Rohan Gumaste

805 W. Green Street, Urbana, IL 61801
408-722-8231 gumaste2@illinois.edu linkedin.com/in/rgumaste rohangumaste.github.io

Education

University of Illinois at Urbana Champaign (GPA: 3.92/4.00) **Sep. 2021 – May 2025 [Expected]**
Bachelor of Science in Statistics & Computer Science *Urbana, IL*

Cupertino High School (GPA: 4.00/4.00) **August 2017 – May 2021**
Salutatorian: Rank 2/531 *Cupertino, CA*

Relevant Coursework

- Artificial Intelligence
- Deep Learning for Computer Vision
- Unsupervised Learning
- Applied Bayesian Analysis
- Statistical Modeling (I & II)
- Statistics and Probability (I & II)
- Text Information Systems
- Programming Languages and Compilers
- Numerical Methods I
- Introduction to Algorithms and Models of Computation
- System Programming
- Computer Architecture
- Data Structures
- Computational Linear Algebra
- Discrete Structures

Papers & Invited Talks

* Denotes Equal Contribtion.

[1] Ugare, S., **Gumaste, R**., Suresh, T., Singh, G., & Misailovic, S. (2024). IterGen: Iterative structured LLM generation. Under Review. (arXiv:2410.07295)

[2] Xu, Y.*, Zhu, D.*, **Gumaste, R.**, & Singh, G. (2024). Binary Reward Labeling: Bridging Offline Preference and Reward-Based Reinforcement Learning. Under Review. (arXiv:2406.10445.)

[3] Xu, Y.*, **Gumaste, R.***, & Singh, G. (2024). Universal Black-Box Reward Poisoning Attack against Offline Reinforcement Learning. Under Review. (arXiv:2402.09695.)

[4] Xu, Y., Suresh, T., **Gumaste, R**., Zhu, D., Li, R., Wang, Z., Jiang, H., Tang, X., Yin, Q., Cheng, M. X., Zeng, Q., Zhang, C., & Singh, G. (2024). Two-Step Offline Preference-Based Reinforcement Learning with Constrained Actions. Under Review. (arXiv:2401.00330)

[5] **Gumaste, R**., & Ries, D. (2023). Comparing covariance structures of log Gaussian Cox processes applied to lightning strike data. Talk at UIUC Statistics URES Symposium.

Research Experience

Formally Certified Automation and Learning (FOCAL) Laboratory **May 2023 – Present**
Undergraduate Research Assistant *Urbana, IL*

- **Research Focus**: Vulnerabilities in deep offline reinforcement learning. Efficiently pessimistic learning in RLHF. Reward Modeling in offline PBRL.
- **Advisor**: Professor Gagandeep Singh
- Developed, implemented, and deployed a novel attack strategy leveraging weaknesses in pessimistic evaluation.
- Developed the iterative method for multiple different good policy generation. Implemented methods to check generated policy differences.
- Tested and fine-tuned poisoned reward function against baseline attack strategy. Resulted in out-performing baseline attack in every algorithm/dataset combination tested.
- Helped develop and test the ORL method for offline PBRL training. Earned recognition for identifiying and helping fix critical errors in experimental methodology and data validity.
- Helped develop novel PRC method for offline PBRL. Also contributed to data collection, analysis, and visualization.

Approximate and Resilient Computing (ARC) Laboratory **April 2024 – Present**
Undergraduate Research Assistant *Urbana, IL*

- **Research Focus**: Constrained LLM decoding. Applications in: translation to first-order logic programs, corrective code generation, and model alignment/safety.
- **Advisor**: Professor Sasa Misailovic
- Constrained, grammar aligned decoding for translation from natural language to Prover9 first-order logic programs.
- Used newly built Symbol Position Map structure to create custom arity checker to detect model errors mid-generation.
- Designed and implemented strategies that facilitate iterative grammar-aligned generation, enhancing the efficiency and accuracy of code generation tasks. Resulted in core contributions to the IterGen framework.
- Developed and implemented evaluation strategies to analyze IterGen's applications to reduce privacy leakage in LLMs, resulting in 100% leakage prevention.

Sandia National Laboratories **August 2023 – Present**
Undergraduate Research Intern *Albuquerque, NM [Remote]*

- **Research Focus**: Near real time lightning strike prediction using statistical and deep neural models.
- **Advisor**: Dr. Daniel Ries
- Building spatio-temporal point process models along with custom deep neural architectures for lighting prediction.
- Using custom designed statistical models to integrate meteorological/environmental factors such as cloud height, pressure levels, etc into lightning prediction.
- Studying the effects of various candidate statistical modeling techniques such as: inhomogenous point process models, Log-Gaussian Cox processes, Neyman-Scott cluster processes, and generalized mixed effects models.

Crowd Dynamics Laboratory **August 2022 – May 2023**
Undergraduate Research Assistant *Urbana, IL*

- **Research Focus**: Addressing fast machine unlearning and the cold start problem in deep neural recommender systems.
- **Advisor**: Professor Hari Sundaram
- Part time research assistant focusing on applied machine learning in the context of recommender systems.
- Reviewed and implemented cutting edge recommender systems to construct baseline implementations for evaluation.
- Applied conventional deep learning and novel sharding techniques in an attempt to solve the cold start problem.
- Investigated the possibility of computational audits to generate a certificate guaranteeing that user data has been "unlearned" by the neural model.

Technical Skills

Languages: Python, R, C, C++, OCaml, STAN, Java, STAN, LaTeX.
ML Tools: PyTorch, TensorFlow, keras, D4RL, OpenAI-Gymnasium, Mujoco-Py, OpenCV.
Developer Tools: Git, Bash/Zsh, W&B, Valgrind, ASan/UBSan, Make.
Statistical Tools: Pandas, NumPy, SciPy, Scikit-Learn, ggplot2, SpatStat, rStan.

Test Scores

GRE Total Score: 335/340
Quantitive: 169/170
Verbal: 166/170
Analytical Writing: 5.5/6.0

Service

ICLR Reviewer - 2024
Discrete Structures CA - 2022
HackIllinois Organizer - 2022