Studies in Classification, Data Analysis, and Knowledge Organization

Managing Editors

H.-H. Bock, Aachen
W. Gaul, Karlsruhe
M. Vichi, Rome
C. Weihs, Dortmund

Editorial Board

D. Baier, Cottbus
F. Critchley, Milton Keynes
R. Decker, Bielefeld
E. Diday, Paris
M. Greenacre, Barcelona
C.N. Lauro, Naples
J. Meulman, Leiden
P. Monari, Bologna
S. Nishisato, Toronto
N. Ohsumi, Tokyo
O. Opitz, Augsburg
G. Ritter, Passau
M. Schader, Mannheim

More information about this series at http://www.springer.com/series/1564

Adalbert F.X. Wilhelm • Hans A. Kestler
Editors

Analysis of Large and Complex Data

Springer

Editors
Adalbert F.X. Wilhelm
Jacobs University Bremen
Bremen, Germany

Hans A. Kestler
Institute of Medical Systems Biology
Universität Ulm
Ulm, Germany

ISSN 1431-8814 ISSN 2198-3321 (electronic)
Studies in Classification, Data Analysis, and Knowledge Organization
ISBN 978-3-319-25224-7 ISBN 978-3-319-25226-1 (eBook)
DOI 10.1007/978-3-319-25226-1

Library of Congress Control Number: 2016930307

Springer Cham Heidelberg New York Dordrecht London
© Springer International Publishing Switzerland 2016
This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.
The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.
The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

Springer International Publishing AG Switzerland is part of Springer Science+Business Media (www.springer.com)

Foreword

Dear Scholars,

The world we live in is producing vast amounts of data everywhere and anytime. Wider use of the Internet with smartphones and tablets and increasing interconnection of equipment, vehicles and machines are swelling the data flow into a veritable flood of information. This flood of information, better known as "Big Data", is a valuable resource—if you know how to use it. Only efficient and intelligent analysis of Big Data can help us to understand linkages and to make better decisions on this basis. Its potential can be found in many areas: Evaluation of large volumes of data helps to improve medical care, to optimise use of natural resources, to increase our security or also to develop new products and services. We are only just beginning to exploit this treasure. This book is the outcome of the second European Conference on Data Analysis (ECDA) held in Bremen in 2014. The scientific programme of the conference covered a broad range of topics. Special emphasis was given to research on and development of innovative tools, techniques and strategies that address current challenges in the data analysis process. I warmly invite you to read this book in order to get a deep insight into the present state of research and into the pivotal areas of data analysis.

President of the Confederation of German Employers' Association
(Bundesvereinigung der Deutschen Arbeitgeberverbände – BDA)
Berlin, Germany
June 2015

Ingo Kramer

Preface

The volume that you hold now in your hand or read electronically comprises the revised versions of selected papers presented during the European Conference on Data Analysis (ECDA 2014) and the Workshop on Classification and Subject Indexing in Library and Information Science (LIS' 2014). This second edition of the European Conference on Data Analysis was held at Jacobs University Bremen (Germany) under the patronage of Ingo Kramer, President of the Confederation of German Employers' Association (Bundesvereinigung der Deutschen Arbeitgeberverbände—BDA). The conference marked also the occasion of the 38th anniversary of the German Classification Society (GfKl). The conference was organised by the German Classification Society (GfKl) in cooperation with the Italian Statistical Society Classification and Data Analysis Group (SIS-Cladag), Vereniging voor Ordinatie en Classificatie (VOC), Sekcja Klasyfikacji i Analizy Danych PTS (SKAD) and the International Association for Statistical Computing (IASC).

In early July 2014, a total of 193 participants from 27 countries gathered at the beautiful campus of Jacobs University Bremen to listen to and critically discuss on 154 presentations including two plenary and eight semi-plenary keynote speeches, six invited symposia and a plenary panel discussion on "The Future of Publications in Classification and Data Sciences". Having most participants accommodated on campus allowed for additional discussions and mutual exchange of knowledge outside the conference presentations, and it created an excellent stimulus for fostering international collaborations and networks. With half of the participants coming from outside of Germany, the conference truly lived up to the idea of an international convention. The selection of keynote speakers from six European countries, as well as from China, Israel and the United States of America, is another indicator for the growing international network of researchers in this area.

