Simulation Decomposition in Python: `pip install simdec`

Alt title: ?

Short Summary

Uncertainties are everywhere! Whether you are developing a new AI system, running complex simulations or making an experiment in a lab, uncertainties influence the system. And you need a way to understand how these impact your results.

SimDec offers a novel visual way to understand the intracate role that uncertainties play. Thanks to a clear API and our dashboard, we are making uncertainty analysis accessible to everyone.

Abstract

From real life experiments to numerical simulations, uncertainties play a crucial role in the system under study. With the avenment of Artificial Intelligence and new regulations such as the AI Act or the *Better Regulation Guideline*, there is a growing need for explainability and impact assessments of systems under uncertainties.

Traditional methods to analyse the uncertainties focus on quantitative methods to compare the importance of factors, there is a large body of literature and the field is know as: Sensitivity Analysis (SA). The indices of Sobol' are a prominent example of such methods.

Simulation Decomposition is a hybrid uncertainty-sensitivity analysis approach that reveals the critical behavior of a computational model or an empirical dataset. It decomposes the distribution of the output (target variable) by the multivariable scenarios, formed out of the most influential input variables. The resulting visualization shows how different output ranges can be achieved and what kind of critical interactions affect the output. The method has shown value for various computational models from different fields, including business, environment, and engineering, as well as an emerging evidence of use for empirical data and AI.

This poster presents SimDec and our Python implementation. Besides proposing a comprehensive yet simple API, SimDec is also made available to practicioners through an online dashboard at https://simdec.io. Besides the inovative methods of SimDec, the

project relies on powerful methods from SALib and SciPy-notably `sp.stats.sensitivity_indices` -and the dashboard is made possible thanks to Panel.

Other information

Track: General
Keywords: SimDec, Sensitivity Analysis, Visualization
Type: Poster

Author 1:

First Name: Pamphile T.
Last Name: Roy
Email: roy.pamphile@gmail.com
Country/Region: Austria
Organization: Consulting Manao GmbH
Web page: https://github.com/tupui

Author 2:

First Name: Mariia
Last Name: Kozlova
Email: Mariia.Kozlova@lut.fi
Country/Region: Finland
Organization: LUT
Web page: ...