

Model Analysis Tools and Methods Workshop Track

One of the issues that have been raised by the members of the Special Interest Group on Model Analysis (SIGMA) during the last couple of years relates to the limited utilization of existing tools and methods for model analysis. In that respect, we organize a 4-session workshop that aims to introduce interested conference attendees to a selection of methods and tools related to model analysis. While doing so, it is aimed to go beyond simply lecturing the audience about these methods, and to help them actually practice with these methods on simple models during the workshop in a hands-on manner. The workshop is planned as a whole-day workshop on Thursday during the Delft conference, and will consist of four independent sessions. In that sense, they can either be followed as a whole day, or individually as a separate module. The four parts of the whole-day workshop are introduced below. The slides as well as all the files and software used during these 4 workshop sessions are available for download at the website of the Model Analysis SIG. The address for the workshop page is as follows: <http://sigs.systemdynamics.org/model-analysis/sigma-workshop/>

Part 1: Pattern oriented model testing and validation

by Gönenç Yücel & Can Sücüllü

(In the conference schedule: **Workshop** (176): Model Analysis Tools and Methods: Pattern-Based Model Testing – Part 1/4)

Short Description: In this workshop, a new dynamic output analysis environment will be introduced. This environment, namely Behavior Analysis and Testing Software (BATS), integrates a behavior pattern classification algorithm and a selection of statistical methods for analysis of steady-state behavior patterns. The workshop is planned as a hands-on practice session during which participants will be walked through the features of the software as they conduct several output analysis exercises. The workshop aims to demonstrate how BATS can be useful during different stages of a modeling study such as calibration, testing and validation, sensitivity analysis and policy design with the help of these small exercises.

Part 2: Multivariate sensitivity analysis

by Sibel Eker and Jill Slinger

(In the conference schedule: **Workshop** (189): Model Analysis Tools and Methods: Pattern-Based Model Testing – Part 2/4)

Short Description: In a standard sensitivity analysis, the effects of uncertainties in the values of individual parameters on the model outputs are explored. In this workshop, the value of conceptualizing the System Dynamics model outputs as trajectories in solution space in order to analyse the combined effects of uncertainties in a number of parameters is explained and applied. In addition to multi-parameter sensitivity analysis, sensitivity analysis of table functions will be discussed and applied in an exercise.

Part 3: Statistical screening to identify key inputs

by Gönenç Yücel and Andrew Ford

(In the conference schedule: **Workshop** (190): Model Analysis Tools and Methods: Pattern-Based Model Testing – Part 3/4)

Short Description: Statistical screening is a pragmatic method of searching for the key inputs to a system dynamics model. The objective is to analyse which of the uncertain inputs is most influential. Readily available software is used to apply the method

which uses the correlation coefficient to indicate the relative importance of model inputs at different times in the simulation.

Part 4: Loop Eigenvalue Elasticity Analysis by Rogelio Oliva and Christian Kampmann

(In the conference schedule: **Workshop** (188): Model Analysis Tools and Methods: Pattern-Based Model Testing – Part 4/4)

Short Description: The approach uses linear systems theory to decompose the behavior into simple modes, each of which corresponds to an eigenvalue. Measuring how much a given eigenvalue changes with a small change in a parameter or link in the model then gives an indication of how much that link contributes to that behavior mode. This way, the LEEA method aims to provide insights about the structural causes of an observed behavior. In this session, the participants will work through the analysis of an existing model.