11th International Conference on Sensitivity Analysis of Model Output, April 23–25 2025, Grenoble, France

The universe of uncertainty that didn't hide

Andrea Saltelli
(1) UPF Barcelona School of Management, Barcelona, Spain. (2): Centre for the Study of the Sciences and the Humanities, University of Bergen, Bergen, Norway; andrea.saltelli@gmail.com,www.andreasaltelli.eu

Nate Breznau
SOCIUM Research Center on Inequality and Social Policy, University of Bremen, Germany

Alessio Lachi
Department of Statistics, Computer Science, Applications "Giuseppe Parenti" (DiSIA), University of Florence, Viale Giovanni Battista Morgagni 59, Florence, 50134, Italy

Arnald Puy
School of Geography, Earth and Environmental Sciences, University of Birmingham, Birmingham, B15 2TT, United Kingdom

In a series of recent papers [1, 2] we have offered global sensitivity analysis (GSA) [3] as the solution for the recently manifested problem of analytic variability in applied statistical and econometric work, commonly associated with the so-called "Garden of Forking Paths" [4, 5] that analysts engage with when setting up an investigation. Our title refers to the expression "A universe of uncertainty hiding in plain sight" [6] that has been used to comment on the results of multi-analysis studies displaying unexpected variability. In a sense, in our SAMO community of practitioners engaged in sensitivity analysis, this uncertainty was indeed always in plain sight – and was chased with an array of techniques going from efficient design of numerical experiments to setting-specific sensitivity analysis practices. Considering these practice as self-evident may constitute a sort of SAMO-specific bias, especially given the complex and nuanced relation that quantification sciences have with uncertainty across different disciplines, especially at the interfaces between science, society and policy [7]. Thus, we look at the issue of "analytic flexibility" discovered in this new context and reconnect it to how GSA has been taken up in several disciplines to test the quality of a quantification. In particular we recall early econometricians' works [8, 9] suggesting global sensitivity analysis (GSA) to test the robustness of a quantitative inference, and comment on the recommendations' slow take up [10] in both econometrics and other disciplines. We show how today a mature [11] GSA approach permits analysts to properly chart gardens of forking paths before venturing into one, or to make sense of a multi-analyst experiment after it has been done. GSA allows the "universe of uncertainty" hidden in multi-analyst studies to be unveiled (uncertainty quantification) and characterised (sensitivity analysis proper), especially in relation to pattern of strong dependencies of the inference upon high order interaction terms that appear to characterise the experimental settings of multi-analyst studies [12]. We illustrate our treatment of a a recent multi-analyst study from Breznau and co-workers [13], that we extend here to a different policy setting. We call our application of GSA to the garden of forking path a "modelling of the modelling process" [14, 15] (MOMP), detailing the differences between this and a more recent "multiverse analysis" [16]. We trace a path from global sensitivity analysis – often concerned with mostly parametric uncertainty – t0 MOMP – where the modelling process is opened up to investigation – to sensitivity auditing [17] where the policy dimensions of an analysis are questioned. We conclude offering a programming environment for these studies.

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