The scientific programme extended across a broad range of sessions dealing with different aspects of the data analysis process. Quite a spectrum of application fields had been covered in the presentations showing the importance of a close interaction between theory and practice as well as between scientific disciplines. The members of the scientific programme committee under the lead of the Scientific

Programme Chair Hans A. Kestler stipulated and selected a truly inspiring and interdisciplinary programme bridging theory, methods and applications of data analysis in the following seven thematic areas:

1. Statistics and Data Analysis, organised by Claus Weihs, Francesco Mola, Roberto Rocci and Christian Hennig
2. Machine Learning and Knowledge Discovery, organised by Eyke Hüllermeier, Friedhelm Schwenker and Myra Spiliopoulou
3. Data Analysis in Marketing, organised by Józef Pociecha, Daniel Baier, Wolfgang Gaul and Reinhold Decker
4. Data Analysis in Finance and Economics, organised by Marlene Müller, Gregor Dorfleitner and Colin Vance
5. Data Analysis in Medicine and the Life Sciences, organised by Hans A. Kestler, Matthias Schmid, Iris Pigeot and Berthold Lausen
6. Data Analysis in the Social, Behavioural, and Health Care Sciences, organised by Ali Ünlü, Ingo Rohlfing, Karin Wolf-Ostermann and Jeroen K. Vermunt
7. Data Analysis in Interdisciplinary Domains, organised by Adalbert F.X. Wilhelm, Patrick Groenen, Sabine Krolak-Schwerdt, Frank Scholze and Andreas Geyer-Schulz
8. The Workshop Library and Information Science (LIS' 2014), organised by Frank Scholze

For each of these topics, a number of well-elaborated papers have been submitted for the proceedings volume after the conference took place. The 55 contributions that you find now in this volume have been accepted after a peer-reviewing process and provide a good representation of the topics covered at the conference. The contributions to the proceedings represent a diverse range of scientific disciplines, namely, Statistics, Psychology, Biology, Information Retrieval and Library Science, Archeology, Banking and Finance, Computer Science, Economics, Engineering, Geography, Geology, Linguistics and Musicology, Marketing, Mathematics, Medical and Health Sciences, Sociology and Educational Sciences. In all these disciplines, *Data Science* is a major unifying topic, which is reflected in papers that cover the meaningful extraction of knowledge from diverse data sources via structural, quantitative and statistical approaches. Examples are advances in classification and clustering and other pattern recognition methods. The explicit modelling of complex data in specific domains also includes the issues that come with *Big Data* in terms of numerical stability, set size and model learning or adaptation time and effort.

Empirical research in these fields requires the analysis of multiple data types. Even though underlying research questions and corresponding data emerge from most various areas, they often require similar statistical, structural or quantitative approaches for the analysis of data. The specific scientific impact of the post-conference volume concerns the presentation of methods, which may commonly be used for the analysis of data stemming from different domains and domain-specific research questions with the aim of solving the numerous domain-specific problems of data analysis on a theoretical as well as on a practical level, fostering

their effective use for answering specific questions in various areas of application as well as evaluating alternative methods in the framework of applications.

Accordingly, the volume is organised with the following subsections:

Part I	Invited Papers
Part II	Big Data
Part III	Clustering
Part V	Regression and Other Statistical Techniques
Part VI	Applications
Part VII	Data Analysis in Marketing
Part VIII	Data Analysis in Finance
Part IX	Data Analysis in Medicine and Life Sciences
Part X	Data Analysis in Musicology
Part XI	Data Analysis in Interdisciplinary Domains
Part XII	Data Analysis in Social, Behavioural and Health Care Sciences
Part XIII	Data Analysis in Library Science

