INTRODUCTION

The present volume covers a wide scope of topics within the area of multivariate statistical analysis, ranging from mathematical statistics, multivariate distributions and nonparametric inference, cluster analysis, Bayesian inference, regression and variance analysis to innovative applications of statistical methods. Scientific problemes considered in the volume result from the papers presented and discussed during 31st Scientific Conference on Multivariate Statistical Analysis MSA 2012. The conference was organized by the Department of Statistical Methods, University of Lodz and the Polish Statistical Association in Lodz, on November 12–14, 2012.

The first section of the Volume is devoted to the centinary of the Polish Statistical Association and prominent representatives of Polish statistics. The paper by Tadeusz Bednarski is an introduction to the problem of casualty analysis in a manner in which it was studied by Jerzy Spława-Neyman and other outstanding pioneers of Polish statistics. Mirosław Krzyśko and Czesław Domański present scientific achievements of Karolina Iwaszkiewicz-Gintowt as well as give insight into scientific works of Rajmund Buławski and Jan Piekałkiewicz.

The second section covers the vast area of probability theory and construction of statistical tests. In the field of statistical inference Czesław Domański and Katarzyna Bolonek-Lasoń focus on generalization of lambda distribution through introduction of a five-parameter lambda distribution. Dariusz Parys proposes new procedures of multiple hypotheses testing for discreetly distributed data. Jacek Stelmach links the problem of multivariate approach in regression analysis with statistical test theory and proposes a formal approach to find the optimal number of base models. In his approach both parametric and permutation tests are applied and the new testing statistic is proposed. The section also looks into recent developments in probability theory. Tadeusz Bednarski examines potential causal relationship between nonresponse and job finding in survey unemployment studies. Tadeusz Gerstenkorn and Jacek Mańko study the concept of the probability of fuzzy events and discuss its application to economic problems. Małgorzata Szerszunowicz tackles the issue of the proper order of experimental trials realization in order to reduce the cost of experiment implementation.

The subsequent section turns to the regression analysis and estimation issues. Bronisław Ceranka and Małgorzata Graczyk study weighing designs in

which the errors are non-positively correlated and have equal variances. Grażyna Trzpiot presents a Bayesian spatial model of quantile regression. She developed a model that allowed the covariates to affect the entire conditional distribution, rather than just the mean. Wojciech Zieliński compares minimum variance unbiased estimators of a probability of success obtained in two models: a binomial and a negative binomial model. Tomasz Żądło in turn examines the problem of prediction of subpopulation (domain) total. Beata Bieszk-Stolorz and Iwona Markowicz use the Cox non-proportional hazard model to analyse the influence of unemployed person age on the job seek time. Mariusz Kubus focused on the problem of feature selection in discrimination or regression analysis. He investigates the concept of wrappers and proposes the competitive feature ranking, which resulted in low classification error. Finally Joanna Trzęsiok presentes the simulation procedure for comparing the performance of several competing algorithms of nonparametric regression.

The fourth section enquires into various methods of statistical analysis with a special focus on classification methods. Jerzy Korzeniewski proposes a modification of the HINoV method, which involved grouping all variables, separately for each reference variable, into two classes. Dorota Rozmus carried out an experimental study to compare accuracy of cluster ensembles and affinity propagation methods. Katarzyna Dębkowska and Marta Jarocka analyse the impact of methods of data normalization on the result of linear ordering. Justyna Wilk and Marcin Pełka investigate the concept of clustering in context of data type, propose a classification of cluster analysis methods and compared numerical and symbolic taxonomy. Artur Zaborski presents the gravity unfolding analysis, which can be used for graphical presentation of the data contained in the asymmetric similarity matrix, which resulted in configuration of points representing objects and respondents. Michał Trzęsiok considers Support Vector Machines (SVMs) as a classification method. He presents a procedure that enables knowledge extraction that uses the information embedded in support vectors – the observations that define the classification function.

The next section explores the area of statistical methods used in finance and time series analysis. Eugeniusz Gatnar considers the problem of financial inclusion, which refers to a state in which all working age adults have effective access to credit, savings, payments, and insurance from formal service providers. As an innovative application to time series analysis, Dominika Polko and Grzegorz Kończak propose modifications of control charts method to get quantitative predictions. Turning to capital market, Iwona Konarzewska utilizes the eigenvalue decomposition of the rates of return correlation or covariance matrix for the construction of the optimal investment portfolio model. Daniel Kosiorowski, Mateusz Bocian, Anna Węgrzynkiewicz and Zygmunt Zawadzki present their R package {depthproc}, which implemented several multivariate

procedures, induced by statistical depth functions, and showed its application to the multivariate time series analysis. Testing procedures used in VaR approach to risk assesment are analysed by Marta Małecka. In the same area Dominik Krężołek shows application of the alpha-stable distributions to investment risk measurement. He uses non-classical risk measures based on Value-at-Risk: Expected Shortfall and Median Shortfall.

In the final section various applications of statistical methods are presented, with the special focus on applications in economics. In the field of corporate finance Magdalena Chmielińska investigates the shaping of middle-operating control costs, especially in case of appearance of qualification mistakes. Grzegorz Kończak proposes the use of extreme value theory in monitoring production processes. Grażyna Dehnel, Tomasz Klimanek and Jacek Kowalewski present results of the study which attempted to use indirect estimation methods (including the method accounting for spatial correlation) to estimate certain characteristics of small and middle enterprises in one of the districts in Poland. Damian Gajda and Tomasz Jurkiewicz discuss the results of the annual survey carried out between 2010-2012 on a representative group of small and medium-sized enterprises and define the directions of changes in the usage of insurance products by such businesses. In the area of survey statistics Piotr Tarka analyses issues concerning the scale design based on one-parametric Rasch model in the context of consumer attitudes. Katarzyna Cheba and Maja Kiba-Janiak investigate the conjoint analysis as a multidimensional method used to enquire how consumers define their preferences for specific products or services. Finally Justyna Brzezińska examines odds ratios as a framework for understanding contingency tables and log-linear models. She presents its generalization to larger tables by local odds ratios or by the spanning cell approach.

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