

From the Editor

With the current issue of Statistics in Transition new series (*SiTns*) – one hundred and first since the beginning of its publication (not counting special editions) – we are entering a new decade of the journal’s mission carried out so far for 30 years, consisting in promoting the development of statistical sciences while contributing to the scientific life of the broadly conceived international statistical community: authors, reviewers and readers of *SiTns*.

The September issue of *SiTns* consists of a collection of twelve articles written by twenty-eight authors from eleven countries, in order of appearance: Egypt, USA, Algeria, Pakistan, Australia, Poland, India, Iran, Nigeria, Thailand and Canada. There are eight articles in the Original Scientific Articles section, two articles in Other Articles section, and two in Research Communicates and Letters section.

Research articles

In the first paper, *The modified Bagdonavičius-Nikulín goodness-of-fit test statistic for the right censored distributional validation with applications in medicine and reliability*, Haitham M. Yousof, M. Masoom Ali, Khaoula Aidi, and Mohamed Ibrahim discuss the modified test statistic ($\mathcal{J}\mathcal{T}rr, \varepsilon\varepsilon2$) for validation under the right censored cas. Simulation *via* Barzilai-Borwein algorithm is performed for assessing the right-censorship estimation method. Next, four right censored data sets are analyzed under the new modified test statistic for checking the distributional validation. It is shown that according to the modified Bagdonavičius-Nikulín goodness-of-fit test statistic, the new odd log-logistic inverted Weibull model can be used in modelling the censored medicine and reliability real data sets.

Sania Khawar Kiani’s, Muhammad Aslam’s, and M. Ishaq Bhatti’s paper entitled *Investigation of half-normal model using informative priors under Bayesian structure* describes properties of half-normal distribution using informative priors under the Bayesian criterion. It employs the squared root inverted gamma, Chi-square and Rayleigh distributions as the prior distribution to construct the posterior distributions of the respective distributional parameters. Hyperparameters are elicited via prior predictive distribution. The properties of the posterior distribution are studied, and their graphs are presented using a real data set. A comprehensive simulation scheme is

conducted using informative priors. Bayes estimates are obtained using the loss functions (squared error loss function, modified loss function, quadratic loss function and DeGroot loss function). By the comparison of results, with increasing the sample size, the Bayes estimates converge to the parametric values and their risks tend to be smaller.

In the next article, *What explains the differences in material deprivation between rural and urban areas in Poland before and during the COVID-19 pandemic?* Joanna Landmesser-Rusek and Hanna Dudek examine the relationships between the compositional changes in demographic and socioeconomic factors and the changes in the prevalence of material deprivation in rural and urban areas in Poland. Using the European Union Statistics on Income and Living Conditions (EU-SILC) data for 2019–2020, the authors applied the Fairlie decomposition approach for a logit model. Six items of material deprivation analysing each symptom (item) as a binary variable were considered. Separate models were evaluated for each symptom. It was found that the important characteristics affecting a gap in material deprivation between rural and urban areas are: household equalized income, the level of education, the type of household, and the presence of disabled or unemployed persons in the household. A non-significant effect of the pandemic on the material deprivation gap between rural and urban areas were observed.

Dipika Patra, Sanghamitra Pal, and Arijit Chaudhuri in the paper *Respondent-specific randomized response technique to estimate sensitive proportion* focus on Randomized Response Techniques and present a more general procedure using five different types of cards. A respondent-specific randomized response technique is also proposed, in which respondents are allowed to build up the boxes according to their own choices. An immediate objective for this change is to enhance the sense of protection of privacy of the respondents. But as by-products higher efficiency in terms of actual coverage percentages of confidence intervals and related features are demonstrated by a simulation study and superior jeopardy levels against divulgence of personal secrecy are also reported to be achievable. The findings described in this study will stimulate researchers and survey practitioners to apply the response-specific RRT in real surveys. Respondents will co-operate freely in the survey methods as they are building their own RR devices.

