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 and for Dexterous Manipulation.

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

B.Tech. in Computer Science and Engineering with Honours and Thesis | GPA: 8.72 *2015 - 2019*

- Selected courses: Foundations of Intelligent and Learning Agents, Advanced Machine Learning, 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.

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 which involved **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 system for object pose tracking.
- Learning with the above setup and approach achieved modest tolerance to initialization noise. **[PR] [Video]**

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

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

- Studied applicability of Dynamic Motion Primitives with **inferable goal, duration params** for robotic manipulation.
- Built a learning framework for gating policies operating in primitive param space that uses Deep RL algorithms.
- Investigated variants involving primitive interruption heuristics, duration inference mechanisms, optimization of inference costs, utilization of sub primitive trajectory information for frequent network updates.
- Evaluated performance and utility of the method regarding exploration efficiency, **trajectory smoothness**, in Maze, Box Push and Dexterous In-Hand Manipulation environments.

Out-of-Distribution detection 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 and ODIN to language domain for Active Learning of Named Entity Recognition (NER). **[Report]**
- Studied adaptation of NLP prediction services to client domains with obscure tokens and sub-optimal performance.
- Built model to adapt sentences by **contextual token substitutions** to improve performance on NER tagging.
- Employed REINFORCE to train the above model using sentence and token level rewards based on discrepancy between target labels and service model's predictions on adapted sentence.
- Employed task relevant exploration strategies to find relevant tokens efficiently using language models. **[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]**

Research Interests

Robotics, Human Computer Interaction: Deep Reinforcement Learning, Control Theory, Theory of Mind
Neural Network Modeling: Latent Representations, Graphical Models, Bayesian Reasoning
Data Mining, Organizing Web Information: Knowledge Graphs, Topic Embeddings, Commonsense Reasoning
Neuroscience, Neuromorphic Engineering: Cognitive Processes, Spiking Neural Networks
Geometry Processing: Shape Understanding, Scene Synthesis, Differential Geometry

Positions of Responsibility

Teaching Assistant *IITB*
Software Systems Lab, Autumn 2018 *July '18 - Nov '18*
- Awarded 'Certificate of Excellence' for the Month of Oct '18 in the CSE Department.

Academic Mentor *IITB*
CSE Department Academic Mentorship Program *May '18 - May '19*
- Mentored 7 sophomore students and helped them cope with academic problems.
- Mentored a back-logged student under the Academic Rehabilitation Program, IITB.

Core Member, Synergy From Diversity *Honda R&D*
Frontier Robotics *May '21 - Present*
- Organized language exchange sessions and workshops to promote cultural sensitivity and communication in the context of remote work during COVID-19.

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 sequence-to-sequence models to synthesize motion gestures of an animated character signing Japanese from annotated sentences.
- Studied modeling the generation of gestures with adversarially learnt style features to incorporate natural human-like variability.
- Explored various representations of orientations for efficiently learning them in a data scarce scenario. **[Report]**

Hand Gesture Recognition *IIT Bombay*
Institute Technical Summer Project *June '16*
- Designed and built a gesture recognition glove using accelerometer, gyroscope, flex sensors & Bluetooth module.
- Interfaced sensors with microprocessors programmed in C relaying data to an Android mobile device.
- Processed data stream using Dynamic Time Warping matching with prerecorded static and dynamic gestures.
- Investigated further development of the recognition software using sequence classification models built with weka.

Miscellaneous

Assisted in Honda R&D's recruitment activities from premier engineering universities in India. **2021**
N4 level proficiency in Japanese Language - on track for N3 by Dec '21. **2021**
Participated in the Asian Regional Space Settlement Design Competition and stood Runners' Up. **2013**