Priyam Parashar

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Summary

I am interested in behavior planning and, more importantly, plan recovery for autonomous agents in semi-structured domains. My thesis work grounds execution of traditional planning methods in perception of an agent using behavior trees, enabling complex recovery behaviors based on both observations and domain knowledge. My internships have provided me with specific experience with mobile agents (planning driving behaviors at HRI and indoor travel-time prediction at Vecna Tech.) while my thesis work focuses on agents with a manipulator.

Education

2016-Present PH.D. RESEARCHER in Computer Science **UC, San Diego**
Expected: Summer 2021

2015-2016 PH.D. RESEARCHER in Robotics **IRIM, Georgia Institute of Technology**
CGPA: 3.50 / 4.00

2015 M.SC. in Robotics **Robotics Institute, CMU**
CGPA: 3.90 / 4.00

2013 B.TECH. in Elec. and Comm. **International Institute of Information Technology, Hyderabad**
CGPA: 8.55 / 10.00

Research and Work Experience

2015-Present COGNITIVE ROBOTICS LAB - UC SAN DIEGO, CA
- Research and design plan recovery methods for robots in assembly domain
- Grounding planning using cognitive architectures and behavior trees for monitoring [1],[2]
- Scoped recovery problem based on observed failures at action, task and mission level [arxiv]
- Designing methods based on perception and domain knowledge for recovery and plan repair at each level

2017 HONDA RESEARCH INSTITUTE - US - SAN JOSE, CA
- Trained and designed driving behaviors around occlusive objects off to the side of the road using keypoints extracted from expert demonstrations [5]
- Designed and developed a driving simulator in Gazebo from scratch
- Collected expert driving demonstrations using simulator to study driving patterns
- Designed a maneuvering strategy to account for occluded pedestrians based on number of lanes on the road and distance-from *&* size-of the object
- Trained smooth driving behavior using keyframes and splines

2013-2014 ROBOTICS INSTITUTE - CMU - PITTSBURGH, PA
- Trained classifier to distinguish between segments with complex and simple traffic patterns for indoor maps. Based on analysis trained a predictor for average travel-time on complex edges based on daily, weekly and monthly features
- Analyzed months of travel logs on CoBot to design classifier and predictor [3]
- Identified 5% of total corridors as being complex and predicted travel-time using random forest with <2.7 sec error

2014 VECNA TECHNOLOGIES, INC. - CAMBRIDGE, MA
- Tuned predictor parameters based on data from real-world runs of QC Bot in office facility
- In conjunction with project at CMU, implemented the complexity classifier and traffic predictor for QC Bot in C++

Selected Publications and Patents (all)

[1] **Parashar, Priyam**, Ashok K. Goel, Bradley Sheneman, and Henrik I. Christensen. "Towards life-long adaptive agents: using metareasoning for combining knowledge-based planning with situated learning." *The Knowledge Engineering Review 33* (2018): e24

[2] **Priyam Parashar**, Bradley Sheneman, Ashok K. Goel "Adaptive Agents in Minecraft: A Hybrid Paradigm for Combining Domain Knowledge with Reinforcement Learning."
In: *International Conference on Autonomous Agents and Multiagent Systems* (pp.86-100). Springer, 2017

[3] **Parashar, Priyam**, Robert Fisher, Reid Simmons, Manuela Veloso, and Joydeep Biswas. "Learning context-based outcomes for mobile robots in unstructured indoor environments."
In *IEEE 14th International Conference on Machine Learning and Applications*, pp. 703-706. IEEE, 2015

[4] Goel, Ashok K., Tesca Fitzgerald, and **Priyam Parashar**. "Analogy and metareasoning: Cognitive strategies for robot learning."
In *Human-Machine Shared Contexts*, pp. 23-44. Academic Press, 2020

[5] **Parashar, Priyam**, Kikuo Fujimura, Alireza Nakhaei Sarvedani, and Akansel Cosgun. "Keyframe based autonomous vehicle operation."
U.S. Patent 10,739,774, issued August 11, 2020.

Technical Projects

2020 World Robot Summit - Assembly Challenge 2020 with RPDC Robotics
- Led a team of three to build a dual-arm assembly system from scratch [video], [arxiv]
- Designed the ROS architecture, the behavior planner and plan recovery system based on hierarchical task networks and behavior trees [arxiv]
- Responsible for project management, problem-scoping and cross-team communication
- Our system passed screening process to compete in the finals which remains postponed

2017 RoboCup @ Home Competition
- Responsible for designing behavior of the robot for various challenges integrating output of perception and input to specialized planners into a state-machine
- Covered by UC San Diego news release

2013-2014 Selected Projects from M.Sc.
- Analysis and comparison between constrained human hand and parallel gripper for specified manipulation tasks [report]
- Visual Wikipedia: Landmark detection for cities [report]
- Extracting Interest Regions from Egocentric Image Streams and Comparison with Existing Saliency Techniques [poster]

Awards and Honors

- Paper [2] won the Visionary Paper award at AAMAS 2017
- Received Georgia Robotics Fellowship for Women and Underrepresented Minorities
- Awarded on the Dean's List of Academic Excellence: Monsoon-2010, Monsoon-2011, Monsoon-2009, and Spring-2012
- Work on [1] and [2] featured in news articles [article-1], [article-2]

Other Experiences

TAship Served as both lab and course-oriented teaching assistant for: CSE291-SP17 (UCSD); CSE3630-SP16 (GT); 'Electronics Workshop II' – Spring 2012 and 'Embedded Hardware Design' – Fall 2011 (IIIT-H)

Leadership Founding member of Women in Robotics at UC San Diego
Chaired on boards of RoboGrads at Georgia Tech and UC San Diego

Volunteering Active member of RoboGrads @ UC San Diego Outreach committee
Participated in project showcase at Contextual Robotics Insitute/San Diego Robotics Forum @ UC San Diego 2017, 2018, 2019
Participated in Robotics Week at Georgia Tech 2016
Reviewed papers for conferences like IROS, ICRA, and AAAI; and for journals like T-RO, IJRR and RA-Letters