SCIENTIFIC PROGRAMME

Summer School on Sensitivity Analysis – SAMO 2016, Villa Orlandi Anacapri (Italy) - July 4-8, 2016

Monday 4th July

9:00 Registration / get together

9:45 Introduction to sensitivity analysis (A. Saltelli)
Critique of modelling, perfunctory sensitivity analysis, settings for sensitivity analysis, first order and total indices.

11:00 Break

11:30 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

12:30 Screening methods and scatter-plot smoothing (W. Becker)
Elementary effects, factor fixing, scatter-plots, correlation ratio, nonlinear regression

13:30 Lunch

14:30 Derivative-based techniques and examples (S. Kucherenko)
Definition, link to Sobol' sensitivity indices; link to Morris method; comparison with other techniques

15:30 Sampling-based and Graphical Methods (N. Saint Geours)
contribution to the sample mean and variance, link CSM - first order indices, CUSUNORO technique, Monte Carlo filtering, paralell lines sensitivity plot, Kolmogorov-Smirnov test

16:30 Break

17:00 – 18:00 Practicum (D. Albrecht, V. Punzo, R. Rosati, S. Tarantola)

Hands-on session with exercises carried out in groups

Tuesday 5th July

8:30 Variance-based methods (W. Becker)

ANOVA decomposition, Sobol’ sensitivity indices, estimation of Sobol’ sensitivity indices with brute-force, Sobol’/Saltelli/Owen formulas, spectral methods (FAST, Random balance design, EASI)

10:00 Practicum (D. Albrecht, V. Punzo, R. Rosati, S. Tarantola)

Hands-on session with exercises carried out in groups

11:00 Break

11:30 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

12:30 The problem of correlated input (T. Mara)

Review of approaches, Variance-based sensitivity indices, Correlated contribution, Uncorrelated contribution, Sampling-based estimators, regression-based estimators via polynomial chaos expansions, Rosenblatt transformation, Iman Conover method

13:30 Lunch

14:30 Practicum and case study (T. Mara)

Hands-on session with exercises carried out in groups

15:30 Sensitivity analysis on non-rectangular domains (Biagio Ciuffo)

Definition, dependent inputs, computational methods, case studies

16:30 break

17:00 Spatially dependent inputs/outputs (N. Saint Geours)

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

17:00 Moment-independent methods (E. Borgonovo)

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

18:00 End

20:00 Social Dinner (Restaurant Geranio, Capri)

Wednesday 6th July

8:30 Moment-independent methods (E. Borgonovo)

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

9:45 Further approaches to Metamodelling (W. Becker)

Definition, review of approaches, non-parametric model approximation; Gaussian processes, smoothing splines.

11:00 Break

11:30 Evaluation of Sensitivity Indices using Metamodels (S. Kucherenko)

Metamodelling, random sampling-high-dimensional model representation, Quasi random sampling-high dimensional model representation, Polynomial chaos expansion, SobolHDMR

12:30 Case study on security of gas supply in Europe (R. Bolado)

13:30 lunch

14:30 Case study in econometrics (P. Paruolo)

Application of variance-based sensitivity indices to variable selection in econometrics, with examples in growth regressions. Monte Carlo comparison with alternative variable selection techniques

15:30 Practicum (D. Albrecht, V. Punzo, R. Rosati, S. Tarantola)

Hands-on session with exercises carried out in groups

16:30 Break

17:00 Practicum (D. Albrecht, V. Punzo, R. Rosati, S. Tarantola)
Hands-on session with exercises carried out in groups

18:00 End

Thursday 7th July

8:30 Practicum (D. Albrecht, V. Punzo, R. Rosati, S. Tarantola)
Hands-on session with exercises carried out in groups

11:00 Break

11:30 Sensitivity indices with an Excel spreadsheet (Daniel Albrecht)
Demonstration of analytic computation of variance-based sensitivity indices.

12:00 New formulas for Sobol' indices (Rossana Rosati)
A set of new formulas for Sobol' indices, efficiency, performance, case studies

12:30 Practicum (D. Albrecht, V. Punzo, R. Rosati, S. Tarantola)
Hands-on session with exercises carried out in groups

13:30 lunch

14:30 Practicum (D. Albrecht, V. Punzo, R. Rosati, S. Tarantola)
Hands-on session with exercises carried out in groups

16:30 Break

17:00 Practicum (D. Albrecht, V. Punzo, R. Rosati, S. Tarantola)
Hands-on session with exercises carried out in groups

18:00 End

Friday 8th July

9:30 Two case studies proposed by the students with discussion

11:00 break

11:30 Two case studies proposed by the students with discussion

13:00 Wrap up and conclusions

The school ends at 13:30