YASH SHUKLA

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OBJECTIVE

Summer Intership in Robotics with applications in Reinforcement Learning, Sim2Real transfer, Machine Learning

EDUCATION

Ph.D. in Computer Science and Human-Robot Interaction   Sept '20 – Present
Tufts University, Medford, MA   (GPA - 4.0/4.0)
<u>Relevant Courses</u>: Reinforcement Learning, Probabilistic Robotics

Master of Science in Robotics Engineering   Aug '18 – May '20
Worcester Polytechnic Institute (WPI), Worcester, MA   (GPA - 4.0/4.0)
<u>Relevant Courses</u>: Deep Learning for Perception, Artificial Intelligence, Robot Control, Human Robot Interaction

Bachelor of Engineering (Hons.) in Mechanical Engineering   Aug '14 – May '18
Birla Institute of Technology and Science, Pilani, India   (CGPA - 8.36/10)
<u>Relevant Courses</u>: Digital Image Processing, Object Oriented Programming, Robotics and Mechanisms, Mechatronics

SKILLS

Programming: Python, C/C++, MATLAB, Java

Robotic Frameworks: Robot Operating System

Deep Learning Frameworks: PyTorch, Tensorflow, Keras

Simulation Softwares: PyBullet, Gazebo, OpenRave, NVIDIA FleX, OpenAI gym, MuJoCo, Ansys, SolidWorks

Libraries: OpenCV, Point Cloud Library, scikit-learn

EXPERIENCE

Tufts University, Medford, MA   Aug '20 – Present
· Designed a framework for curriculum transfer from a low-fidelity to a high-fidelity environment.
· Experimentally validated improved jumpstart performance and quicker learning in complex realistic scenarios.
· Manuscript submitted to IJCAI 2021 for review.
· Currently extending this work to transfer policy for efficient curriculum optimization.

Computer Vision Team, MathWorks, Natick, MA   May '19 – Aug '19
· Formulated an innovative CV algorithm to improve accuracy of camera calibration parameters for Fisheye Cameras.
· The Checkerboard Detection algorithm designed for Fisheye Cameras had better true positive detection even for images from Pinhole and Stereo Cameras.
· Achieved better checkerboard detection precision (98 %) as compared to the existing technique (83 %).

Centre for Artificial Intelligence and Robotics, Bangalore, India   Jan '18 – June '18
· Developed a novel image processing algorithm for efficient road segmentation in unstructured environment.
· Generated costmap in ROS using pointcloud information from Velodyne LIDAR, Stereo Camera and Ultrasonic sensor.
· Achieved better segmentation accuracy (91 %) as compared to existing Pyramid Scene Parsing Network (79 %).

PUBLICATIONS

Yash Shukla, Gyan Tatiya and Jivko Sinapov, A Framework for Curriculum Transfer from Simple to Complex Environments, *Under review at International Joint Conference on Artificial Intelligence (IJCAI) 2021.*

Gyan Tatiya, **Yash Shukla**, Michael Edegware and Jivko Sinapov, Haptic Knowledge Transfer Between Heterogeneous Robots using Kernel Manifold Alignment, *In proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Las Vegas, USA (Virtual), October25-29, 2020.*

PROJECTS

Curriculum Optimization on a graph, Tufts University   Jan '21 – Present
· Currently working on optimizing graph based curriculum for reinforcement learning agents.

Model-Based RL for efficient learning in novel situations, Tufts University   Jan '21 – Present
· Working on Model-Based RL techniques to leverage knowledge graph to deal with novelty.

Multi-Source Feature Alignment for Collaborative Learning in Robots, Tufts University Jan '20 – May '20
· Designed representation for knowledge transfer using kernel manifold alignment (KEMA).
· The representation enabled two source robots to transfer knowledge about novel objects to a target robot.

Graphical Neural Network For Real-Time Simulation of Soft Robotic Snakes, WPI   Jan '20 – May '20
· Developed a graph neural network to model structure of a soft snake robot for efficient locomotion.
· Achieved improved time to threshold and regret on PPO compared to non graphical model.

Learning based Motion Planning for Manipulators, WPI   Aug '19 – Dec '19
· Designed and applied DDPG-MP to a 4 DOF manipulator to achieve motion planning faster than RRT.
· Compared and evaluated Imitation Learning, Supervised Learning and DDPG-MP approaches for motion planning.

Viewpoint optimization for aiding grasp synthesis using Supervised learning, WPI   Jan '19 – Dec '19
· Implemented active vision methodology to optimize depth sensor viewpoint to increase synthesized grasp quality.
· Simulated results using Gazebo. Currently implementing the algorithms on Franka Emika Panda Robot.

Ship Detection and Segmentation from Aerial Images, WPI   Aug '18 – Dec '18
· Implemented a two model Deep Learning architecture to segment ships from aerial images on Airbus Dataset.
· Applied ResNet to classify images containing ships which were later fed to a stacked Hourglass model for segmentation.