Varshith Sreeramdass

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Experience & Education

Georgia Institute of Technology (GT) *Atlanta, US*

MS in Computer Science | Specialization in Computer Perception and Robotics *2022 - Present*

- Working on Human-Robot Collaboration in racquet sports with **Prof. Matthew Gombolay**.
- Expecting to graduate in May 2024.

Frontier Robotics, Honda Innovative Research Excellence (R&D) *Tokyo, Japan*

Research Engineer *2019 - 2022*

- Worked on Classical Control and Deep Reinforcement Learning for Dexterous Manipulation.

Indian Institute of Technology Bombay (IITB) *Mumbai, India*

B.Tech. in Computer Science and Engineering (with Honors, Thesis) | GPA: 8.72 *2015 - 2019*

- Course Work: Advanced Machine Learning, Foundations of Intelligent and Learning Agents, Organization of Web Information, Neuromorphic Engineering, Computer Graphics.
- Thesis on out-of-distribution detection and active learning advised by **Prof. Sunita Sarawagi**.

Research Interests

Reinforcement Learning, Learning from Demonstrations, Sim-to-Real for Robotic Manipulation, Human Robot Interaction.

Key Research

Learning Human Robot Collaboration in Tennis from Data *GT*

Prof. Matthew Gombolay *Aug '22 - Present*

- Learning models for collaborative movement of a robot with a human partner, to capture strategies in doubles play and enable dynamic adaptation to individual preferences and styles.
- Evaluated baseline of mixture of Interaction Primitives, based on ProMPs to infer strategies from dataset modes.
- Exploring methods to capture an expressive latent space amenable to online adaptation in multi-agent settings.

Dexterous In-Hand Manipulation using Data driven Deep Reinforcement Learning *Honda R&D*

Akinobu Hayashi, Tadaaki Hasegawa *Apr '20 - Aug '21*

- Evaluated baseline, existing demo-based and offline Deep RL methods in simulation on dexterous In-Hand Manipulation tasks involving **transitions among tripod, precision and power grasps** of cylindrical, cuboidal objects.
- Collected expert demonstrations using manually designed controllers, and exploration data with noisy behaviour-cloned policies, on **real in-house prototype Robot Hand** with motion capture for object pose tracking.
- Deployed RL on real setup to achieve tolerance to init. noise of ranges 4cm and 30° in two tasks resp. **[PR] [Video]**

Hierarchical RL of Motor Primitive based Robotic Manipulation Control *Honda R&D*

Prof. Takayuki Osa, Akinobu Hayashi *Apr '20 - Sept '21*

- Deep RL framework for gating policies that operate Dynamic Motion Primitives with **inferable goal, duration**.
- Investigated variants involving primitive interruption heuristics, duration inference mechanisms, optimization of inference costs, local planning, utilization of sub primitive trajectory information for frequent network updates.
- Evaluated exploration efficiency, **trajectory smoothness** with Maze Navigation, Box Pushing, InHand Manipulation.

Domain Adaptation of Cloud NLP Services though Word Substitutions *IITB*

Prof. Sunita Sarawagi, Prof. Soumen Chakrabarti | Thesis *July '18 - May '19*

- Adaptation of cloud NLP services with sub-optimal performance on client domains with obscure tokens.
- Built **contextual token substitution** model based on ELMO language model architecture to adapt input sentences.
- Employed RL with sentence, token level rewards based on discrepancy b/w true labels and predictions from service.
- Surveyed use of sentiment aware embeddings for improving exploration for sentiment classification. **[Report]**

Leadership Experience

Teaching Assistantships

Interactive Robot Learning *GT, Fall 2022*

- Conducted office hours, facilitated discussion on online class forum, graded homeworks.

Software Systems Lab *IITB, Fall 2018*

- Delivered guest lectures on Build Tools and Introduction to Android Development.
- Awarded 'Certificate of Excellence' for the Month of Oct '18 in the CSE Dept.

Synergy From Diversity *Honda R&D*

Frontier Robotics (Division) *Apr '21 - Apr '22*

- Co-established a working group to promote cultural sensitivity among different nationalities, and communication in the context of remote work during COVID-19. Organized language exchange sessions and sensitivity workshops.

Academic Mentor *IITB*

CSE Department Academic Mentorship Program *May '18 - May '19*

- Mentored 7 sophomore students, helped coordinate solutions to common academic problems with CSE Dept.
- Advised a back-logged student under the Academic Rehabilitation Program.

Skills

Deep RL Algorithms AWAC (rlkit), DAPG (mjrl), SAC, TD3, baselines (OpenAI).

ML Models VAEs for Representation Learning; LSTMs for Music Synthesis; Deep Kalman Filters for Time Series Forecasting; RL of Spiking Neural Networks for Inverse Pendulum.

ML Libraries PyTorch, TensorFlow (1, 2), CUDA (basic).

Simulation PyByllet, ROS, MuJoCo (basic), MoveIt, Pinocchio (basic).

Miscellaneous Git, pybind11, OpenGL, LaTeX.

Languages English, Japanese (JLPT N3), Hindi, Telugu.

Other Projects

Out-of-Distribution metrics for Active Domain Adaptation *IITB*

Prof. Sunita Sarawagi, Prof. Soumen Chakrabarti *July '18 - May '19*

- Evaluated out-of-distribution (OOD) detection methods involving image classifiers: likelihood temperature scaling (TS), Variational Information Bottlenecks, multi-label and calibrated NNs, perturbation based detectors (ODIN).
- Investigated applicability of OOD-ness as a **proxy for informativeness** of data samples in Deep Active Learning.
- Extended TS, ODIN to sequence inputs for Active Domain Adaptation in Named Entity Recognition. **[Report]**

Augmenting Scene Graph Generation with Knowledge from Corpora *IITB, IBM Bangalore*

Prof. Soumen Chakrabarti, Amrita Saha | Independent Study under Faculty *Jan '19 - Apr '19*

- Studied various sources of side information to improve Scene Graph Completion in a gold data-scarce scenario.
- Built pipeline to parse text corpus, infer relevant entities and relations, and construct usable priors using OpenIE.
- Implemented and evaluated **LK distillation**, a method of prior incorporation, to improve Neural-Motifs.
- Investigated methods to deal with relation label space discrepancy among text and visual sources. **[Report] [Code]**

Sign Language Synthesis with Adversarial Styling *Honda Research JP*

Brock, Heike | Summer Internship *May '18 - July '18*

- Developed seq-to-seq models to synthesize motion gestures of an animated character from annotated sentences.
- Studied incorporation of natural human-like variability into gestures using adversarially learnt style features.
- Investigated various representations of orientations for efficient learning in a data scarce scenario. **[Report][Code]**