

RANVEER SINGH

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RESEARCH INTERESTS

AI for Healthcare, Large Language Models, Probabilistic Models, Relational Reinforcement Learning, Causal Reasoning

EDUCATION

University of Texas at Dallas <i>Ph.D., Computer Science</i>	Richardson, TX <i>2021 – Present</i>
<ul style="list-style-type: none">• Advisor: Dr. Sriraam Natarajan (StARLinG Lab)• Research focus: LLMs for Clinical AI, Probabilistic models, Relational Reinforcement Learning• Funded by the National Institutes of Health (NIH)	
University of Texas at Dallas <i>M.S., Computer Science</i>	Richardson, TX <i>2021 – 2025</i>
University of Texas at Dallas <i>B.S., Computer Science</i>	Richardson, TX <i>2017 – 2021</i>

PUBLICATIONS

* indicates equal contribution

Conference Papers

LLM-Guided Causal Bayesian Network Construction for Pediatric Patients on ECMO

Mathur, S.*, **Singh, R.***, Skinner, M., Sanford, E., Shah, N., Reeder, P., Raman, L., Natarajan, S.
Artificial Intelligence in Medicine (AIME), 2025.

LLMs for Causal Reasoning in Medicine? A Call for Caution

Mathur, S.*, **Singh, R.***, Skinner, M., Radivojac, P., Haas, D.M., Raman, L., & Natarajan, S.
13th ACM IKDD International Conference on Data Science (CODS), 2025.

Combining Planning and Reinforcement Learning for Solving Relational Multiagent Domains

Prabhakar, N.*, **Singh, R.***, Kokel, H., Natarajan, S., & Tadepalli, P.

International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2025.

Causal Models with Tiny Data: The Case of Rural People Living with Dementia

Singh, R.*, Mathur, S.*, Kavimayil, P., Soni, A., Whetung, C., Warry, W., Jacklin, K., Blind, M., & Natarajan, S.
Artificial Intelligence in Medicine (AIME), 2026.

A Neurosymbolic Approach for Explainable Early Diagnosis of Alzheimer’s Disease

Singh, R.*, Tenali, P.*, Mathur, S.*, Soni, A., Phatak, V., Lynch, K., Murman, D., Rizzo, M., & Natarajan, S.
Under Review at 20th International Conference On Neurosymbolic Learning AND Reasoning (NeSy), 2026.

A Neurosymbolic Approach for Constructing Planning Domain Models from Clinical Narratives

Singh, R.*, Mathur, S.*, Skinner, M., Tadepalli, P., Kersting, K., & Natarajan, S.

Under Review at SIAM International Conference on Data Mining (SDM), 2026.

Dynamic Structural Causal Modeling for Sleep

Singh, R.*, Tenali, P.*, Mathur, S.*, Badi A. , & Natarajan, S.

Under Review at Dynamic Data Driven Applications Systems (DDDAS), 2026.

Journal Articles

EHR Sampling Interval Bias Detection and Burden of Blood Pressure Excursions: Implications for Clinical Decision Support and Model Validity in Pediatric ECMO

Shah, N., Sanford, E., Busch, D.R., **Singh, R.**, Mathur, S., Sharma, J., Reeder, P., Natarajan, S., & Raman, L.
Information, MDPI, 2026.

Workshop Papers

LLMs for Causal Reasoning in Medicine? A Call for Caution (*workshop version of CODS 2025 paper*)

Mathur, S.*, **Singh, R.***, Skinner, M., Radivojac, P., Haas, D.M., Raman, L., & Natarajan, S.

IJCAI Workshop on User-Aligned Assessment of Adaptive AI (AIA) Systems, 2025.

Exploiting Relational Planning and Task-Specific Abstractions for Multiagent Reinforcement Learning in Relational Domains

Singh, R.*, Prabhakar, N.*, Natarajan, S., & Tadepalli, P.

AAAI Workshop on Cooperative Multi-Agent Systems Decision-Making and Learning (CMASDL), 2024.

RESEARCH EXPERIENCE

Research Assistant – StARLinG Lab

Richardson, TX

University of Texas at Dallas, advised by Dr. Sriraam Natarajan

2023 – Present

- Designed and evaluated LLM-based pipelines for relational information extraction from EHRs and causal reasoning in clinical domains, including Alzheimer’s disease, Adverse Pregnancy Outcomes, and pediatric ECMO.
- Developed evaluation frameworks to systematically identify and mitigate hallucination and stochastic failure modes in LLMs deployed for high-stakes clinical decision support.
- Leveraged LLMs as approximate prior knowledge sources to construct causal Bayesian networks in data-scarce settings, enabling clinical insight in pediatric ECMO patients where traditional data-driven approaches are infeasible.
- Developed methods combining relational planning with multi-agent reinforcement learning to tractably solve relational multi-agent domains with exponentially large state/action spaces.

OTHER EXPERIENCE

Mentor for Summer Research Program for high school students

Richardson, TX

University of Texas at Dallas

Summer 2025

- Mentored High School Students on Machine Learning and its applications to network security

Teaching Assistant – CS 4141 Digital Logic Lab

Richardson, TX

University of Texas at Dallas

2021 – 2023

- Conducted lab sessions and instructed over 800 students across two years
- Taught and demonstrated experiments and underlying concepts; graded student work

Student Intern

Delhi, India

Fintricks Consultancy Services

Summer 2019

- Developed statistical models for mutual fund policy selection using temporal modelling of high-frequency stock data
- Migrated MS Excel-based analytical workloads to SQL-based pipelines for improved Python integration

TECHNICAL SKILLS

Languages: Python (primary), Java, C++

LLMs and NLP: Hugging Face Transformers, vLLM(LLM serving), OpenAI API, Pydantic (structured outputs)

Reinforcement Learning and Planning: Ray Rllib, Stable Baselines 3, Gymnasium, PDDL, STRIPS

ML and Modeling: PyTorch, scikit-learn, XGBoost, pgmpy, CausalLearn (causal discovery), BoostSRL (statistical relational learning), pm4py (process mining)

Data Engineering: SQL, numpy, pandas

Infrastructure and Tools: Git/GitHub, Linux, Bash