Varshith Sreeramdass

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Experience & Education

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

Research Engineer *2019 - Present*

- Working 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*

- Advanced Machine Learning, Foundations of Intelligent and Learning Agents, Organization of Web Information, Neuromorphic Engineering, Computer Graphics, and other core CS courses.
- Thesis advised by **Prof. Sunita Sarawagi**.

Honda Research Institute Japan (HRIJP) *Tokyo, Japan*

Summer Internship *2018*

- Worked on synthesizing motion gestures for Japanese Sign Language from language tokens.

Research Interests

Reinforcement Learning, Latent Models, Bayesian Reasoning for Robotics, Geometric Perception, NLP.

Key Research

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.

Out-of-Distribution metrics for Active Learning | Adaptation of Prediction Services *IITB*

Prof. Sunita Sarawagi, Prof. Soumen Chakrabarti | Undergraduate Thesis *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 (NER). **[Report]**

- Adaptation of cloud NER 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]**

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

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

Social Engagement

Synergy From Diversity *Honda R&D*

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

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

Teaching Assistant *IITB*

Software Systems Lab, Autumn 2018 *July '18 - Nov '18*

- 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.

Scholastic Achievements

2015 **AP Grade**, Exceptional Performance in Engineering Graphics (awarded to less than top 1%).
2015 **All India Rank 204**, Joint Entrance Examination (JEE) Advanced, among 150,000 candidates.
2014 **All India Rank 710**, Awarded the KVPY Scholarship from the Government of India.
2014 **Top 1%**, State of Andhra Pradesh, India, National Standard Exam Physics, IAPT.

Other Projects

Sign Language Synthesis with Adversarial Styling *HRIJP*

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]**

Hand Gesture Recognition *IITB*

Institute Technical Summer Project | Self Project *June '16*

- Built a gesture recognition glove using accelerometer, gyroscope, flex sensors & Bluetooth module.
- Interfaced sensors with microprocessors that relayed data to an Android mobile device.
- Matched gesture data with prerecorded static and dynamic gestures using Dynamic Time Warping.
- Performed preliminary investigations into recognition algorithms using sequence classification models using weka.

Frameworks, Minor Projects

Deep RL	AWAC (rlkit), DAPG (mjrl), SAC, TD3, baselines (OpenAI).
Simulators, Control	PyByllet, ROS, MoveIt, Pinocchio (basic).
NN 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).
Others	Git, pybind11, OpenGL, LaTeX.

Miscellaneous

Assisted in **recruitment activities** of Honda R&D from premier engineering universities in India. 2021
N3 level proficiency in Japanese Language. 2021
Participated in the Performance Arts Festival, IIT Bombay as a part of the winning dance team. 2015