

Mahdi Qezlou

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Employment

- 2024-present **Data Scientist**, *University of Texas, Austin*.
Leading machine learning and AI projects in astronomy for accurate causal inference and forecasting.
- 2018-2024 **Research fellow**, *University of California, Riverside*.
Led three major machine learning projects to infer the behavior of complex systems.

Education

- 2018–2024 **Ph.D. Machine Learning for Astrophysics**, *University of California, Riverside*.
Developing Machine learning and Statistical tools to infer properties of astrophysical systems
- 2018–2019 **M.Sc. Physics**, *University of California, Riverside*.
- 2013-2018 : **B.Sc. in Physics** , *Sharif University of Technology*.

Skills

- Programming: Git, Bash, Python, C, SQL, TensorFlow, PyTorch, XGBoost, Cloud Architecture (AWS/Google Cloud), Apache Spark (Databricks), Tableau, Matplotlib
- ML & stat Bayesian/Frequentist statistics, stochastic processes (Markov/Gaussian), Deep Learning (CNN, NLP), Generative AI. Strong background in mathematics and computation, with active engagement in machine learning literature.
- Languages: English (Fluent), Persian (Fluent), Turkish (Intermediate)

Highlighted Project leadership:

- 2018-present **Leading Experimental Design, Success Metrics, Causal Inference, decision making under uncertainty**.

Objectives: Conducting experimental design on a high-dimensional (20+ D) feature space for accurate inference and forecasting, conditioned on uncertain observed data from astrophysical complex systems.

Challenges: Forward modeling of the observed data is computationally expensive, and the feature space is typically sparsely sampled. For causal inference, an affordable but accurate surrogate model is needed for frequent evaluations at arbitrary points of parameter space using Markov Chain Monte Carlo (MCMC).

My contribution: I identified the issue and performed experimental design on the feature space. I trained Gaussian Process (GP) and generative AI models on a small set of high-fidelity forward models. These machine learning models replicated the expensive computational models with 1% accuracy at 1/100th of the cost. I applied these fast, nonlinear surrogate models during MCMC sampling for accurate causal inference across the 20+ dimensional feature space.

Techniques: Experimental design, A/B testing, frequentist and Bayesian statistical modeling, deep learning, generative AI (Diffusion Models, Normalizing Flow)

Programming Languages and Platforms: Python, SQL, TensorFlow, Cloud Architecture (AWS), Apache Spark (Databricks)

Collaboration with Technical and Non-Technical Teams: Regular discussions with Software/ML engineers at the Texas Advanced Computing Center (TACC) | Presentations to non-technical stakeholders, including the Department of Energy, NASA, and the Air Force.

Github : [Lya-Emulator](#)

Relevant courses/Certifications

- UCR Advanced Statistics, Deep Learning, Probabilistic models in AI, Generative AI
- Coursera Deep Learning specialization