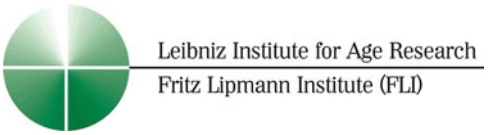
Organising this second ECDA conference required the coordination of many people and topics; dedicated colleagues and the great team of the Jacobs University Bremen made this possible. We would like to thank the area chairs and the LIS workshop chair for organising the areas during the conference, author recruitment and the evaluation of submissions. We are grateful to all reviewers: Daniel Baier, Andre Burkovski, Reinhold Decker, Gregor Dorfleitner, Axel Fürstberger, Wolfgang Gaul, Andreas Geyer-Schulz, Patrick Groenen, Christian Hennig, Eyke Hüllermeier, Johann Kraus, Sabine Krolak-Schwerdt, Berthold Lausen, Ludwig Lausser, Francesco Mola, Marlene Müller, Christoph Müssel, Magnus Pfeffer, Iris Pigeot, Józef Pociecha, Roberto Rocci, Ingo Rohlfing, Florian Schmid, Matthias Schmid, Frank Scholze, Friedhelm Schwenker, Myra Spiliopoulou, Eric Sträng, Ali Ünlü, Colin Vance, Jerome K. Vermunt, Claus Weihs, Heidrun Wiesenmüller and Karin Wolf-Ostermann.

Furthermore, we would like to thank Martina Bihn and Alice Blanck, Springer-Verlag, Heidelberg, for their support and dedication to the production of this volume. Last but not least, we would like to thank all participants of the ECDA 2014 conference for their interest and activities, which made the conference such a great interdisciplinary venue for scientific discussion.

Bremen, Germany — Adalbert F.X. Wilhelm
Ulm, Germany — Hans A. Kestler
July 2015

Acknowledgements

We gratefully acknowledge financial support by the Deutsche Forschungsgemeinschaft (DFG), the Bremen International Graduate School of Social Sciences (BIGSSS), the Bankenverband Bremen e.V. and Springer-Verlag. We are very thankful for Jacobs University Bremen for hosting the conference. We also like to thank both Jacobs University Bremen and the Fritz-Lipmann Institute in Jena for providing us with the necessary infrastructure and time to edit this volume.



Contents

Part I Invited Papers

Latent Variables and Marketing Theory: The Paradigm Shift 3
Adam Sagan

Business Intelligence in the Context of Integrated Care Systems (ICS): Experiences from the ICS "Gesundes Kinzigtal" in Germany..... 17
Alexander Pimperl, Timo Schulte, and Helmut Hildebrandt

Clustering and a Dissimilarity Measure for Methadone Dosage Time Series..... 31
Chien-Ju Lin, Christian Hennig, and Chieh-Liang Huang

Linear Storage and Potentially Constant Time Hierarchical Clustering Using the Baire Metric and Random Spanning Paths 43
Fionn Murtagh and Pedro Contreras

Standard and Novel Model Selection Criteria in the Pairwise Likelihood Estimation of a Mixture Model for Ordinal Data 53
Monia Ranalli and Roberto Rocci

Part II Big Data

Textual Information Localization and Retrieval in Document Images Based on Quadtree Decomposition..... 71
Cynthia Pitou and Jean Diatta

Selection Stability as a Means of Biomarker Discovery in Classification..... 79
Lyn-Rouven Schirra, Ludwig Lausser, and Hans A. Kestler

Active Multi-Instance Multi-Label Learning 91
Robert Retz and Friedhelm Schwenker

Using Annotated Suffix Tree Similarity Measure for Text Summarisation 103
Maxim Yakovlev and Ekaterina Chernyak

Big Data Classification: Aspects on Many Features and Many Observations 113
Claus Weihs, Daniel Horn, and Bernd Bischl

Part III Clustering

Bottom-Up Variable Selection in Cluster Analysis Using Bootstrapping: A Proposal 125
Hans-Joachim Mucha and Hans-Georg Bartel

A Comparison Study for Spectral, Ensemble and Spectral-Mean Shift Clustering Approaches for Interval-Valued Symbolic Data 137
Marcin Pełka

Supervised Pre-processings Are Useful for Supervised Clustering 147
Oumaima Alaoui Ismaili, Vincent Lemaire, and Antoine Cornuéjols

Similarity Measures on Concept Lattices 159
Florent Domenach and George Portides

Part IV Classification

Multivariate Functional Regression Analysis with Application to Classification Problems 173
Tomasz Górecki, Mirosław Krzyśko, and Waldemar Wołyński

