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karthikv792
Scholar profile

Karthik Valmeekam

Research Interests

My current research primarily focuses on the intersection of Large Language Models (LLMs) and reasoning, with a special emphasis on examining the planning capabilities of LLMs. This research involves two key aspects:

- Identifying the inherent limitations of LLMs in generating plans, particularly in classical planning, and
- Demonstrating the constructive applications of LLMs as complementary tools alongside the robust planners developed in the AI Planning community.

Experience

May 2024 – August 2024 **amazon Science**, *Applied Scientist Intern*, Palo Alto, CA, United States.

Education

Fall 2021 – Spring 2026 (Expected) **Arizona State University**, Tempe, AZ, United States
Ph.D. in Computer Science, Advisor: *Prof. Subbarao Kambhampati*
Research: Large Language Models, Automated Planning, Reinforcement Learning
GPA: 4.0/4.0

Fall 2019 – Spring 2021 **Arizona State University**, Tempe, AZ, United States
M.S. in Computer Science, Advisor: *Prof. Subbarao Kambhampati*
Thesis: A Study of Explainable Decision Support for Longitudinal Sequential Decision Making
GPA: 4.0/4.0

Fall 2015 – Spring 2019 **Vellore Institute of Technology**, Vellore, TN, India
B.Tech. in Computer Science and Engineering
GPA: 9.19/10.0

Selected Publications and Manuscripts

ICML 2024 Subbarao Kambhampati, **Karthik Valmeekam**, Lin Guan, Kaya Stechly, Mudit Verma, Siddhant Bhambri, Lucas Saldyt, Anil Murthy. LLMs Can't Plan, But Can Help Planning in LLM-Modulo Frameworks. In Forty-first International Conference on Machine Learning, 2024.

Arxiv Preprint (Under Review) Atharva Gundawar, Mudit Verma, Lin Guan, **Karthik Valmeekam**, Siddhant Bhambri, Subbarao Kambhampati. Robust Planning with LLM-Modulo Framework: Case Study in Travel Planning. arXiv preprint arXiv:2405.20625, 2024.

Arxiv Preprint (Under Review) Kaya Stechly, **Karthik Valmeekam**, Subbarao Kambhampati. Chain of thoughtlessness: An analysis of cot in planning. arXiv preprint arXiv:2405.04776, 2024.

Arxiv Preprint (Under Review) Subbarao Kambhampati, **Karthik Valmeekam**, Lin Guan. On the self-verification limitations of large language models on reasoning and planning tasks. arXiv preprint arXiv:2402.08115, 2024.

AAAI 2024 Subbarao Kambhampati, **Karthik Valmeekam**, Lin Guan. On the role of large language models in planning. Tutorial at the AAAI Conference on Artificial Intelligence, 2024.

NeurIPS 2023 **Karthik Valmeekam**, Matthew Marquez, Sarath Sreedharan, Subbarao Kambhampati. On the Planning Abilities of Large Language Models–A Critical Investigation. In Thirty-seventh Conference on Neural Information Processing Systems, 2023.
Spotlight paper (Top 3%).

NeurIPS 2023 Lin Guan*, **Karthik Valmeekam*** (equal contribution), Sarath Sreedharan, Subbarao Kambhampati. Leveraging Pre-trained Large Language Models to Construct and Utilize World Models for Model-based Task Planning. In Thirty-seventh Conference on Neural Information Processing Systems, 2023.

NeurIPS 2023 **Karthik Valmeekam**, Matthew Marquez, Alberto Olmo, Sarath Sreedharan, Subbarao Kambhampati. PlanBench: An Extensible Benchmark for Evaluating Large Language Models on Planning and Reasoning about Change. In Thirty-seventh Conference on Neural Information Processing Systems Datasets and Benchmarks Track, 2023.

FMDM @ NeurIPS 2023 **Karthik Valmeekam***, Matthew Marquez* (equal contribution), Subbarao Kambhampati. Can Large Language Models Really Improve by Self-critiquing Their Own Plans?. In NeurIPS 2023 Foundation Models for Decision Making Workshop, 2023.

ICAPS 2023 Subbarao Kambhampati, **Karthik Valmeekam**, Matthew Marquez, Lin Guan. On the role of large language models in planning. Tutorial at the International Conference on Automated Planning and Scheduling (ICAPS), 2023.

ICLR 2023 Lin Guan, **Karthik Valmeekam**, Subbarao Kambhampati. Relative Behavioral Attributes: Filling the Gap between Symbolic Goal Specification and Reward Learning from Human Preferences. In The Eleventh International Conference on Learning Representations, 2023.

ICAPS 2022 **Karthik Valmeekam**, Sarath Sreedharan, Sailik Sengupta, Subbarao Kambhampati. RADAR-X: An Interactive Mixed Initiative Planning Interface Pairing Contrastive Explanations and Revised Plan Suggestions. In Proceedings of the International Conference on Automated Planning and Scheduling (Vol. 32, pp. 508-517), 2022.

Projects

2021 **Reinforcement Learning for Imperfect Information Games**
On a two-player imperfect information game (Sequence), an agent was trained offline by *approximation in value and policy space* using neural networks. In the test phase, the agent used one-step look-ahead using the trained network to make a move. This improved win percentage (upto 60%) with more training against a random agent.

2020 **High-Speed Autonomous Drifting using Deep Reinforcement Learning**
An end-to-end drift controller which utilizes a state-of-the-art model-free reinforcement learning algorithm is modelled using *Pytorch*. This RL problem is devised as a trajectory following problem. The resulting agent was able to generate the required behavior.

Teaching & Service

Teaching Assistant 2021: **CSE471-Intro to Artificial Intelligence** by Prof. Subbarao Kambhampati.

Reviewer/PCM 2024: **ICLR, NeurIPS, AAAI-Student Program, ICRA.**
2023: **ICLR, NeurIPS, ICAPS, HAXP@ICAPS, GenPlan@NeurIPS.**
2022: **XAIP@ICAPS.**

Student Volunteer 2021: **AAAI, ICAPS.**

Skills

Programming Python, C++, HTML/CSS, JavaScript, Bash, SAP-ABAP, SQL, PDDL

Frameworks Pytorch, Transformers (HuggingFace), PyTorch Lightning, Scikit-Learn, Numpy, Pandas, OpenAI gym, Keras, NLTK, Flask, JQuery, Bootstrap

Misc Adobe Premiere Pro, Lightroom, Photoshop, Git, Latex

Honors

2024 SCAI Doctoral Fellowship (Merit-Based), Arizona State University.

2021 CIDSE Doctoral Fellowship (Merit-Based), Arizona State University.

2018 Vice Chair Management of the student chapter CODECHEF-VIT, Vellore Institute of Technology