Special issue – communications in statistics – theory and methods 4th stochastic modeling techniques and data analysis international conference

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Preface

This special issue of the journal Communications in Statistics – Theory and Methods contains selected papers presented at the conference on Stochastic Modeling Techniques and Data Analysis (SMTDA2016). The conference was held in La Valletta, Malta from 1-4 June 2016 where significant and recent developments concerning stochastic modeling and data analysis techniques were presented. This issue includes twelve research articles that were first presented at the conference, then selected by the guest editors and finally, having undergone the peer-review process according to the standards of the journal, have been found to be acceptable for publication.

In the first article "Bayesian Modeling of Temperature-related Mortality with Latent Functional Relationships" Robert Aykroyd uses local correlation, explicitly described using a generalized additive model with a spatial component, to incorporate and combine information from neighboring locations. Random walk and random field models are proposed to describe temporal and spatial correlation structure, and MCMC methods used for parameter estimation, and posterior inference. This should use data more efficiently and also reduce prediction variability.

The second article "Modeling Mortality Rates in Malta using GEE Models" by Liberato Camilleri and Kathleen England study use of generalized estimating equation (GEE) models to analyze correlated longitudinal responses for members of the exponential family. The model is used to show that mortality rate and temperature are related by a quadratic function. A number of significant main and interaction effects are identified which provide knowledge concerning the effect of weather predictors on daily mortality rates.

In the third article "The Analysis of Student Paths at the University using the Multivariate Joint Models", Marcella Mazzoleni analyses jointly survival and longitudinal data using a longitudinal and a survival sub-model. The joint models quantify the influence of one or more longitudinal covariates onto the risk of one or more events. The model is applied to undergraduate paths in an Italian University, analyzing the time of student graduation and their influence on the event graduation for one or more longitudinal covariates.

The next paper, written by Valeria D'Amato, Steven Haberman and Gabriella Piscopo and with the title "The Dependency Premium Based on a Multifactor Model for Dependent Mortality Data" proposes a new multifactor model for capturing common and specific features of the mortality trend over time. The introduction of the concept of the dependency premium allows for an improvement in the calculation of the fair price of insurance products and could produce a reduction of prices for some subgroups.

Valerie Girardin and Justine Lequesne deal with "Entropy-based Goodness-of-fit tests – A Unifying Framework. Application to DNA Replication". The authors present an unified approach to goodness-of-fit tests based on Shannon entropy (S-test) and Kullback-Leibler (KL-test) divergence estimates. The link between S-tests and KL-tests has been explained and the proposed methodology is then applied to a real dataset on a DNA replication process.

The contribution "Identification of Hidden Markov Chains Governing Dependent Credit-rating Migrations" given by Dmitri Boreiko, Serguei Kaniovski, Yuri M. Kaniovsky and Georg Ch. Pflug deal with three models of dependent credit-rating migrations. The models are mixtures of an idiosyncratic and a common component. Each of them involves a coupling scheme and a discrete-time Markov chain for the description of the macroeconomic dynamics.

Terence Mills, Ka Chan, Christopher Lenard and Ruth Williams, in their article titled "Measuring Inequality in Society," present an introduction to measures of economic inequality in society from a mathematical perspective, and highlight policy implications of such measures.

The article "Nonparametric Estimation of the Measure Associated with the Lévy-Khintchine Canonical Representation" given by Mark Anthony Caruana presents the estimator of Rubin and Tucker and apply it within the context of nonparametric estimation of the Lévy measure using the method of sieves. The asymptotic consistency and also asymptotic normality is also proven and an estimation method is proposed.

In the article "Recent Mortality Trends in Greece", Konstantinos Zafeiris and Anastasia Kostaki consider a new combination of methods for the smoothing of death probabilities in a life table. This method is a combination of the Heligman-Pollard formula as modified by Kostaki with three subsequent cubic splines. Related applications are discussed as well.

The next paper is written by Panagiotis Andreopoulos, Fragkiskos Bersimis, Alexandra Tragaki and Antonis Rovolis and titled "Mortaility Modelling using Probability Distributions. Application in Greek Mortaility Data". The authors propose a new mathematical model, combining the Gompertz and Gompertz-Makeham distributions with the Beta distribution. Applications to the Greek mortality data are presented.

The contribution "Use of Components' Weights Improves the Diagnostic Accuracy of a Health-related Index" given by Fragkiskos Bersimis, Demosthenes Panagiotakos and Malvina Vamvakari proposes the use of weights in a composite health related index, which is constructed by m variables. The theoretical results are then applied to a dietary data.

The final paper is written by Aijun Yang, Jiang Xuejun, Lianjie Shu and Pengfei Liu and considers "Sparse Bayesian Kernel Multinomial Probit Regression Model for High-dimensional Data Classification". This paper combines data analysis methods and techniques.

Finally, we would like to thank all the authors for submitting their articles, the referees for their valuable work in the review process and the Editor-in-Chief of Communications in Statistics - Theory and Methods, Prof. N. Balakrishnan, for his support in publishing this special issue devoted to the 4th SMTDA International Conference, 01-04 June, 2016, La Valletta, Malta, and the editorial assistant Debbie Iscoe for taking care of the editorial and production work.

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