Aditya Devade

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Research Objective

Aspiring Deep Reinforcement Learning researcher with proven expertise in policy gradient methods, multi-agent systems, and decision transformers. Transitioned from high-impact software engineering roles to pursue fundamental research in autonomous agent learning, seeking to contribute to cutting-edge research labs focused on sample-efficient RL, foundation models for control, or multi-agent emergent behaviors. Strong implementation skills combined with theoretical understanding of modern RL paradigms.

Education

Indian Institute of Technology (IIT) Jodhpur B. Tech, Computer Science 2019 - 2023

- Advanced coursework: Machine Learning and Pattern Recognition, Advanced Graph Theory, Statistical Methods, Probabilistic Models, Game Theory, Optimization Theory, Stochastic Processes, Cryptography
- Research-oriented projects in reinforcement learning, computer vision, and distributed systems optimization

Deep Reinforcement Learning Research

BipedalWalker-v3 Hardcore PPO Agent **GitHub**

- **Implemented end-to-end PPO training pipeline** for continuous control on challenging BipedalWalker-v3 Hardcore environment, achieving stable bipedal locomotion through rough terrain
- **Advanced PPO optimizations:** Generalized Advantage Estimation (GAE), reward clipping, adaptive entropy decay, and learning rate scheduling for stable policy improvement
- **Extensive ablation studies** on rollout buffer sizes, trajectory sampling strategies, and early stopping criteria to maximize sample efficiency and training stability
- **Comprehensive evaluation framework** with TensorBoard logging, policy visualization, and reproducible experimental setup supporting population-based training extensions

ConnectX Multi-Agent Self-Play System **GitHub**

- **Self-play architecture** using REINFORCE and PPO with curriculum learning, training agents against evolving opponents from random to expert-level minimax players
- **Custom environment design** with Kaggle Environments API integration, implementing action masking, invalid move penalties, and sparse reward shaping for strategic gameplay
- **Modular PyTorch implementation** supporting flexible policy/value network architectures, experience replay, and entropy regularization for exploration-exploitation balance
- **Systematic benchmarking** against rule-based, minimax, and Monte Carlo Tree Search baselines with statistical significance testing and ELO rating progression tracking

Research Foundation & Paper Implementations

- **Key Papers Studied & Implemented:** DQN (experience replay, target networks), PPO (clipped surrogate objective), TRPO (trust regions), Decision Transformer (trajectory modeling), Attention mechanisms for sequential decision making
- **Advanced RL Concepts:** Multi-agent reinforcement learning, curriculum learning, reward shaping, exploration strategies (UCB, Thompson sampling), and distributional RL fundamentals

Technical Skills

Deep RL Frameworks: PyTorch, Stable Baselines3, OpenAI Gym, Kaggle Environments, MuJoCo, Box2D Physics
RL Algorithms: PPO, REINFORCE, TRPO, DQN, Actor-Critic, GAE, Self-Play, Curriculum Learning, Decision Transformers
ML & Research Tools: TensorFlow, Scikit-learn, Weights & Biases, TensorBoard, Optuna (hyperparameter

optimization), NumPy, SciPy
Programming & HPC: Python, C++, CUDA, JAX (learning), distributed training, Docker, Git, LaTeX, Jupyter
Advanced ML: Transformers, CNNs, Ensemble Methods, Meta-learning, Kaggle Competition Experience, Statistical Analysis

Experience

Freelancer, IntraintelAI *Remote* April 2025

- **Multi-Agent Health Intelligence System:** Designed specialized agents for EMR analysis, personalized health recommendations, and medical insight extraction using large language models and domain-specific fine-tuning
- **Hallucination Detection Research:** Developed novel uncertainty quantification methods for LLM outputs, implementing ensemble-based confidence estimation and semantic consistency checking for medical AI applications
- **Agent Coordination Framework:** Built multi-agent system with specialized roles, inter-agent communication protocols, and consensus mechanisms for improved accuracy in healthcare decision support

Software Engineer, Clinch AGI *Remote* Jan 2025 – Mar 2025

- **AI Agent Development:** Designed AI-powered Team Coach Agent utilizing TensorFlow, TypeScript and React, delivering real-time performance analytics that increased team productivity by 20% for enterprise clients
- **ML-Powered Sales Intelligence:** Developed and deployed AI agent for ICP (Ideal Customer Profile) scoring in LinkedIn extension, improving sales prospecting accuracy by 25%
- **Production ML Systems:** Established monitoring systems for ML models using Grafana Loki, reducing debugging time by 40% and improving system reliability
- **Data Pipeline Engineering:** Implemented advanced data analysis pipelines for sales intelligence, extracting actionable insights from unstructured data using NLP techniques

Software Engineer, Paytm *Noida, India (Remote)* Jun 2023 – Aug 2024

- **Advanced ML Pipelines:** Designed real-time fraud detection using Scala, TensorFlow, and Kafka, reducing fraudulent transactions by 34% through ensemble methods and anomaly detection
- **Production ML Systems:** Built scalable microservice architecture for insurance products with continuous model deployment, A/B testing, and performance monitoring
- **Technical Leadership:** Led 3-engineer team developing post-payment KYC features, significantly improving conversion rates through ML-driven risk assessment and decision optimization

Select Technical Projects

GPU-Accelerated SimRank Algorithm

- **High-Performance Computing:** Achieved 50x speedup using CUDA and C++ optimization, scaling from 400 to 100,000+ edges through CSR graph representation and parallel processing
- **Graph ML Applications:** Applied to recommendation systems and network analysis with implications for multi-agent RL environment design and social network modeling

Computer Vision & ML Optimization

- **Advanced ML Pipeline:** Implemented ensemble methods (KNN, Naive Bayes, Decision Trees) with hyperparameter optimization achieving 89% accuracy through systematic feature engineering and cross-validation

Research Interests & Future Directions

- **Sample-Efficient RL:** Meta-learning, few-shot adaptation, and transfer learning for rapid policy acquisition in new environments
- **Foundation Models for Control:** Decision transformers, sequence modeling for RL, and large-scale pre-training for embodied AI
- **Multi-Agent Systems:** Emergent communication, cooperative-competitive dynamics, and scalable training methodologies
- **Human-AI Alignment:** Preference learning, RLHF, and safe exploration in real-world deployment scenarios