Adithya Ramesh

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Website | Github | LinkedIn | Google Scholar

EDUCATION

- **MS Robotics, Northeastern University, Concentration: Computer Science** Boston, USA, Sep 2023 - Present
- **Dual Degree (B.Tech, M.Tech) in Engineering Design, IIT Madras** Chennai, India, Aug 2011 - June 2016

PUBLICATIONS

- **"Physics-Informed Model-Based Reinforcement Learning"**, Adithya Ramesh and Balaraman Ravindran, published in Learning for Dynamics and Control Conference (L4DC), 2023 (Paper | Webpage | Code)

PROFESSIONAL EXPERIENCE

- **Research Associate, Khoury College of Computer Sciences, Northeastern University** Boston, USA, Sep 2023 - Present
  Foundation Model for Robotics: We apply RL to robotic manipulation tasks. We learn a compact, low dimensional representation and a world model from high dimensional, partial observations such as images. The RL agent uses this representation as input and learns to carry out the given task through imitation learning / model-free RL.

- **Research Associate, Department of Computer Science, IIT Madras** Chennai, India, Oct 2021 - Aug 2023
  Physics-Informed Model-Based Reinforcement Learning: We learn the dynamics model of a robot using a physics-informed neural network and use it to train a model-based RL algorithm. We show that, in model-based RL, model accuracy mainly matters in environments that are sensitive to initial conditions, where numerical errors accumulate fast.

- **Research Engineer, Honeywell** Bengaluru, India, June 2018 - Mar 2021
  Multi-Agent Cooperation using Reinforcement Learning: Developed multi-agent systems that can co-operate and execute a task. Adopted a centralized training and decentralized execution approach based on the MADDPG algorithm.

  Autonomous Navigation for Quadrotors using Reinforcement Learning: Worked on a RL based autonomous navigation system for quadrotors, that can navigate to a goal position in the shortest path, without colliding with obstacles.

  LSTM based Speaker Recognition: Developed a LSTM based text-independent speaker recognition system. Trained on 2000 hours of audio from 6000 speakers. Achieved an accuracy of ~ 91.8% on a test dataset containing 1250 speakers.

- **Deep Learning Engineer, Predible Health** Bengaluru, India, Sep 2017 - May 2018
  ***Biomedical Image Processing*:** Experimented with CNNs for lung nodule classification, prostate MRI segmentation.

- **Founder, Stealth Robotics Startup** Chennai, India, June 2016 - Sep 2017

- **Intern, Airwood Aerostructures** Chennai, India, Dec 2014 - May 2015
  ***Flight Controller for Quadrotors*:** Worked on a flight controller for quadrotors. Developed complementary filter based state estimation algorithms and PID based control algorithms.

PROJECTS

- **Mixed State Entanglement in Quantized Chaotic Systems (Master's Thesis) (Link)**
  Studied the connections between chaos and quantum entanglement. In particular, studied entanglement dynamics in mixed states of quantized chaotic systems, focusing on the quantum coupled standard map.

- **RL Repository (Link)**
  Implemented RL algorithms such as DQN, A3C, DDPG, MADDPG, PPO, SAC etc, from scratch in Pytorch. Tested the algorithms on tasks from OpenAI Gym and Deepmind Control Suite. Open sourced the code.

TEACHING

- Spring 2024, Fall 2023: TA for RL course at Khoury College of Computer Sciences, Northeastern University
- Spring 2022, Spring 2023: TA for RL course at Department of Computer Science, IIT Madras

COURSEWORK

Deep Learning, Reinforcement Learning, Linear Algebra, Optimization, Robot Mechanics, Control Theory, Electronics

SKILLS

Operating Systems - Linux, Windows | **Programming Languages** - Python, C, C++ | **Development Tools** - SSH, Docker, Git
Deep Learning Frameworks - Pytorch, Tensorflow | **Scientific Computing** - Numpy, Matlab | **Microcontrollers** - Arduino
Robotics Frameworks - ROS | **Robotics Simulation** - MuJoCo, OpenAI Gym, Deepmind Control Suite, AirSim, Gazebo