

Global sensitivity analysis and surrogate models for predictive modelling

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Abstract

Computational models are used nowadays in virtually all fields of applied sciences, engineering and economics to predict the behaviour of complex systems, and to derive optimal designs or policies. Such models are usually computationally intensive and may depend on many parameters that are not known in the first place and should be calibrated with appropriate data.

Uncertainty quantification allows to model the sources of uncertainty (e.g. due to lack of knowledge) on the model parameters and to study their impact onto the model predictions. Specifically, global sensitivity analysis aims at finding the “important parameters” of the problem, i.e. the ones whose uncertainty have the largest impact on the predictions.

In this talk we will present a general framework for uncertainty quantification and sensitivity analysis, that has been recently introduced in computational economics [1]. The need of surrogate models for an efficient estimation of sensitivity indices will be underlined. For this purpose, an introduction to the so-called *sparse polynomial chaos expansions* [2] will be given. Different examples from economics to geosciences will illustrate the power and versatility of the presented tools.