Vedant Khandelwal

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Summary

Doctoral Student at the University of South Carolina with expertise in Generative AI, Knowledge Graphs, and Deep Reinforcement Learning, working on solving pathfinding problems and developing safe conversational agents.

Work Experience

- **Artificial Intelligence Institute, University of South Carolina [🌐]** *01/2021 - Present*
  Graduate Research and Teaching Assistant Columbia, US
  - Developing a foundation model that can generalize with little or no fine-tuning to pathfinding problems and applications.
  - Working in the integration of Large Language Models and Knowledge graphs to build safe mental health conversational agents.
  - **Teaching Assistant:** Database System Design (Spring 2021), Artificial Intelligence (Spring 2024).
- **Artificial Intelligence Institute, University of South Carolina [🌐]** *12/2019 - 07/2020*
  Research Affiliate Columbia, US
  - Developed a knowledge-infused machine learning pipeline for assessing the psychological impacts of pandemics using tweets.
  - Analyzed 12 billion COVID-19 tweets to study the spatiotemporal effect of the pandemic and policy decisions.

Education

- **University of South Carolina** *01/2021 - Present*
  Doctor of Philosophy, Computer Science Columbia, South Carolina
  - **Advisors:** Forest Agostinelli, Amit Sheth.
  - **Relevant Coursework:** Artificial Intelligence, Reinforcement Learning & Search, Trusted AI.
  - **Award:** Best Poster Award at DISCOVER USC 2024, **"Foundation Model For Pathfinding Problems."** ($>$ 500 Participants).
- **International Institute of Information Technology, Naya Raipur** *05/2020*
  Bachelor of Technology in Computer Science & Engineering Chhattisgarh, India
  - **Relevant Coursework:** Data Structures & Algorithms, Data Science, Artificial Intelligence, Discrete Math, Statistics & Probability.
  - **Award:** **Institute Gold Medal** for Best All-Round Performance.

Projects

- **Foundation Model for Pathfinding Problems | *Publication: C.1, W.1***
  - Developing a foundational model capable of generalizing across various pathfinding problems.
  - Successfully achieved generalizability across goals and action-varying domains of the same size.
- **Safe Mental Health Conversational Agents | *Publication: C.3***
  - Developed an AI conversational agent for personalized mental health support.
  - Improved and controlled patient interactions, leveraging generative AI and clinical knowledge graphs.
- **Knowledge Graph and Generative AI-Based Scholarly Article Retrieval for Systematic Review | *Publication: C.2***
  - Enhanced systematic review efficiency in academic research with Knowledge Graph and Generative AI approach.
  - Improved 90% time for scholarly article retrieval through knowledge-infused query expansion and context enrichment.

Publications

C=Conference, J=Journal, W=Workshops, S=Symposium

[C.1] *Vedant Khandelwal*, Manas Gaur, Ugur Kursuncu, Valerie Shalin, and Amit Sheth. **"A Domain-Agnostic Neurosymbolic Approach for Big Social Data Analysis: Evaluating Mental Health Sentiment on Social Media during COVID-19."** In Proceedings of the *IEEE International Conference on Big Data*, 2024. *Link*

[C.2] Forest Agostinelli, Rojina Panta, and *Vedant Khandelwal*. **"Specifying goals to deep neural networks with answer set programming."** In Proceedings of the *ICAPS*, vol. 34, pp. 2-10, 2024. *Link*

[C.3] Kaushik Roy*, *Vedant Khandelwal**, Harshul Surana, Valerie Vera, Amit Sheth, and Heather Heckman. **"GEAR-Up: Generative AI and External Knowledge-based Retrieval Upgrading Scholarly Article Searches for Systematic Reviews."** In Thirty-Eighth *AAAI Conference on Artificial Intelligence. 2024. Link*

[C.4] Kaushik Roy,*Vedant Khandelwal*, Raxit Goswami, Nathan Dolbir, Jinendra Malekar, and Amit Sheth. **"Demo Alleviate: Demonstrating Artificial Intelligence Enabled Virtual Assistance for Telehealth: The Mental Health Case."** In Thirty-Seventh *AAAI Conference on Artificial Intelligence. 2023. Link*

[C.5] Amit Sheth, Manas Gaur, Kaushik Roy, Revathy Venkataraman, and *Vedant Khandelwal*. **"Process knowledge-infused ai: Toward user-level explainability, interpretability, and safety."** *IEEE Internet Computing* 26, no. 5 (2022): 76-84. *Link*

[C.6] Kausik Lakkaraju, Thahimum Hassan, *Vedant Khandelwal*, Prathamjeet Singh, Cassidy Bradley, Ronak Shah, Forest Agostinelli, Biplav Srivastava, and Dezhi Wu. **"ALLURE: A Multi-Modal Guided Environment for Helping Children Learn to Solve a Rubik's Cube with Automatic Solving and Interactive Explanations."** In Proceedings of the *AAAI Conference on Artificial Intelligence*, vol. 36, no. 11, pp. 13185-13187. 2022. *Link*

[C.7] Forest Agostinelli, Mihir Mavalankar, *Vedant Khandelwal*, Hengtao Tang, Dezhi Wu, Barnett Berry, Biplav Srivastava, Amit Sheth, and Matthew Irvin. **"Designing children's new learning partner: collaborative artificial intelligence for learning to solve the Rubik's cube."** In *Interaction Design and Children*, pp. 610-614. 2021. *Link*

[C.8] Himanshu Singh, Vishal Pallagani, *Vedant Khandelwal*, and U. Venkanna. **"IoT based smart home automation system using sensor node."** In 2018 4th *International Conference on Recent Advances in Information Technology*, pp. 1-5. IEEE, 2018. *Link*

