Arpit Agarwal

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RESEARCH INTEREST Tactile sensing, Robotics Simulation and robotic control

EDUCATION

Carnegie Mellon University, School of Computer Science — Pittsburgh, Pennsylvania

PhD in Robotics Engineering — 2018 – Ongoing
- Focus : Computer simulation of light in vision based tactile sensing

Carnegie Mellon University, School of Computer Science — Pittsburgh, Pennsylvania

M.S. in Robotics Engineering — Aug 2016 – Jul 2018
- Cumulative GPA: 4.04 / 4.0
- **Masters Thesis**: Deep Reinforcement Learning with Skill Library: Exploring with Temporal Abstractions and coarse approximate Dynamics Models [pdf]
- Courses Taken: Planning, Reinforcement Learning, Computer vision, Machine learning(PhD), KDC.

Indian Institute of Technology Kanpur — Kanpur, India

B.Tech. in Electrical Engineering — Jun 2012 – May 2016
- Cumulative GPA: 3.44 / 4.00

PUBLICATIONS

- Model Learning for Look-ahead Exploration in Continuous Control [Pre-print]
  AAAI Conference on Artificial Intelligence 2019 **(Oral Presentation)**
  Arpit Agarwal, Katharina Muelling and Katerina Fragkiadaki
- Reinforcement Learning of Active Vision for Manipulating Objects under Occlusions[PDF]
  Conference on Robot Learning, 2018
  Ricson Cheng, **Arpit Agarwal** and Katerina Fragkiadaki

RESEARCH EXPERIENCE

Robotics Institute, Carnegie Mellon University

- Graduate Research Student, Computer Science Department — Aug 2016 – Jul 2018
  - Supervisors: Prof. Katharina Muelling, Robotics Institute, CMU
    Prof.Katerina Fragkiadaki, Machine Learning Department, CMU
  - Learning hierarchical policies for manipulation in long horizon robotics tasks in simulation and real world tasks.
  - Implementation of simulated environment in Mujoco simulator and experimentation with Trust Region Policy optimization and Guided Policy Search algorithms for objects placed on table-top.
  - Implemented Metric learning based correspondence embedding learning for point feature representation of scene using optical flow
  - Focus: Manipulation, Deep Learning, Perception, Planning

Cornell University

- Graduate Research Scholar, Computer Science Department — May 2015 – Jul 2015
  - Supervisors: Ashutosh Saxena, Caspar.ai
  - Learning natural language grounding to robot instructions and user-context aware planning in home settings
  - Focus: Learning, Natural Language Processing, Planning
  - **RaQuel: Robot Query Language**, target robotic language using functional programming contructs for getting information from RoboBrain Demo
  - Focus: Functional programming, cloud robotics, database systems

INDUSTRIAL EXPERIENCE

Nvidia, Project Isaac — Pittsburgh, Pennsylvania

AI/ Robotics Engineer — Jul 2018 – Aug 2019
- Part of Isaac SDK Project[link], collection of tools for next-generation robots with computer vision, manipulation and navigation capabilities.
- Focused on developing dynamic control algorithms for legged locomotion and 7-dof articulated robot arms.

RELEVANT PROJECTS

Expert guided exploration for Reinforcement learning — Jan 2018 – May 2018
- Developed 2 novel algorithms for exploration using experts advice in Reinforcement Learning for discrete and continuous control problems. The approach is orthogonal to policy learning method in RL.
- Implemented and tested the approach for Frozen-Lake and Four Room discrete state and action space environments
- Integrated DQN and DDPG policy training for continuous state space environments.
- Focus: Deep Reinforcement Learning, Deep Learning, Robotics

Zero Shot Transfer Learning for Robotics — Jan 2017 – May 2017

- Implemented the parallel version of Guided Policy Search algorithm for learning control policies for simulated robotics systems in Mujoco simulator.
- Tested the policy transfer between different simulated for 2-3 DoF robotic arms in 2D plane.
- Focus: Deep Reinforcement Learning, Deep Learning, Robotics

CONFERENCE REFEREEING IROS 2018, 2019, Humanoids 2018 and ICRA 2018, 2020

COMPUTING SKILLS

Robots: Kinova **Jaco 2** (7 DoF robotic arm), Ghost Robotics **Minitaur**(4 Legged dynamic UGV), Rethink Robotics **Baxter**(7 DoF manipulator arm), Barret **WAM** arm(7 DoF Manipulator Arm)
Virtual Reality headsets: HTC Vive
Deep Learning Frameworks: Tensorflow, PyTorch, Theano
Computing Languages: C++, Python, C, C# , Cypher, ROS, Matlab, CUDA, OpenCV, PCL, HTML, CSS, D3, Javascript, Autodesk Inventor, Qt, R, MS-Office
Operating Systems Windows, Linux(Ubuntu, Xubuntu, Lubuntu)
Platforms dsPIC, Amazon AWS ,ATmel atmega, ARM Odroid X2, ARM Odroid U3, arduino
Utilities Git, LaTeX, GNU Octave
Database Management Neo4j, MySQL