

An Open-Source Benchmarking Pipeline for Rare-Event Estimation

Aim: Build a reproducible benchmarking pipeline to compare rare-event estimators

Tasks

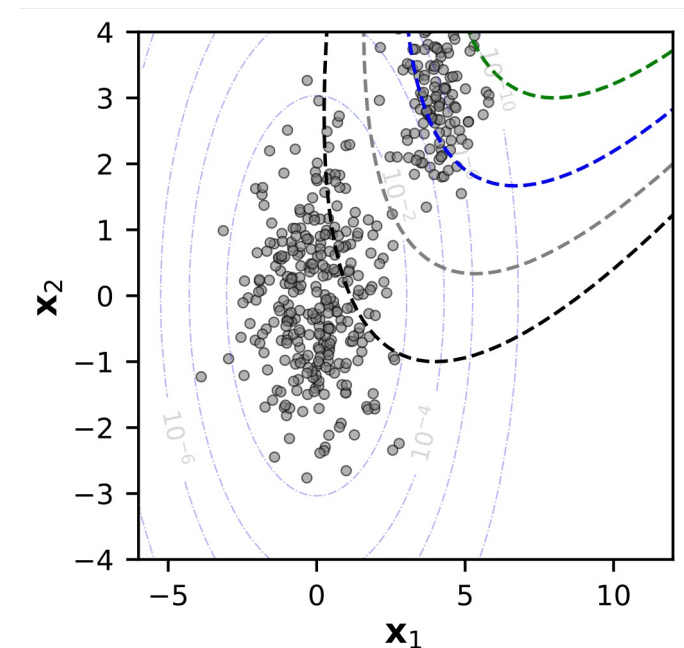
- Specify benchmarking requirements (scope, assumptions, plug-in API, and reproducibility standards).
- Define benchmark problems (limit-state functions, input distributions, reference solutions, and evaluation budgets).
- Develop the experimental pipeline in a Python repository (configuration, logging, storage, and automated reporting).
- Define and implement metrics/diagnostics (accuracy, sample efficiency, robustness, and tuning sensitivity).
- Validate the pipeline via pilot studies and synthesize recommendations for reporting and practical use.

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[1] Papaioannou, I., Betz, W., Zwirgmaier, K., & Straub, D. (2015). MCMC algorithms for subset simulation. *Probabilistic Engineering Mechanics*, 41, 89-103.

[2] Moustapha, M., Marelli, S., & Sudret, B. (2022). Active learning for structural reliability: Survey, general framework and benchmark. *Structural Safety*, 96, 102174.

[3] Papaioannou, I., Zwirgmaier, K & Straub D. (2012). Assessment of MCMC algorithms for subset simulation. <https://mediatum.ub.tum.de/doc/1120238/document.pdf>



Illustrative sampling of rare-event regions.

Project Characteristics

