to be partially observable for testing the agent
- The NMQ agent outperformed the standard DQN agent in partially observable environments and Non-Markovian random walks

## Technical Skills

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| **Skills** | AWS Certified Cloud Practitioner, Python, C++, SQL, Azure, Spark, Java, CUDA, Linux, Neo4j, Git, Slurm |
| **Frameworks** | PyTorch, TensorFlow, vllm, LangChain, LlamaIndex, HuggingFace, OpenAI, Gym, RLlib, torchrun, TesnorRT |

## Extracurricular Activities and Awards

- **Scholarships**: KCMET Fellowship ['24], NFIA Scholarship ['24], KVPY Fellowship ['19 & '20]
- Led IITB's autonomous underwater vehicle team on L&T Defence ROV and ONGC subsea inspection project [Aug '22 - May '23]
- Elected as a student **mentor** for **14** freshmen and **4** sophomores, offering academic and general guidance [May '22 - May '24]