Aadhithyan Velan M

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Education

Birla Institute of Technology and Science (BITS), Pilani — Hyderabad, India
Bachelor of Engineering in Computer Science — *Aug. 2023 – May 2027*
CGPA: 8.20/10.0

Experience

Undergraduate Student Researcher (Adversarial Deep Learning) — Aug. 2025 – Dec. 2025
BITS Pilani (Advisor: Prof. Aneesh Chivukula) — *Hyderabad, India*

- Reproduced and evaluated **latent-space adversarial attacks** on CNNs using **VAEs**, framing the interaction as a **Stackelberg game** to generate perceptually constrained perturbations.
- Benchmarked attack performance on standard vision datasets (MNIST, GTSRB), including safety-critical traffic sign recognition tasks.
- Explored Quantum-behaved Particle Swarm Optimization (QPSO) as an alternative optimization strategy to study attack effectiveness and stability.

Projects

Knightmare Protocol: Chess Agent | *Python, PyTorch* — Jul. 2025 – Present

- Used chess as a testbed to study **reinforcement learning** in large discrete action spaces, implementing **NFQ, DQN, DDQN, and Dueling DDQN** from scratch.
- Trained a supervised policy on **8M+ expert positions** from the Lichess Elite Database and deployed the resulting agent (∼1500 Elo) live on Lichess.
- Designed **canonical board representations** to remove player-perspective asymmetry, improving data efficiency and training stability.
- Conducted systematic experiments transitioning from **offline supervised learning to online RL**, observing **policy collapse and catastrophic forgetting** driven by objective mismatch and **Q-value inflation**.
- Authored a technical blog documenting architectural decisions, experimental results, and failures.

E-Commerce Attribute Extraction | *Python, Hugging Face* — Aug. 2025 – Dec. 2025

- Built an end-to-end **Attribute–Value Extraction (AVE)** system for unstructured e-commerce product titles, framing the task as **sequence labeling**.
- Implemented a **BERT–CRF architecture** to leverage contextual token representations while enforcing **label consistency and valid attribute–value spans**.

Technical Skills

Machine Learning: PyTorch, NumPy, scikit-learn, OpenAI Gym
Research Areas: Reinforcement Learning (value-based methods, offline-to-online learning), Imitation Learning
Languages: Python, C++, Java, GDScript
Tools: Git, Linux/Bash

Honors & Achievements

National Talent Search Exam (NTSE) Scholar: Awarded by Govt. of India to top 2,000 students nationwide.

Interests

Creative Writing: Authored a **50,000+ word** high-fantasy novel draft; designed comprehensive world-building bible.
Game Development: Prototyping a 3D Open-World RPG in **Godot**; focusing on narrative system design.