
2-FUN

*Full-chain and UNcertainty Approaches for Assessing Health Risks in
FUture ENvironmental Scenarios*

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REPORT ON THE SUMMER SCHOOL ON GNOSTIC APPROACH TO SMALL SAMPLE DATA ANALYSIS –

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Project coordinator name: *Dr. Frédéric Y. BOIS*

Project coordinator organisation name: *INERIS*

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Approvals

	Name	Company	Date	Visa
Author	O.Tomoszková	IPH	15/07/2010	O. Tomoszková
WP leader	T.Ocelka	IPH	15/07/2010	T.Ocelka
Coordinator	F. BOIS	INERIS	16/07/2010	F. Bois

The report was circulated also to the Steering Committee.

Documents history

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Version 1	16/06/2010	First version	O. Tomoszková

15/07/2010

Summer School Organized by 2-FUN

The overview of the Summer School details was published in the 2-FUN Newsletter 7 (http://www.2-fun.org/download/newsletter7_en.pdf), which is reproduced on the following pages.



2FUN SUMMER SCHOOL ON GNOSTIC APPROACH TO SMALL SAMPLE DATA ANALYSIS

Prague, Czech Republic, 22.-25.June 2010
 Tomas Ocelka, Pavel Kovanic, Olga Tomoszková -
 IPH – Institute of Public Health Ostrava (Czech Republic)

The Institute of Public Health (Ostrava, Czech Republic) organized the "Summer school of treatment of small samples of strongly dispersed data" as part of the European Union's 2-FUN project. The school took place in a computer lab at Charles University's Faculty of Science in Prague on 22 – 25 June 2010. The goal of the school was to make available the advanced alternative of data treatment based on the mathematic gnostics (<http://www.math-gnostics.com/>), i.e. on the theory of individual uncertain data and small samples briefly characterized at Newsletter No. 4 (<http://2-fun.org/>). These methods are being developed in IPH to enable their applications not only by users of the commercial computing environment S-PLUS of the Insightful Co.™, but also by those using the free software environment of the R-project (<http://r-project.org/>) based on the GNU General Public License. The suitability of the gnostic approach for applications results from its specifics:

- 1) No assumptions of statistical models of the data are necessary.
- 2) Gnostic theory warrants maximization of information obtained from results.

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- 3) Methods are naturally robust, whereby two kinds of robustness can be chosen:
 - a) Robustness with respect to the peripheral, outlying data.
 - b) Robustness with respect to the central, inlying data and inner noise.
- 4) Non-parametric distribution and density functions are available enabling
 - a) robust estimation not only of the probability and its density, but also of the finite bounds of the data domains,
 - b) robust testing of the data homogeneity and homogenization of the non-homogeneous data,
 - c) estimation of the censored data (data measured below the Limit of Detection, above the range of the scale and of interval data.
 - d) Robust estimating of the correlation coefficients and matrices.
- 5) Robust multi-dimensional (MD) gnostic methods are suitable for
 - a) MD-modeling,
 - b) MD-filtering and prediction,
 - c) Ordering of MD-objects,
 - d) Reliable monitoring of MD-processes.



Pavel Kovanic



Milan Meloun





Full-chain and UNcertainty Approaches For Assessing Health Risks in Future ENvironmental Scenarios

Participants of the school (scientists, scholars, students) have received a complete package of the recently freely available gnostic software, together with a large amount of complementary educational materials. The program of the school included not only an introduction into statistical computing with an emphasis on the specifics of small sample statistics, but also exercises in applying gnostic methods, e.g. exercises in basic operations in R and using of gnostic package, Exercises in distribution functions in gnostic marginal analysis of small data samples. A demonstration of usage statistical tools (Adstat™ 1.25), as well as the R-project was conducted on real data. Students could try evaluating selected pilot datasets and compare results between the statistical and gnostic approach.

Participants have shown interest in further future training on a new version of Gnostic package, mainly in respect to multivariate applications.



