Estimating the Approximation Error when Fixing Unessential Factors in Global Sensitivity Analysis

Abstract:
One of the major settings of global sensitivity analysis is that of fixing non influential factors, in order to reduce the dimensionality of a model. However, this is usually done without knowing the magnitude of the approximation error being produced. This paper presents and proves a new theorem for the estimation of the average approximation error generated when fixing non influential factors. A simple function where analytical solutions are available is used as test case to illustrate the theorem; furthermore this function is used to show the theorem applicability to sensitivity analysis by groups of factors. Improved formulas for the estimation of sensitivity indices are presented; such formulas allow for more accurate estimations at a lower computational cost with respect to the original method of Sobol'.

Authors:
SOBOL' Ilya
TARANTOLA Stefano
GATELLI Debora
KUCHERENKO Sergei
MAUNTZ Wolfgang

Publication Year:
2007

Type:
Articles in Journals

Publisher:
ELSEVIER SCI LTD

DOI:
10.1016/j.ress.2006.07.001

Citation:
RELIABILITY ENGINEERING & SYSTEM SAFETY p. 957-960 vol. 92

Source URL:
Links