Incremental Generalized Canonical Correlation Analysis 185
Angelos Markos and Alfonso Iodice D'Enza

Evaluating the Necessity of a Triadic Distance Model 195
Atsuho Nakayama

Assessing the Reliability of a Multi-Class Classifier 207
Luca Frigau, Claudio Conversano, and Francesco Mola

Part V Regression and Other Statistical Techniques

Reviewing Graphical Modelling of Multivariate Temporal Processes 221
Matthias Eckardt

The Weight of Penalty Optimization for Ridge Regression 231
Sri Utami Zuliana and Aris Perperoglou

Monitoring a Dynamic Weighted Majority Method Based on Datasets with Concept Drift 241
Dhouha Mejri, Mohamed Limam, and Claus Weihs

Part VI Applications

Specialization in Smart Growth Sectors vs. Effects of Change of Workforce Numbers in the European Union Regional Space 253
Elżbieta Sobczak and Marcin Pełka

Evaluation of the Individually Perceived Quality from Head-Up Display Images Relating to Distortions 265
Sonja Köppl, Markus Hellmann, Klaus Jostschulte, and Christian Wöhler

Minimizing Redundancy Among Genes Selected Based on the Overlapping Analysis 275
Osama Mahmoud, Andrew Harrison, Asma Gul, Zardad Khan, Metodi V. Metodiev, and Berthold Lausen

The Identification of Relations Between Smart Specialization and Sensitivity to Crisis in the European Union Regions 287
Beata Bal-Domańska

Part VII Data Analysis in Marketing

Market Oriented Product Design and Pricing: Effects of Intra-Individual Varying Partworths 301
Stephanie Löffler and Daniel Baier

The Use of Hybrid Predictive C&RT-Logit Models in Analytical CRM ... 311
Mariusz Łapczyński

Part VIII Data Analysis in Finance

Excess Takeover Premiums and Bidder Contests in Merger & Acquisitions: New Methods for Determining Abnormal Offer Prices 323
Wolfgang Bessler and Colin Schneck

Firm-Specific Determinants on Dividend Changes: Insights from Data Mining 335
Karsten Luebke and Joachim Rojahn

Selection of Balanced Structure Samples in Corporate Bankruptcy Prediction 345
Mateusz Baryła, Barbara Pawełek, and Józef Pociecha

Facilitating Household Financial Plan Optimization by Adjusting Time Range of Analysis to Life-Length Risk Aversion..... 357
Radoslaw Pietrzyk and Pawel Rokita

Dynamic Aspects of Bankruptcy Prediction Logit Model for Manufacturing Firms in Poland 369
Barbara Pawełek, Józef Pociecha, and Mateusz Baryła

Part IX Data Analysis in Medicine and Life Sciences

Estimating Age- and Height-Specific Percentile Curves for Children Using GAMLSS in the IDEFICS Study 385
Timm Intemann, Hermann Pohlabeln, Diana Herrmann, Wolfgang Ahrens, and Iris Pigeot, on behalf of the IDEFICS consortium

An Ensemble of Optimal Trees for Class Membership Probability Estimation 395
Zardad Khan, Asma Gul, Osama Mahmoud, Miftahuddin Miftahuddin, Aris Perperoglou, Werner Adler, and Berthold Lausen

Ensemble of Subset of *k*-Nearest Neighbours Models for Class Membership Probability Estimation 411
Asma Gul, Zardad Khan, Aris Perperoglou, Osama Mahmoud, Miftahuddin Miftahuddin, Werner Adler, and Berthold Lausen

Part X Data Analysis in Musicology

The Surprising Character of Music: A Search for Sparsity in Music Evoked Body Movements 425
Denis Amelynck, Pieter-Jan Maes, Marc Leman, and Jean-Pierre Martens

Comparing Audio Features and Playlist Statistics for Music Classification 437
Igor Vatolkin, Geoffray Bonnin, and Dietmar Jannach

Duplicate Detection in Facsimile Scans of Early Printed Music 449
Christophe Rhodes, Tim Crawford, and Mark d'Inverno

Fast Model Based Optimization of Tone Onset Detection by Instance Sampling 461
Nadja Bauer, Klaus Friedrichs, Bernd Bischl, and Claus Weihs

