Sankalp Garg

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Education

Carnegie Mellon University, Machine Learning Department *August 2021 - December 2022*
M.Sc in Machine Learning CGPA: 4.08
Advisor: Prof. Aditi Raghunathan and Prof. Zico Kolter

Indian Institute of Technology Delhi *July 2016 - July 2020*
B.Tech in Electrical Engineering CGPA: 9.36/10
Advisor: Prof. Mausam Department Rank 5

Publications

* - equal contribution

5. **Finetune like you pretrain: Improved finetuning of zero-shot vision models**
   Sachin Goyal, Ananya Kumar, **Sankalp Garg**, Zico Kolter, Aditi Raghunathan
   *Computer Vision and Pattern Recognition Conference (**CVPR**) 2023*

4. **Symbolic Network: Generalized Neural Policies for Relational MDPs**
   Sankalp Garg, Aniket Bajpai, Mausam.
   *International Conference on Machine Learning (**ICML**) 2020* **(Virtual Talk)**
   PRL workshop @ ICAPS, 2020.

3. **Temporal Attribute Prediction via Joint Modeling of Multi-Relational Structure Evolution**
   Sankalp Garg*, Navodita Sharma*, Woojeong Jin, Xiang Ren.
   *International Joint Conference on Artificial Intelligence (**IJCAI**) 2020.*

2. **Size Independent Neural Transfer for RDDL Planning**
   Sankalp Garg, Aniket Bajpai, Mausam.
   *International Conference on Automated Planning and Scheduling (**ICAPS**) 2019.*

1. **Transfer of Deep Reactive Policies for MDP Planning**
   Aniket Bajpai, **Sankalp Garg**, Mausam.
   *Conference on Neural Information Processing Systems (**NeurIPS**) 2018.*

Employment and Internships

Apple *Jan 2023 - Present*
Siri Info Intelligence Team

- Language understanding and search ranking for Siri, Spotlight and Safari.

Amazon AI *May 2022 - August 2022*
Advisors: Dr. Murali Narayanaswamy
RL base Rightsizing of Redshift Databases

- Worked on developing Reinforcement Learning methods to determine the best size for optimal query processing
- Analyzed $100s$ for Database instances to create a model to predict query execution time
- Built a simulator of Redshift database to train RL models effectively
- Added features to RL models for zero-shot adaptation on new database instances.

Quadeye (High Frequency Trading) *July 2020 - August 2021*
Quantitative Strategist

- Developed and handled strategies trading in India and Brazil.

Microsoft Research India *Jan 2020 - June 2020*
Advisors: Dr. Prateek Jain & Dr. Harsha Vardhan Simhadri
Keyword Spotting on Tiny Devices (NLP)

- Developed phoneme detection model for low memory devices, achieving 3x compression with comparable accuracy
- Developed a keyword classifier using phoneme detection achieving 90% accuracy by training on synthetic data and testing on real world noisy data.

University Of Southern California, Los Angeles, US *Summer 2019*
Advisors: Prof. Xiang Ren
Joint Modeling of Structure and Attribute Evolution in Temporal Knowledge Graphs

- Designed a new Neural Network Framework to predict time-series which incorporates information from temporal graphs.
- Introduced static & dynamic embeddings which aggregates neighborhood information to capture the interdependency.

National University of Singapore *Summer 2018*
Advisors: Prof. Brian Lim
Explainable AI for Food Recommendation Systems

- Developed a system capable of providing an explanation for the food recommendation provided by dieting apps.
- Implemented a Natural Language Conversation System capable of answering questions in form of a dialog.

Miscellaneous

- **Conference Reviewer** ICML 2024, ICLR 2024, NeurIPS 2023, ICAPS 2023, ICAPS 2022
- ***Teaching assistant*** Indian Institute of Technology Delhi, Electromagnetic Engineering (ELP212) *July 2019- Dec 2019*

Skills

Deep Learning, Machine Learning, Reinforcement Learning, Large Language Models (LLM), CLIP, Foundation Models, PyTorch, Tensorflow, GoLang, C++, Python, Linux

Selected Awards and Honors

- Awarded NSF I-Corps fellowship to work on my startup at CMU. *2021*
- Awarded J.N. Tata Scholarship for pursuing higher education. *2021*
- Selected for the Harvard Project for Asian and International Relations (**HPAIR**) 2020. *2020*
- Awarded **INAE conference travel grant** for presenting research work at ICAPS, Berkeley, USA. *2019*
- **IUSSTF-Viterbi Scholarship:** Awarded to 15 students for conducting research at University of Southern California. *2019*
- **IRD 1234 Research Grant:** Awarded a research grant for ₹100K by IIT Delhi. *2018*
- Awarded **IITD Semester Merit Award** (top 7%) undergraduate students in the 1^{st}, 2^{nd}, 4^{th} and 5^{th} semester. *2016-2019*
- Represented India in **Asian Physics Olympiad (APhO) 2016** held in Hong Kong in a team of 7 students. *2016*
- Gold Medal in India at OCSC for International Physics Olympiad '16. *2016*
- Gold Medal in India at OCSC for International Chemistry Olympiad '16. *2016*
- Awarded **KVPY Fellowship** by Department of Science and Technology, Government of India *2015*
- Awarded **NTSE** Scholarship by **Government of India** for securing All India Rank 66. *2012*

Selected Research Projects

Generalized Neural Policies for Relational MDPs *March 2019 - December 2019*
Advisor: Prof. Mausam

- Developed a method for learning generalized policy from first order representation of RMDPs in RDDL.
- Achieved 90% transfer on 40 instances and 80% transfer on 50 instances, out of 54 instances without retraining on 9 RDDL domains beating the previous baselines.
- Research paper presented at **ICML 2020** (Virtual Talk).

Size Independent Neural Transfer for RDDL Planning *August 2018 - February 2019*
Advisor: Prof. Mausam

- Developed a method for zero-shot neural transfer of policy for RDDL MDPs.
- Developed a problem-size independent framework for learning the policy using Reinforcement Learning.
- Research paper presented at **ICAPS 2019**, University of California Berkeley.

Transfer of Deep Reactive Policies for MDP Planning *February 2018 - June 2018*
Advisor: Prof. Mausam

- Developed a Deep Reinforcement Learning Architecture which generalizes across instances of a MDP problem domain and transfers the knowledge to unseen instance of the problem on same size domain.
- Model incorporates ideas from Graph Convolutions, A3C, Auxiliary tasks, and Multi-task learning.
- Transfer Learning incorporates ideas from classical learning by estimating the transition function from the graphs embeddings.
- Research paper presented at **NeurIPS 2018**, Montreal, Canada.