

ROHAN GUMASTE

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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
- Calculus III

Papers & Invited Talks

* Denotes Equal Contribution.

- [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

- **Advisor:** Professor Gagandeep Singh
- **Research Focus:** Vulnerabilities in deep offline reinforcement learning, efficiently pessimistic learning in RLHF, reward modeling in offline PBRL, adversarial training for RLHF.
- Developed, implemented, and deployed a novel attack strategy [3] leveraging weaknesses in pessimistic evaluation.
- Developed an iterative method for near-optimal policy generation. Implemented methods to check generated policy differences.
- Tested and fine-tuned poisoned reward function against baseline attack strategy. **Out-performed all known baseline attacks** in every algorithm/dataset combination tested.
- Collaborated on BRL framework [2] to translate PBRL data to standard (s, a, r, s') tuples for regular offline RL.
- Earned recognition for identifying and helping fix critical errors in experimental methodology and data validity.
- Co-developed novel PRC method [4] for offline PBRL. Also contributed to data collection, analysis, and visualizations.

Approximate and Resilient Computing (ARC) Laboratory

April 2024 – Present

Undergraduate Research Assistant

Urbana, IL

- **Advisor:** Professor Sasa Misailovic
- **Research Focus:** Constrained LLM decoding. Applications in: translation to first-order logic programs, corrective code generation, and model alignment/safety.
- Constrained, grammar aligned decoding for translation from natural language to Prover9 first-order logic programs.
- Used novel 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.
- Built system for **iterative grammar guided generation with backtracking** [1], based on user-defined syntactic structures. Developed core library utilities and tests. Conducted case-studies to evaluate the system over 3 separate domains.
- 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 – September 2024

Undergraduate Research Intern

Albuquerque, NM (Remote)

- **Advisor:** Dr. Daniel Ries
- **Research Focus:** Near real time lightning strike prediction using statistical and deep neural models.
- Conducted EDA for multidimensional data
- Built spatio-temporal point process models along with custom deep neural architectures for lightning prediction.
- Used custom designed statistical models to integrate meteorological/environmental factors such as cloud height, pressure levels, etc. into lightning prediction.
- Studied 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.
- Implemented and evaluated performance of spatial models in rSTAN.

Crowd Dynamics Laboratory

August 2022 – January 2023

Undergraduate Research Assistant

Urbana, IL

- **Advisor:** Professor Hari Sundaram
- **Research Focus:** Addressing fast machine unlearning and the cold start problem in deep neural recommender systems.
- 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 & Frameworks: Python, R, C, C++, OCaml, Java, STAN, Hadoop, \LaTeX .

ML Tools: PyTorch, TensorFlow, keras, D4RL, OpenAI-Gymnasium, Mujoco-Py, OpenCV.

Statistical Tools: Pandas, NumPy, SciPy, Scikit-Learn, ggplot2, SpatStat, rStan.

Developer Tools: Git, Bash/Zsh, W&B, Valgrind, ASan/UBSan, Make.

Test Scores

GRE Total Score: 335/340

Quantitative: 169/170

Verbal: 166/170

Analytical Writing: 5.5/6.0

Service

ICLR Reviewer - 2024

Discrete Structures CA - 2022

HackIllinois Organizer - 2022