Recognition of Leitmotives in Richard Wagner's Music: An Item Response Theory Approach 473
Daniel Müllensiefen, David Baker, Christophe Rhodes, Tim Crawford, and Laurence Dreyfus

Part XI Data Analysis in Interdisciplinary Domains

Optimization of a Simulation for Inhomogeneous Mineral Subsoil Machining 487
Swetlana Herbrandt, Claus Weihs, Uwe Ligges, Manuel Ferreira, Christian Rautert, Dirk Biermann, and Wolfgang Tillmann

Fast and Robust Isosurface Similarity Maps Extraction Using Quasi-Monte Carlo Approach 497
Alexey Fofonov and Lars Linsen

Analysis of ChIP-seq Data Via Bayesian Finite Mixture Models with a Non-parametric Component 507
Baba B. Alhaji, Hongsheng Dai, Yoshiko Hayashi, Veronica Vinciotti, Andrew Harrison, and Berthold Lausen

Information Theoretic Measures for Ant Colony Optimization 519
Gunnar Völkel, Markus Maucher, Christoph Müssel, Uwe Schöning, and Hans A. Kestler

A Signature Based Method for Fraud Detection on E-Commerce Scenarios 531
Orlando Belo, Gabriel Mota, and Joana Fernandes

Three-Way Clustering Problems in Regional Science 545
Małgorzata Markowska, Andrzej Sokołowski, and Danuta Strahl

Part XII Data Analysis in Social, Behavioural and Health Care Sciences

CFA-MTMM Model in Comparative Analysis of 5-, 7-, 9-, and 11-point A/D Scales 553
Piotr Tarka

Biasing Effects of Non-Representative Samples of Quasi-Orders in the Assessment of Recovery Quality of IITA-Type Item Hierarchy Mining 563
Ali Ünlü and Martin Schrepp

Correlated Component Regression: Profiling Student Performances by Means of Background Characteristics 575
Bernhard Gschrey and Ali Ünlü

Analysing Psychological Data by Evolving Computational Models 587
Peter C.R. Lane, Peter D. Sozou, Fernand Gobet, and Mark Addis

Use of Panel Data Analysis for V4 Households Poverty Risk Prediction 599
Lukáš Sobíšek and Mária Stachová

Part XIII Data Analysis in Library Science

Collaborative Literature Work in the Research Publication Process: The Cogeneration of Citation Networks as Example 611
Leon Otto Burkard and Andreas Geyer-Schulz

Subject Indexing of Textbooks: Challenges in the Construction of a Discovery System 621
Bianca Pramann, Jessica Drechsler, Esther Chen, and Robert Strötgen

The Ofness and Aboutness of Survey Data: Improved Indexing of Social Science Questionnaires 629
Tanja Friedrich and Pascal Siegers

Subject Indexing for Author Name Disambiguation: Opportunities and Challenges 639
Cornelia Hedeler, Andreas Oskar Kempf, and Jan Steinberg

Index 651

Contributors

Mark Addis Faculty of Arts, Design and Media, Birmingham City University, Birmingham, UK

Werner Adler Department of Biometry and Epidemiology, University of Erlangen-Nuremberg, Erlangen, Germany

Wolfgang Ahrens Leibniz Institute for Prevention Research and Epidemiology - BIPS GmbH, Bremen, Germany

Oumaima Alaoui Ismaili Orange Labs, Lannion Cedex, France

AgroParisTech, Paris, France

Denis Amelynck Ghent University, Gent, Belgium

Daniel Baier Institute of Business Administration and Economics, BTU Cottbus-Senftenberg, Senftenberg, Germany

David Baker Goldsmiths, University of London, London, UK

Beata Bal-Domańska Department of Regional Economics, Wroclaw University of Economics, Jelenia Góra, Poland

Hans-Georg Bartel Department of Chemistry, Humboldt University Berlin, Berlin, Germany

Mateusz Baryła Cracow University of Economics, Cracow, Poland

Nadja Bauer Chair of Computational Statistics, Faculty of Statistics, TU Dortmund, Dortmund, Germany

