Varshith Sreeramdass

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Experience & Education

Frontier Robotics, Honda Innovative Research Excellence (R&D), Tokyo *2019 - Present*

Research Engineer

Indian Institute of Technology Bombay, Mumbai *2015 - 2019*

B.Tech. in Computer Science and Engineering with Honours and Thesis *GPA: 8.72*

Telangana State Board of Intermediate Education, Hyderabad *2013 - 2015*

Intermediate/+2 in Maths, Physics and Chemistry *GPA: 9.78*

Key Research

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

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

- Studied applicability of Dynamic Motion Primitives with **inferable goal, duration params** for robotic manipulation.
- Built a framework for **learning gating policies** operating in DMP params space, employing DRL algorithms **TD3**, **SAC** & **AWAC**.
- Investigated variants of the framework involving **primitive interruption** heuristics, **duration inference** mechanisms, optimization of **inference costs**, utilization of **sub primitive** trajectory information for dense(r) network updates.
- Investigated the performance and utility of the method regarding **exploration efficiency**, **trajectory smoothness**, in 2D Point Mass, Box Push and dexterous In-Hand Manipulation environments.

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

Akinobu Hayashi *Apr '20 - Aug '21*

- Evaluated baseline (SAC), existing **demo based** (DAPG) and **offline** (AWAC) RL methods in simulation on dexterous In-Hand Manipulation tasks which involved **transitions among tripod, precision and power grasps** of cylindrical and cuboid 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 setup for object pose tracking.
- Deployed mentioned data driven DRL algorithms on the above robot setup achieving modest tolerance to initialization noise.

Out-of-distribution detection and Active Learning with DNNs *IIT Bombay*

Prof. Sunita Sarawagi | Undergraduate Thesis - Part I *July '18 - March '19*

- Surveyed and evaluated out-of-distribution (OOD) detection methods involving SOTA **image classification** models: likelihood temperature scaling (TS), Variational Information Bottlenecks, multi-label models, calibrated NNs, perturbation based detectors (ODIN).
- Investigated applicability of OOD-ness as a **proxy for informativeness** of data samples for Active Learning of DNNs.
- Extended TS and ODIN for Active Learning of **language tasks**: NER tagging and sentiment classification.

Augmenting Scene Graph Generation with knowledge from corpora *IIT Bombay, IBM Bangalore*

Prof. S. 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 the baseline model of **Neural-Motifs**.
- Investigated methods to deal with relation label space discrepancy among text and visual sources.

Positions of Responsibility

Teaching Assistant

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

- Co-led a team of 8 TAs.
- Designed assignments, projects; organized tutorials, help sessions for a class of 130 sophomores.
- Awarded 'Certificate of Excellence' for the month of Oct '18 in the CSE Department.

Department Academic Mentor

CSE Department, IIT Bombay *May '18 - May '19*

- Mentored 7 sophomore students and helped them cope with academic problems.

Research Interests

Robotics, Human Computer Interaction: DRL, Control Theory, Theory of mind

Data Mining, Organization of Information: Knowledge Graphs, Topic Embeddings

Neural Network Modeling: Latent representations, Bayesian Reasoning

Geometry Processing: Shape Understanding, Scene Synthesis, Differential Geometry

Neuroscience, Neuromorphic Engineering: Cognitive Processes, Spiking NNs

Skills

ML, CV, Robotics

PyTorch, Tensorflow, Keras, CUDA (basic)

OpenCV, OpenGL

PyBullet, ROS, Pinocchio (basic)

Others

Git, Android Studio, Django, SQL

C++/C, Java, Python, JS, LaTeX

MATLAB, STATA, R

Other Projects

Domain Adaptation of Cloud NLP Services through word substitutions *IIT Bombay*

Prof. Sunita Sarawagi | Undergraduate Thesis - Part II *March '19 - May '19*

- Studied adaptation of general purpose NLP services to specific client domains on which performance may be sub-optimal.
- Built model to adapt sentences by **contextual token substitutions** to improve performance on NER tagging, sentiment classification.
- 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.
- Studied **task relevant** exploration strategies to find relevant tokens efficiently using language models, sentiment-aware embeddings.

Sign Language Synthesis with Adversarial Styling *Honda Research Institute Japan*

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

- Developed seq2seq 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.

Hand Gesture Recognition *IIT Bombay*

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

- Designed and built **gesture recognition glove** using accelerometer, gyroscope, flex sensors & Bluetooth module.
- Interfaced sensors with **microprocessors programmed in C** relaying data to an Android mobile device.
- Developed algorithms to process the data stream using **DTW** matching with prerecorded **static and dynamic gestures**.
- Investigated further development of the recognition software using **sequence classification models** built on **weka**.

Distributed Database System over PostgreSQL *IIT Bombay*

Prof. Sudarshan S | Course Project *July '17 - Nov '17*

- Built a wrapper over **multiple PostgreSQL servers** to facilitate use as a single database system.
- Developed algorithms for parallelizing select, insert, aggregate and delete operations over nodes.

Miscellaneous

Organized workshops at Honda R&D as a part of 'Synergy from Diversity' working group, to promote cultural sensitivity.	2021
Assisted in recruitment activities of Honda R&D, hiring candidates from premier engineering universities in India.	2021
N4 level proficiency in Japanese Language - on track for N3 by Dec '21.	2021
Participated in the Performance Arts Festival, IIT Bombay as a part of the winning dance team.	2015
Participated in the Asian Regional Space Settlement Design Competition and stood Runners' Up.	2013

Scholastic Achievements

2015 **AP Grade**, Exceptional Performance in Engineering Graphics

2015 **AIR 204**, Joint Entrance Examination Advanced

2014 **AIR 710**, Kishore Vaigyanik Protsahan Yojana Fellowship

2014 **Top 1%**, NSE Physics, Andhra Pradesh, IAPT