[J.1] Venkanna Udutalapally, Saraju P. Mohanty, Vishal Pallagani, and **Vedant Khandelwal. "sCrop: A novel device for sustainable automatic disease prediction, crop selection, and irrigation in Internet-of-Agro-Things for smart agriculture."** *IEEE Sensors Journal* 21, no. 16 (2020): 17525-17538. *Link*

[W.1] Forest Agostinelli, Rojina Panta, and *Vedant Khandelwal*. **"Specifying Goals to Deep Neural Networks with Answer Set Programming."** In *ICAPS 2023 Workshop on Human-Aware Explainable Planning*. 2023. *Link*

[W.2] Forest Agostinelli, Rojina Panta, *Vedant Khandelwal*, Biplav Srivastava, Bharath Chandra Muppasani, Kausik Lakkaraju, and Dezhi Wu. **"Explainable Pathfinding for Inscrutable Planners with Inductive Logic Programming."** In *ICAPS 2022 Workshop on Explainable AI Planning*. 2022. *Link*

[W.3] Vishal Pallagani, Priyadharsini Ramamurthy, *Vedant Khandelwal*, Revathy Venkataramanan, Kausik Lakkaraju, Sathyanarayanan N. Aakur, and Biplav Srivastava. **"A Rich Recipe Representation as Plan to Support Expressive Multi Modal Queries on Recipe Content and Preparation Process."** *ICAPS 2022 Workshop on Knowledge Engineering for Planning and Scheduling*. 2022. *Link*

[S.1] Kaushik Roy, Usha Lokala, *Vedant Khandelwal*, and Amit Sheth. **"Is depression related to cannabis?": A knowledge-infused model for entity and relation extraction with limited Supervision.** Proceedings of the *AAAI 2021 Spring Symposium on Combining Machine Learning and knowledge Engineering (AAAI-MAKE 2021)*. *Link*

[S.2] Vishal Pallagani, *Vedant Khandelwal*, Bharath Chandra, Venkanna Udutalapally, Debanjan Das, and Saraju P. Mohanty. **"DCrop: A deep-learning based framework for accurate prediction of diseases of crops in smart agriculture."** In 2019 *IEEE international symposium on smart electronic systems (iSES)*, pp. 29-33. IEEE, 2019. *Link*

Pre-print

[1] *Vedant Khandelwal*, Amit Sheth, and Forest Agostinelli. **"Towards Learning Foundation Models for Heuristic Functions to Solve Pathfinding Problems."** arXiv preprint arXiv:2406.02598 (2024). *Link*

Tutorials and Guest Lectures

[1] *Vedant Khandelwal*, Manas Gaur, Ugur Kursuncu, Valerie Shalin, and Amit Sheth. **"Neuro-Symbolic AI for Deep Analysis of Social Media Big Data"** (Tutorial), In ***IEEE International Conference on Big Data***, December 2024.

[2] *Vedant Khandelwal.* **"Introduction to Transformers: Theory and Practical Applications."** Guest Lecture at CSCE 180 - Artificial Intelligence for All, ***University of South Carolina***, September 2024.

[3] *Vedant Khandelwal.* **"Foundation Models"** Guest Lecture at CSCE 580 - Artificial Intelligence, ***University of South Carolina***, April 2024.

Panelists and Seminar

[1] *Vedant Khandelwal.* Panelist for the session titled **"A Brief Primer on AI-Based Tools and Generative AI Applications"** at the seminar **"From Chatbots to Generative AI: How to Ethically and Efficiently Advise Clients on the Use of AI-Based Technology and Capture its Potential Value in Everyday Practice"** during 2025 SOUTH CAROLINA BAR CONVENTION, January 16-19, 2025.

[2] *Vedant Khandelwal.* **"Psychidemic: Measuring the Spatio-Temporal Psychological Impact of Novel Coronavirus with a Social Quality Index."** At CSCE 791 - Seminar in Advances in Computing, ***University of South Carolina***, April 2021.

Patents

[1] Biplav Srivastava, Vishal Pallagani, Revathy Venkataramanan, *Vedant Khandelwal*, and Kausik Lakkaraju. **"Multimodal retrieval and execution monitoring using rich recipe representation."** ***U.S. Patent*** Application 18/455,730, filed March 14, 2024. *Link*

[2] Biplav Srivastava, Kausik Lakkaraju, Revathy Venkataramanan, Vishal Pallagani, *Vedant Khandelwal*, and Hong Yung Yip. **"Robust useful and general task-oriented virtual assistants."** ***U.S. Patent*** Application 17/714,508, filed November 10, 2022. *Link*

Skills

- **Programming Languages:** Python, C, SQL, Prolog, Clingo, PDDL.
- **Frameworks and Libraries:** Popper, PyTorch, Huggingface, Pandas, Numpy, Matplotlib, Keras.
- **Software & Tools:** GitHub, Anaconda, MS Office, MATLAB, Protege, Neo4j, Streamlit.

Academic Service

R=Reviewer, PC=Program Committee Member

[R] IEEE IoT Journal 2025, ICLR 2025, ICAPS 2024 & 2025, TAFM@RLC 2024, MNIT@NeurIPS 2024, CySoc 2024 & 2023, PeerJ Computer Science 2024, ACM Transactions on Computing for Healthcare 2023, 2024 & 2025, SN Computer Science 2023, ACM WSDM 2022.

[PC] ICAPS 2024, CySoc 2024, CySoc 2023.

Note: Last Updated Monday 18th November, 2024