Orlando Belo University of Minho, Guimaraes, Portugal

Wolfgang Bessler Center for Finance and Banking, Justus-Liebig University Giessen, Giessen, Germany

Dirk Biermann Institute of Machining Technology, TU Dortmund, Dortmund, Germany

Bernd Bischl Department of Statistics, TU Dortmund University, Dortmund, Germany

Geoffray Bonnin LORIA, Nancy, France

Baba B. Alhaji Department of Mathematical Sciences, University of Essex, Colchester, UK

Leon Otto Burkard Information Services and Electronic Markets, Karlsruhe Institute of Technology, Karlsruhe, Germany

Esther Chen Georg Eckert Institute for International Textbook Research - Member of the Leibniz Association, Braunschweig, Germany

Max-Planck-Institut für Wissenschaftsgeschichte - Max Planck Institute for the History of Science, Berlin, Germany

Ekaterina Chernyak National Research University Higher School of Economics, Moscow, Russia

Pedro Contreras Thinking Safe Ltd., Egham, Surrey, UK

Claudio Conversano Department of Business and Economics, University of Cagliari, Cagliari, Italy

Antoine Cornuéjols AgroParisTech, Paris, France

Tim Crawford Goldsmiths, University of London, London, UK

Mark d'Inverno Goldsmiths, University of London, London, UK

Hongsheng Dai Department of Mathematical Sciences, University of Essex, Colchester, UK

Jean Diatta EA2525-LIM, University of Reunion Island, Ile de La Reunion, Saint Denis, France

Florent Domenach Computer Science Department, University of Nicosia, Nicosia, Cyprus

Jessica Drechsler Georg Eckert Institute for International Textbook Research - Member of the Leibniz Association, Braunschweig, Germany

Laurence Dreyfus University of Oxford, Oxford, UK

Matthias Eckardt Institute of Computer Science, Humboldt-Universität zu Berlin, Berlin, Germany

Joana Fernandes Farfetch, Braga, Portugal

Manuel Ferreira Institute of Materials Engineering, TU Dortmund, Dortmund, Germany

Alexey Fofonov Jacobs University Bremen, Bremen, Germany

Tanja Friedrich GESIS, Cologne, Germany

Klaus Friedrichs Chair of Computational Statistics, Faculty of Statistics, TU Dortmund, Dortmund, Germany

Luca Frigau Department of Business and Economics, University of Cagliari, Cagliari, Italy

Andreas Geyer-Schulz Information Services and Electronic Markets, Karlsruhe Institute of Technology, Karlsruhe, Germany

Fernand Gobet Department of Psychological Sciences, University of Liverpool, Liverpool, UK

Tomasz Górecki Faculty of Mathematics and Computer Science, Adam Mickiewicz University, Poznań, Poland

Bernhard Gschrey Chair for Methods in Empirical Educational Research, TUM School of Education and Centre for International Student Assessment (ZIB), TU München, Munich, Germany

Asma Gul Department of Mathematical Sciences, University of Essex, Colchester, UK

Department of Statistics, Shaheed Benazir Bhutto Women University Peshawar, Khyber Pukhtoonkhwa, Pakistan

Andrew Harrison Department of Mathematical Sciences, University of Essex, Colchester, UK

Yoshiko Hayashi Department of Mathematical Sciences, University of Essex, Colchester, UK

Cornelia Hedeler School of Computer Science, The University of Manchester, Manchester, UK

Markus Hellmann Daimler AG, Stuttgart, Germany

Christian Hennig Department of Statistical Science, University College London, London, UK

Swetlana Herbrandt Department of Statistics, TU Dortmund, Dortmund, Germany

Diana Herrmann Leibniz Institute for Prevention Research and Epidemiology - BIPS GmbH, Bremen, Germany

Helmut Hildebrandt OptiMedis AG, Hamburg, Germany

Daniel Horn Department of Statistics, TU Dortmund University, Dortmund, Germany

Chieh-Liang Huang Department of Psychiatry, China Medical University Hospital, Taichung City, Taiwan, ROC

Timm Intemann Leibniz Institute for Prevention Research and Epidemiology - BIPS GmbH, Bremen, Germany

