Sarthak Ahuja

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EDUCATION

CARNEGIE MELLON UNIVERSITY
School of Computer Science
Masters in Robotics
Exp July 2020 | Pittsburgh, PA
GPA 4.22/4.33

IIIT-DELHI
B.Tech. in Computer Science
May 2016 | Delhi, India
GPA 9.1/10.0

TECHNICAL SKILLS

Github: https://github.com/thecoldviews
Languages: Python, C++, MATLAB, Java
ML Tools: Spark, Pandas, scikit-learn
Deep Learning: PyTorch, Tensorflow
Robotics: ROS, OpenCV, V-REP, MoveIt
Platforms: SPSS, AWS, Android Studio
OS: Linux, Windows

PUBLICATIONS

Interactive POMDPs for Social Decision Making with Dynamic Focus on Agents
Vallam, R., Ahuja, S., et al. | *AAMAS 2019*
Similarity Computation Using the Semantic and Syntactic Structure among Jobs Titles
Ahuja, S., Mondal, J. et al. | *ICSOC 2017*
Visual Summarization of Social Media Events Using Mid-Level Visual Elements
Goel, S., Ahuja, S., et al. | *ACMMM 2017*
Visit Google Scholar for the complete list.

PATENTS

Candidate Selection Using a Gaming Framework (2019)
Pub. No. US20190188646A1
Triplet Representations to Assess Similarity Between Job Description Documents (2019)
Pub. No. US20190197482A1

COURSEWORK

Machine Learning
Computer Vision
Deep Reinforcement Learning
Deep Learning for Computer Vision
Data Structures and Algorithms
Planning for Robotics

AWARDS

- Recipient of the **GSA Conference Funding** for presenting research at AAMAS (2019)
- Recipient of the **J.N. Tata Scholarship** for pursuing higher education (2018)
- Recipient of the **Manager's Choice Award** at IBM Research India (2017)
- Recipient of the **Gold Medal for All-Round Performance** at IIIT-Delhi (2016)

WORK EXPERIENCE

THE ROBOTICS INSTITUTE (CMU) | Graduate Research Assistant
Jan 2019 - present | Pittsburgh, PA

- Proposed an object-conditioned multi-view CNN architecture to visually assess the stability of partially occluded cluttered scenes and guide safe object extraction.
- Developed a data-simulation pipeline using MuJoCo to generate synthetic data for training the model and used domain randomization to transfer it to real-world scenes.
- Delivered a real-time pipeline for object detection and support-structure inference using Mask R-CNN and Fully-Convolutional Networks.
- Successfully demonstrated an overall reduction in the manipulation failure rate around careful object selection by **15%** on our collected dataset (under review at **IROS 2020**).
- Implemented manipulation and perception ROS APIs for performing pick-and-place tasks using Kinova Mico and Baxter that are widely used across multiple lab projects.

IBM RESEARCH LAB | Research Engineer - Machine Learning (ML)
July 2016 – July 2018 | Delhi, India

- Spearheaded the design of the Apache Spark based ML component for **Watson Recruitment** - an AI powered job application tracking and candidate matching system.
- Collaborated with 3 remote teams and wrote the complete software stack for real-time resume processing, cloud data management, model training and model deployment.
- Proposed a document matching algorithm that used domain-specific hierarchical representations to out-perform LDA/Doc2Vec baselines on our proprietary datasets.
- Developed a dynamic particle allocation method for resourcefully modeling the nested belief states of participating agents in a public goods game leading to an early stage improvement of **16%** in the prediction accuracy (presented at **AAMAS 2019**).

PRECOG RESEARCH GROUP (IIIT-DELHI) | Research Associate
May 2016 – July 2016 | Delhi, India

- Developed an unsupervised discriminative clustering method that used iteratively trained SVMs for patch-based visual summarization of social media events.
- Effectively reduced the search space of user queries by **99%** while maintaining high coverage and interpretability (presented at **ACM Multimedia 2017**).

SWARATH RESEARCH GROUP (IIIT-DELHI) | Research Intern
May 2015 – July 2015 | Delhi, India

- Designed the ROS infrastructure (design patterns, test suite, topics, messages) for the perception system of a drive-by-wire autonomous E-rickshaw.
- Delivered workshops on ROS, Git and C++ to 40 junior interns and mentored them in developing perception algorithms (such as for pedestrian and lane detection), leading to our team's qualification for the **Mahindra Driverless Car Challenge**.

SELECTED PROJECTS

- **Informed Multi-Representation Multi-Heuristic A* (CMU)**: Used Conditional VAEs to learn a sampling distribution over state expansions on subsets of the state-space to better control expansions from corresponding queues.
- **Assistive Sketching and Animation (CMU)**: Developed an end-to-end platform which assists an artist to draw and animate complex non-convex 2D characters using distance-transform based skeletonization and shape-aware deformations.
- **Stance Detection in Tweets (CMU)**: Implemented a heuristic-based semi-supervised learning approach, LDA2Vec, that combines the benefits of Para2Vec and LDA by learning a coherent and interpretable embedding of topics.
- **Speech-Based Distress Detection over Mobile Devices (IIIT)**: Implemented a two-stage supervised learning algorithm to detect distress activity on a user's mobile device and predict occurrence patterns over crowd-sourced data in real-time.
- **Multi-Sensor Data Fusion for Ego-Centric Human Activity Recognition (IIIT)**: Created a system for sensor fusion between accelerometer data from a smart watch and structured optical flow from an egocentric camera for human activity detection.