Viraj Murab

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Education

University of Alberta Sept. 2021 – May 2025
B.Sc. in Computer Science *Edmonton, AB*

- **Relevant Coursework:** Data Structures, Algorithms, OOP, Operating Systems, Machine Learning, AI, Reinforcement Learning.Solved **730+ DSA questions** on Leetcode.

Experience

Machine Learning Research Assistant - Published Paper Jan. 2025 – Present
University of Alberta *Edmonton, AB*

- Developed and tested reinforcement learning models in Python and **PyTorch** to improve real-time decision-making under partial observability which enabled agents to react more reliably in uncertain environments.
- Implemented Real-Time Recurrent Learning (**RTRL**) methods to help agents retain useful information without replay buffers which helped in reducing memory consumption by 30% allowing the agent to learn in continuous environments.
- Optimized recurrent neural network (RNN) architectures, including **LSTMs**, **GRUs**, and **RTUs**, achieving a 15% improvement in long-term memory retention in streaming environments.
- Ran large-scale experiments in **Atari** and robotic locomotion environments using distributed training on **GCP** and **Kubeflow**, improving cumulative rewards by 12%.
- Refactored RL training pipelines in **PyTorch** and boosting computational efficiency by 20% and reducing GPU memory usage by 25% while ensuring stable convergence.
- Applied **Bayesian methods**, regression, and classification models to improve action evaluation under uncertainty, using **Apache Spark** for large-scale processing.

Full-Stack Web Developer Intern May 2023 – Aug. 2023
Questrade (Fintech) *Toronto, ON*

- Integrated insurance services with Angular, Node.js, and NoSQL databases, boosting client engagement by **30%**. Incorporated **C#** and **Scala** scripts for backend microservices and utilized a **CMS** for versioning.
- Enhanced CI/CD pipelines using Jenkins and CircleCI, deployed containerized microservices via **Kubernetes**, and optimized real-time data feeds. Deployed on **AWS**. Practiced **Agile** sprints to manage features effectively.
- Built data pipelines and automated ETL processes for select analytics features, leveraging AWS S3 for data lake solutions and data transformation.

Projects

Supervised Autoencoder for MNIST Classification — *Python, NumPy, Pandas, scikit-learn, Jupyter* Present

- Developed a neural network architecture combining reconstruction and classification objectives, achieving **55%** accuracy with optimized hyperparameters.
- Experimented with Hadoop and Spark for scalable data processing of MNIST variants, exploring big data processing frameworks.

Wordle Solver (Live Demo) — *Python, NLTK* Present

- Built a Python program that plays Wordle by narrowing down possible words using feedback from green, yellow, and grey letters, just like a human would.
- Used natural language techniques to filter word choices after every guess, achieving **98% accuracy** over 100 games.

Technical Skills

- **Languages:** Python, C/C++, Java, JavaScript/TypeScript, Assembly
- **Frameworks/Tools:** React, Angular, Next.js, Flask, Django, Node.js, Docker, CI/CD, Git, Firebase, Kubeflow
- **Cloud/DevOps:** GCP, AWS, Azure
- **Machine Learning/AI:** PyTorch, TensorFlow, RTRL, Apache Spark, Generative Models
- **Data/ETL:** SQL, NoSQL, PostgreSQL, Data Pipelines, Big Data Processing
- **Concepts:** OOP, DSA, Distributed Systems, REST APIs, Real-Time Systems