OpenTURNS release highlights

J. Schueller (Phimeca)

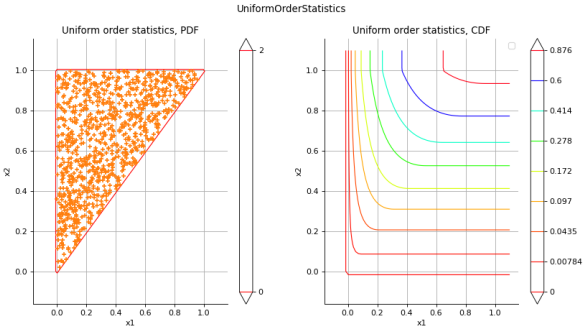
User Day #17, June 14th 2024, EDF Lab

Overview

New features since last year in releases:

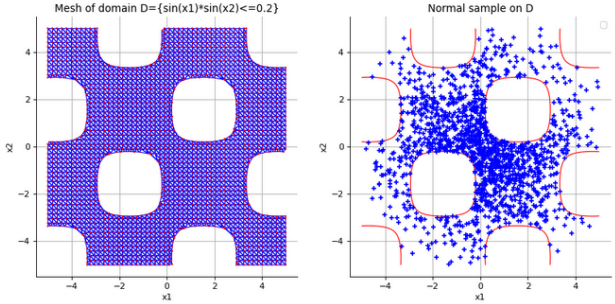
- v1.22: fall 2023
- v1.23: spring 2024

- Joint distribution of the order statistics



Truncated distribution over a mesh

- Generalization of UniformOverMesh
- Sampling following any distribution in any closed set delimited by a generic mesh, any dimension



Other new distributions

- StudentCopula
- StudentCopulaFactory
- SmoothedUniformFactory
- New GEV/GPD estimators

Latent variable model

- Covariance model allowing to compute the covariance between different unordered values (or levels) of a categorical variable

New field metamodeling capabilities

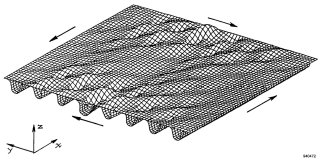
- Vector to field metamodeling and sensitivity using KL + chaos

Rank-based Sobol' indices

- Data-driven (no need for dedicated design of experiments)
- RankSobolSensitivityAlgorithm

Documentation improvements

- Lots of new examples: chaos, cv, regression, MLE, functions, integration, enumerate, ...
- New usecases: fire satellite, wing weight, Linthurst/Coles datasets



- Example minigalleries linking to relevant examples
- Lot of time invested in the improvement of the documentation

Other improvements

- Multidimensional integration using cuba library (CubaIntegration)
- New class for integration from an existing design of experiment (ExperimentIntegration)
- Boundary extraction based on external faces simplices (BoundaryMesher)
- Faster marginal PDF extraction (speedup for BayesDistribution)
- Faster KDTree implementation using nanoflann library
- Faster TruncatedDistribution with n-d CDF inversion

Packaging 1/2

Python channels

- Pip (and uv), Conda
- Versions: 3.8-3.12
- OS: Windows, Linux, MacOS
- Architectures: x86_64, arm64 (MacOS-only)

Packaging 2/2

Supported Linux distributions

- Ubuntu 22/24
- Debian 11/12
- Fedora 39/40
- CentOS 8
- OpenSUSE 15.5
- Mageia 8
- ArchLinux

... and FreeBSD

Outlook

2024-2025 work

- Conditional distributions / Bayesian
- Quantiles estimation / tolerance intervals
- Calibration (functional models, bound constraints)
- New GPR API
- LOLA-Voronoi sequential design

END

Thank you for your attention!
Any questions?