Alfonso Iodice D'Enza Department of Economics and Law, Università di Cassino e del Lazio Meridionale, Cassino FR, Italy

Dietmar Jannach Department of Computer Science, TU Dortmund, Dortmund, Germany

Klaus Jostschulte Daimler AG, Stuttgart, Germany

Daimler Research & Development, Ulm, Germany

Andreas Oskar Kempf GESIS - Leibniz Institute for the Social Sciences, Cologne, Germany

Hans A. Kestler Institute of Medical Systems Biology, Universität Ulm, Ulm, Germany

Zardad Khan Department of Mathematical Sciences, University of Essex, Colchester, UK

Sonja Köppl Daimler AG, Stuttgart, Germany

Daimler Research & Development, Ulm, Germany

Mirosław Krzyśko Faculty of Mathematics and Computer Science, Adam Mickiewicz University, Poznań, Poland

Peter C.R. Lane School of Computer Science, University of Hertfordshire, Hertfordshire, UK

Mariusz Łapczyński Cracow University of Economics, Kraków, Poland

Berthold Lausen Department of Mathematical Sciences, University of Essex, Colchester, UK

Ludwig Lausser Core Unit Medical Systems Biology and Institute of Neural Information Processing, Ulm University, Ulm, Germany

Leibniz Institute for Age Research–Fritz Lipmann Institute, Jena, Germany

Vincent Lemaire Orange Labs, Lannion Cedex, France

Marc Leman Ghent University, Gent, Belgium

Uwe Ligges Department of Statistics, TU Dortmund, Dortmund, Germany

Mohamed Limam ISG, University of Tunis, Tunis, Tunisia

Dhofar University, Salalah, Oman

Chien-Ju Lin Department of Statistical Science, University College London, London, UK

MRC Biostatistics Unit, Cambridge, UK

Lars Linsen Jacobs University Bremen, Bremen, Germany

Stephanie Löffler Institute of Business Administration and Economics, BTU Cottbus-Senftenberg, Senftenberg, Germany

Karsten Luebke FOM Hochschule für Oekonomie und Management, Dortmund, Germany

Pieter-Jan Maes Ghent University, Gent, Belgium

Osama Mahmoud Department of Mathematical Sciences, University of Essex, Colchester, UK

Department of Applied Statistics, Helwan University, Cairo, Egypt

Angelos Markos Department of Primary Education, Democritus University of Thrace, Xanthi, Greece

Małgorzata Markowska Wroclaw University of Economics, Wroclaw, Poland

Jean-Pierre Martens Ghent University, Gent, Belgium

Markus Maucher Core Unit Medical Systems Biology, Ulm University, Ulm, Germany

Dhouha Mejri Technische Universität Dortmund, Dortmund, Germany

ISG, University of Tunis, Tunis, Tunisia

Metodi V. Metodiev School of Biological Sciences/Proteomics Unit, University of Essex, Colchester, UK

Miftahuddin Miftahuddin Department of Mathematical Sciences, University of Essex, Colchester, UK

Francesco Mola Department of Business and Economics, University of Cagliari, Cagliari, Italy

Gabriel Mota University of Minho, Guimaraes, Portugal

Hans-Joachim Mucha Weierstrass Institute for Applied Analysis and Stochastics (WIAS), Berlin, Germany

Daniel Müllensiefen Goldsmiths, University of London, London, UK

Fionn Murtagh Department of Computing, Goldsmiths University of London, London, UK

De Montfort University, Leicester, UK

Department of Computing and Mathematics, University of Derby, Derby, UK

Christoph Müssel Core Unit Medical Systems Biology, Ulm University, Ulm, Germany

Atsuho Nakayama Tokyo Metropolitan University, Tokyo, Japan

Barbara Pawełek Cracow University of Economics, Cracow, Poland

Marcin Pełka Department of Econometrics and Computer Science, Faculty of Economics, Management and Tourism, Wrocław University of Economics, Jelenia Góra, Poland

Aris Perperoglou Department of Mathematical Sciences, University of Essex, Colchester, UK

Radoslaw Pietrzyk Wroclaw University of Economics, Wroclaw, Poland

Iris Pigeot on behalf of the IDEFICS consortium Leibniz Institute for Prevention Research and Epidemiology - BIPS GmbH, Bremen, Germany

