Sarthak Ahuja

CONTACT INFORMATION

Working remotely from Vancouver, BC

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EDUCATION

The Robotics Institute, Carnegie Mellon University, Pittsburgh
Master of Science, Robotics, *GPA 4.24/4.33* — Aug. 2018 - Aug. 2020
Courses: Computer Vision, Machine Learning, Human-Robot Interaction, Planning for Robotics, Deep Reinforcement Learning

Indraprastha Institute of Information Technology (IIIT), Delhi
Bachelor of Technology (Honors), Computer Science, *GPA 9.1/10.0* — Aug. 2012 - May 2016

EXPERIENCE

Machine Learning Engineer II, Amazon Alexa AI — Aug. 2020 onwards
Member of the dynamic routing science team in the Natural Understanding org building scalable end-to-end self-learning ML systems that predict and dynamically route user intents to appropriate Alexa actions.

Graduate Research Assistant, The Robotics Institute — Oct. 2019 to Aug. 2020
Advised by Prof. Henny Admoni and Prof. Aaron Steinfeld. Worked on improving a robot's self-assessment capabilities using vision-based physics intuition models that guide robots to conduct safe manipulation decisions; Researched the effects of anticipatory robot motion during human-robot interactions.

Research Software Engineer, IBM Research India — July 2016 to July 2018
Member of the Collaborative AI team and lead developer for IBM Watson Recruitment. Research lied in domains of natural language processing (dynamic taxonomy generation and semantic similarity computation) and multi-agent systems (human behavior modeling in repeated social dilemmas).

Research Associate, PreCog Research Group, IIIT-Delhi — May 2016 to July 2016
Advised by Prof. Ponnurangam Kumaraguru. Developer on Project-O, Precog's social media analytics platform. Research focused in the domain of social systems and computer vision - particularly on patch-based visual summarization of social media events using discriminative learning.

Research Intern, Infosys Center for AI, IIIT-Delhi — May 2015 to July 2015
Advised by Dr. Saket Anand. Core member of IIIT-Delhis Autonomous Car Team - Swarath working on the perception system architecture and testing framework; Research focused on SLAM algorithms for visual positioning and navigation using wearable and vehicle dashboard monocular cameras.

SELECTED PEER-REVIEWED PUBLICATIONS

- **Ahuja, S.**, Kachuee, M.; Sheikholeslami, F.; Liu, W., Do, J.; Scalable and Safe Remediation of Defective Actions in Self-Learning Conversational Systems, Association for Computational Linguistics (ACL) 2023
- Kachuee, M.; Nam, J.; **Ahuja, S.**; Won, J.; Lee, S.; Scalable and Robust Self-Learning for Skill Routing in Large-Scale Conversational AI Systems, North American Chapter of the Association for Computational Linguistics (NAACL) 2022
- Newman, B*; Biswas, A*, **Ahuja, S.**, Girdhar, S.; Kitani, K.; Admoni, H.; Examining the Effects of Anticipatory Robot Assistance on Human Decision Making, International Conference on Social Robotics (ICSR) 2020
- **Ahuja, S.**, Admoni, H., Steinfeld, A.; Learning Vision-Based Physics Intuition Models for Non-Disruptive Object Extraction from Clutter, International Conference on Intelligent Robots and Systems (IROS) 2020 [**Nominated for Best Student Paper**]
- Vallam, R., **Ahuja, S.**, Chaudhuri, R., Sajja, S., Pimplikar, R., Mukherjee, K., Parija, G.; Interactive POMDPs for Social Decision Making with Dynamic Focus on Agents, International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS) 2019 (pp. 674-682)
- Mondal, J., **Ahuja, S.**, Singh, S., Mukherjee, K., Parija, G.; Benchmarking of a Novel POS Tagging Based Semantic Similarity Approach for Job Description Similarity Computation, European Semantic Web Conference (ESWC) 2018 (pp. 430-444). Springer
- **Ahuja, S.**, Mondal, J., Singh, S., George, D.; Similarity Computation Exploiting the Semantic and Syntactic Inherent Structure among Job Titles, International Conference on Service-Oriented Computing (ICSOC) 2017 (pp. 3-18). Springer
- Goel, S., **Ahuja, S.**, Subramanyam, A., Kumaraguru, P.; #VisualHashtags: Visual Summarization of Social Media Events Using Mid-Level Visual Elements, ACM International Conference on Multimedia (ACMMM) 2017, (pp. 1434-1442)
- Singh, S., Chaudhuri, R., Kuchhal, M., **Ahuja, S.**, Parija, G.; Multi level clustering technique leveraging expert insight, Joint Statistical Meetings (JSM) 2017

