SCIENTIFIC PROGRAMME

Summer School on Sensitivity Analysis – SAMO 2016, Villa Orlandi

Anacapri (Italy) - July 4-8, 2016

Monday 4th July

8:45 Registration /get together

9:30 Introduction to sensitivity analysis (A. Saltelli)
> Critique of modelling, perfunctory sensitivity analysis, settings for sensitivity analysis, first order and total indices

10:45 Break

11:15 Problem settings and overview of methods (S. Tarantola)
> Overview of methods: scatterplots, regression methods, variance-based techniques, screening techniques, emulators, spatial inputs, correlated input, graphical methods, quasi-random numbers

12:15 Variance-based methods (W. Becker)
> ANOVA decomposition, Sobol' sensitivity indices, estimation of Sobol' sensitivity indices with brute-force, Sobol'/Saltelli/Owen formulas

13:15 Lunch

14:15 Matlab scripts for GSA (S. Tarantola, R. Rosati)
Overview of sample strategies and implementations of classic Sobol' formulas
A set of new formulas for Sobol' indices.

15:15 Sampling-based and Graphical Methods (N. Saint Geours)
Scatterplot, Regression, contribution to the sample mean and variance, CUSUNORO technique,
Monte Carlo filtering, Kolmogorov-Smirnov test

16:15 Break

16:45 Practicum (V. Punzo)
Introduction to hands-on sessions

17:30 End

Tuesday 5th July

9:00 Sensitivity indices with an Excel spreadsheet (R. Rosati)
Demonstration of analytic computation of variance-based sensitivity indices

9:45 Derivative-based techniques and examples (S. Kucherenko)
Definition, link to Sobol' sensitivity indices; link to Morris method; comparison with other
techniques

10:30 Break

11:00 Sensitivity auditing: the use of models in policy-making (A. Saltelli)
using models to inform policy, models and epistemology, critique of modelling, commitment to
transparency and parsimony, NUSAP, checklist for models developers and users

12:00 Case study on security of gas supply in Europe (R. Bolado)

13:00 Lunch

14:15 Evaluation of Sensitivity Indices using Metamodels (S. Kucherenko)

Meta-modelling, random sampling-high-dimensional model representation, Polynomial chaos expansion, Sobol' HDMR

15:00 Spatially/Time dependent inputs/outputs (N. Saint Geours)

Overview of sensitivity analysis approaches for spatially or temporally dependent inputs and outputs

16:00 Break

16:30 Practicum (V. Punzo, M. Montanino et al.)

Hands-on session with exercises carried out in groups

17:30 End

20:00 Social Dinner (Restaurant 'Il Geranio' - Capri)

Wednesday 6th July

9:00 Moment-independent methods (E. Plischke)

The Common Rationale of Sensitivity Measures; Density-Based and Distribution-Based Sensitivity Measures; Transformation Invariance and Given Data Estimation

10:00 Screening methods and scatter-plot smoothing (W. Becker)

Elementary effects, factor fixing, scatter-plots, correlation ratio, nonlinear regression

11:00 Break

11:30 Practicum (V. Punzo, M. Montanino et al.)

Hands-on session with exercises carried out in groups

12:30 GSA of models with independent inputs: An introduction to Polynomial Chaos Expansion (based on examples) (T. Mara)

13:15 Lunch

14:15 Bayesian update: Model parameter statistical calibration (T. Mara)

15:00 Approaches to Metamodelling (W. Becker)
    Review of methods with focus on Gaussian processes and software

16:00 Break

16:30 Introduction to SimLab 4.0 (R. Rosati)

17:30 End

Thursday 7th July

9:00 Spectral methods (E. Plischke)
    Random Balance Design (RDB), Fourier Amplitude Sensitivity Test (FAST), Effective Algorithm for computing Global Sensitivity Indices (EASI) with Matlab scripts

10:00 A Bayesian approach to SA (G. Sin)

11:00 Break

11:30 GSA of models with dependent inputs (T. Mara)

12:30 Sensitivity analysis on non-rectangular domains (B. Ciuffo)
    Definition, dependent inputs, computational methods, case studies

13:30 lunch

14:30 Practicum (V. Punzo, M. Montanino et al.)
    Hands-on session with exercises carried out in groups

15:45 Break

16:15 Practicum (T. Mara)
    Hands-on session with exercises carried out in groups

17:15 End

Friday 8th July

9:00 Two case studies proposed by the students with discussion

11:00 Break

11:30 One case study proposed by the students with discussion

12:30 Wrap up and conclusions (chaired by A. Saltelli)

The school ends at 13:30