Lubomír Pavliška

DEPARTMENT ECOLOGICAL CHEMISTRY, HELMHOLTZ CENTRE FOR ENVIRONMENTAL RESEARCH UFZ (GERMANY)

Ralph Kühne, Andrea Richarz, Gerrit Schüürmann -
Helmholtz Centre for Environmental Research (UFZ),
Germany

The Helmholtz Centre for Environmental Research (UFZ) is a governmental research centre belonging to the Helmholtz Association of National Research Centres. It investigates relationships between man and environment under the context of global and climate change.

The Department of Ecological Chemistry:

The goal of the Department is to unravel systematic relationships between the molecular structure of compounds and their fate in the environment including biological systems, and to develop methods for predicting their environmental behaviour and toxicity profile.

The experimental and theoretical activities focus on two major areas:

- *Environmental Chemodynamics*: Compound partitioning and degradation (photolysis, hydrolysis,

- *Molecular Toxicology*: Qualitative and quantitative structure-activity relationships (QSARs) including structural alerts to identify substances of concern and provide respective information to support chemical safety assessment and regulatory decision making.

Research is undertaken into computational (in silico) methods, chemoassays and non-animal bioassays as components of integrated testing strategies (ITS), and includes method and software development to address QSAR model domain and validation.



The UFZ campus in Leipzig, the Department Chemical Ecotoxicology is located in the building attached to the right of the tower.

2-FUN Summer school on Gnostic Approach to Small Sample Data Analysis

15/07/2010

Prague, Czech Republic, 22 - 25 June 2010

Scientific committee:
Pavel Kovanic
Milan Meloun
Tomáš Ocelka
Lubomír Pavliska

Organization committee:
Olga Tomoszková olga.tomoszkova@zuova.cz
Tomáš Ocelka tomas.ocelka@zuova.cz

Programme

First day

22 June 2010	Accommodation, Registration, Party
17.00 – 19.00	Registration
19.00 – 21.00	Welcome party

Second day

23 June 2010	Registration
8.00 – 10.00	Registration
8.45 – 9.00	Welcome remarks, invitation
	Scientific programme
9.00 – 9.30	T. Ocelka: Specific requirements of analysis of environmental data
9.30 – 10.30	P. Kovanic: Introduction to gnostic approach to the analysis of small data samples
10.30 – 11.00	Coffee break
11.00 – 12.30	P. Kovanic: Gnostic software package and its typical applications
12.30 – 13.15	L. Pavliska: Introduction to R-project
13.15 – 13.45	Discussion
13.45 – 14.15	Lunch
14.15 – 17.30	Bus tour
17.30 – 18.00	Coffee break
18.00 – 19.00	L. Pavliska: Installation of R-environment and of gnostic package into

	participant's computers
19.00 – 21.00	Dinner

Third day

24 June 2010	Scientific programme
9.00 – 10.00	P. Kovanic: Gnostic probability and density distributions and their robust parameters
10.00 – 11.00	L. Pavliska: Exercise in basic operations in R and using of gnostic package
11.00 – 11.30	Coffee break
11.30 – 13.00	L. Pavliska: Exercises: distribution functions in gnostic marginal analysis of small data samples
13.00 – 14.00	P. Kovanic: Gnostic software for robust multi-dimensional analysis
14.00 – 15.00	Lunch
15.00 – 16.30	L. Pavliska: Exercises in multi-dimensional analysis
16.30 – 17.00	Discussion
17.00 – 17.30	Coffee break
17.30 – 18.15	M. Meloun: Specifics of small sample statistics
18.15 – 19.00	M. Meloun: Statistical computing and software
19.00 – 21.00	Dinner

Fourth day

25 June 2010	Scientific programme
	P. Kovanic: Presentation of results of comparisons of different technologies of environmental monitoring and analysis
9.00. – 12.00	Discussion including and not limited to following aspects: <ol style="list-style-type: none"> 1) Exchange of environmental and health care data 2) Help in introducing the gnostic methodology in cooperating laboratories 3) Help in analysis of data of cooperating laboratories

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	4) Participation in the initiative aiming to International Inter-calibration of environmental and health-care systems
	Closure
12.00. – 13.00	Lunch