Selected Patents and Applications

- George, D., Mondal, J., Singh, S., **Ahuja, S.**, Medicke, J., Klabzuba, A.; System and Method to Produce Generalized Representation of Job Description Documents and Calculate Similarity Using the Representation in Recruitment Domain, U.S. Patent No. 11410130 (**Granted 2022**)
- **Ahuja, S.**, Mukherjee, K., Mondal, J., Singh, S.; App-lause - Automatic Audience Generation and Simulation for Immersive Rehearsals U.S. Patent No. 10970898 (**Granted 2021**)
- **Ahuja, S.**, Singh, S., Parija, G., Chaudhuri, R., Kuchhal, M., Kataria, M.; SIdeal: System and Method for Attribute Weight Induction in a Multiple Recruiter Setting Exploiting Public Goods Games Framework, U.S. Patent Application No. 15/842,066 (Pending)

Selected Projects

Informed Multi-Representation Multi-Heuristic A*

- Implemented an informed version of MRMHA* that uses past plans to control future state expansions; Used Conditional-VAEs to learn a sampling distribution (Ichter et al. ICRA 2018) over state expansions on subsets of the state-space to better schedule expansions from their corresponding queues.

Assistive Sketching and Animation Using Shape-Aware Moving Least Squares Deformations

- Developed an end-to-end sketching platform which assists an artist to draw complex non-convex 2D characters and dynamically animate them using a Kinect; Implemented drawing tools using bezier curves, distance-transform based skeletonization, and shape-aware deformations (Sharma et al. SA 2015).

Semi-Supervised Stance Detection in Tweets

- Implemented a heuristic-based semi-supervised learning approach, LDA2Vec (Moody CoNLL 2016) for stance detection that learns a coherent and informed embedding comparable to Para2Vec, concurrently bolstering interpretability of topics by creating representations similar to those in Latent Dirichlet Allocation.

Deep Learning Based Dynamic Taxonomy Generation

- Developed a semi-supervised learning approach for dynamically generating a large taxonomy over a large dataset of keywords; Proposed a novel LSTM based architecture that learns over random branches of a small seed taxonomy and uses the trained model to place unseen words under an appropriate parent word.

Speech-Based Distress Detection

- Created an android application that uses a two-stage contextual supervised learning algorithm (Sharma et al. TASLP 2015) to robustly detect speech based distress activity in urban spaces; Developed a web dashboard to monitor the generated alarms and mine for large-scale occurrence patterns in real-time data.

Multi-Sensor Data Fusion for Ego-Centric Human Activity Recognition

Created a real-time system to perform ensemble based sensor fusion between two signals for human activity detection, accelerometers and egocentric cameras, to improve the overall performance of the system.

Multi-Agent Path Planning (MAPP) for Warehouse Butlers

- Hacked an implementation of Pacman to create a simulator with multiple robots trying to reach their resp. goals simultaneously. Implemented a Multi-Agent Path Planning Algorithm (Wang et al. ECAI 2010) and analyzed characteristic warehouse designs and how they affect the quality of the generated plans.

Academic Service

- Reviewer, Conference on Information and Knowledge Management (CIKM) 2019
- Reviewer, International Conference on Robotics and Automation (ICRA) 2021
- Reviewer, International Conference on Intelligent Robots and Systems (IROS) 2021
- Reviewer, IEEE Robotics and Automation Letters (RAL) 2021
- Reviewer, International Conference on Robotics and Automation (ICRA) 2023
- Reviewer, Conference on Empirical Methods in Natural Language Processing (EMNLP) 2023

Selected Honors and Awards

- Nominated for Best Student Paper at IROS 2020 for the paper "Learning Vision-Based Physics Intuition Models for Non-Disruptive Object Extraction from Clutter".
- Awarded the Graduate Student Conference Funding by the Graduate Student Assembly and the Provosts Office to present research at AAMAS 2019.
- J.N. Tata Scholar - Awarded the J.N. Tata Scholarship 2019 for pursuing graduate studies at CMU.
- Runners-Up, Space Innovation Challenge 2018, CMU Tepper School of Business.
- Awarded the IBM Manager's Choice Award 2016.
- Awarded the All Round Performance Medal for outstanding overall performance in curricular and extra-curricular activities in the B.Tech. (CSE) program 2016.
- Awarded First Prize in the Technical Paper Presentation event at Cogenesis 2016, Delhi Technological University for "Multi-Sensor Data Fusion for Human Activity Recognition".
- Awarded Best Demo Award in the Elevator Pitch Event at IIIT-Delhi Research Showcase 2015 for "Distress Detection".