Alexander Pimperl OptiMedis AG, Hamburg, Germany

Cynthia Pitou EA2525-LIM, University of Reunion Island, Ile de La Reunion, Saint Denis, France

Józef Pociecha Cracow University of Economics, Cracow, Poland

Hermann Pohlabeln Leibniz Institute for Prevention Research and Epidemiology - BIPS GmbH, Bremen, Germany

George Portides Computer Science Department, University of Nicosia, Nicosia, Cyprus

Bianca Pramann Georg Eckert Institute for International Textbook Research - Member of the Leibniz Association, Braunschweig, Germany

Monia Ranalli Department of Statistics, The Pennsylvania State University, University Park, State College, PA, USA

Sapienza, University of Rome, Rome, Italy

Christian Rautert Institute of Machining Technology, TU Dortmund, Dortmund, Germany

Robert Retz Institute of Neural Information Processing, Ulm University, Ulm, Germany

Christophe Rhodes Goldsmiths, University of London, London, UK

Roberto Rocci IGF Department, University of Tor Vergata, Rome, Italy

Joachim Rojahn FOM Hochschule für Oekonomie und Management, Essen, Germany

Pawel Rokita Wroclaw University of Economics, Wroclaw, Poland

Adam Sagan Cracow University of Economics, Cracow, Poland

Lyn-Rouven Schirra Core Unit Medical Systems Biology and Institute of Neural Information Processing, Ulm University, Ulm, Germany

Institute of Number Theory and Probability Theory, Ulm University, Ulm, Germany

Colin Schneck Center for Finance and Banking, Justus-Liebig University Giessen, Giessen, Germany

Uwe Schöning Institute of Theoretical Computer Science, Ulm University, Ulm, Germany

Martin Schrepp SAP AG, Walldorf, Germany

Timo Schulte OptiMedis AG, Hamburg, Germany

Friedhelm Schwenker Institute of Neural Information Processing, Ulm University, Ulm, Germany

Pascal Siegers GESIS, Cologne, Germany

Elżbieta Sobczak Department of Regional Economics, Wrocław University of Economics, Jelenia Góra, Poland

Lukáš Sobíšek Faculty of Informatics and Statistics, University of Economics, Prague, Czech Republic

Andrzej Sokołowski Cracow University of Economics, Cracow, Poland

Peter D. Sozou Centre for Philosophy of Natural and Social Science, London School of Economics and Political Science, London, UK

Department of Psychological Sciences, University of Liverpool, Liverpool, UK

Mária Stachová Faculty of Economics, Matej Bel University, Banská Bystrica, Slovakia

Jan Steinberg GESIS - Leibniz Institute for the Social Sciences, Cologne, Germany

Danuta Strahl Wroclaw University of Economics, Wroclaw, Poland

Robert Strötgen Georg Eckert Institute for International Textbook Research, Braunschweig, Germany

Stiftung Wissenschaft und Politik - German Institute for International and Security Affairs, Berlin, Germany

Piotr Tarka Department of Marketing Research, Poznan University of Economics, Poznan, Poland

Wolfgang Tillmann Institute of Materials Engineering, TU Dortmund, Dortmund, Germany

Ali Ünlü Chair for Methods in Empirical Educational Research, TUM School of Education and Centre for International Student Assessment (ZIB), TU München, Munich, Germany

Igor Vatolkin Department of Computer Science, TU Dortmund, Dortmund, Germany

Veronica Vinciotti Department of Mathematical Sciences, University of Essex, Colchester, UK

Gunnar Völkel Institute of Theoretical Computer Science and Core Unit Medical Systems Biology, Ulm University, Ulm, Germany

Claus Weihs Chair of Computational Statistics, Faculty of Statistics, TU Dortmund, Dortmund, Germany

Waldemar Wołyński Faculty of Mathematics and Computer Science, Adam Mickiewicz University, Poznań, Poland

Christian Wöhler TU Dortmund, Dortmund Germany

Maxim Yakovlev National Research University Higher School of Economics, Moscow, Russia

Sri Utami Zuliana Department of Mathematical Sciences, University of Essex, Colchester, UK