In the next paper, *Odd log-logistic generalised Lindley distribution with properties and applications* Vahid Ranjbar, Abbas Eftekharian, Omid Kharazmi, and Morad Alizadeh introduce a new three-parameter lifetime model, called the odd log-logistic generalised Lindley (OLLGL) distribution. The statistical properties of the OLLGL distribution including the hazard function, quantile function, moments, incomplete moments, generating functions, mean deviations and maximum likelihood estimation

for the model parameters are given. The new density function can be expressed as a linear mixture of exponentiated. Different methods are discussed to estimate the model parameters. Simulation studies were conducted to examine the performance of this distribution. The importance and flexibility of the new model are also illustrated empirically by means of two real-life data sets. Finally, Bayesian analysis and Gibbs sampling are performed based on the two data sets.

Rasaki Olawale Olanrewaju's, Sodiq Adejare Olanrewaju's, and Omodolapo Waliyat Isamot's article *Hyper-parametric Generalized Autoregressive Scores (GASs): an application to the price of United States cooking gas* outlines the framework of the Generalized Autoregressive Score (GAS) model with a variety of symmetric conditional densities of different time-varying hyper-parameters. The distinctive trait and goal of the observation-driven GAS model is to use its score and information functions as the compeller of time-variation via hyper-parameters of conditional densities. The score and Hessian functions (via location, scale, skewness, and shapes parameters) are of paramount interest due to their capability to curtail the lacuna of heaviness in the tail of normal distribution and possibility of skewed observations. Due to the flexibility of the GAS model to several statistical distributions, an empirical application to financial data of the price of the United State cooking gas was subjected to the GAS model with ten different conditional densities. Each of the conditional density subjected to the GAS model via the application of the price of cooking gas from 2005 to 2020 was driven by the mechanism of time-varying score and Hessian functions of their embedded hyper-parameters.

In the article entitled *Testing the annual rainfall dispersion in Chaiyaphum Thailand, by using confidence intervals for the coefficient of variation of an inverse gamma distribution* **Wararit Panichkitkosolkul** proposes two statistics for testing the CV of an IG distribution based on the Score and Wald methods. An evaluation of their performances is made using the Monte Carlo simulations conducted under several shape parameter values for an IG distribution based on empirical type I error rates and powers of the tests. The simulation results reveal that the Wald-method test statistic performed better than the Score-method one in terms of the attained nominal significance level, and is thus recommended for analysis in a similar context. Furthermore, the efficacy of the proposed test statistics was illustrated by applying them to the annual rainfall amounts in Chaiyaphum. The researchers can apply the proposed methods for testing the population CV in an IG distribution with other data sets fitted well to an IG distribution. For example, the IG distribution has been used for the hitting time distribution of a Wiener process. Future research could focus on the one-tailed hypothesis testing.

Kumari Priyanka's and **Pidugu Trisandhya's** paper *Advances in estimation by the item sum technique in two move successive sampling* contains a proposal of an estimator for the estimation of dynamic sensitive population mean using the Item Sum Technique (IST) and non-sensitive auxiliary information in the two-move successive sampling. Possible allocation designs for allocating long-list and short-list samples pertaining to the IST have been elaborated. The comparison between various allocation designs has been carried out. Theoretical considerations have been integrated with numerical as well as simulation studies to show the working version of the proposed IST estimators in the two-move successive sampling. It was concluded that IST is an alternative technique to deal with sensitive issues in successive sampling. In IST setup, the estimator utilizing additional auxiliary variable is proved to be more efficient than the estimator in which no additional auxiliary variable is used. Out of the two allocation designs for allocating LL and SL samples, the IST class of estimators using optimum allocation design is coming out to be more efficient than the estimator using general allocation design.

Other articles

*XXXI Scientific Conference of the Classification
and Data Analysis Section (SKAD 2022)*

Aneta Ptak-Chmielewska and **Agnieszka Chłoń-Domińczak** present *Analysis of social and economic conditions of microenterprises based on taxonomy methods*. In the article, a unique data set of the situation of SMEs in the Kujawsko-Pomorskie region was used to assess the changes of the characteristics of the microenterprise sector at the local level in Poland between 2019 and 2020, that is during the first years of the COVID pandemic. The analysis shows that there are visible changes in the microenterprise sector and the economic conditions under which microenterprises operated. In the largest clusters of gminas, there is a drop in the number of microenterprises per 10 000 population. There is also a significant decline in average revenues reported to tax authorities. This data is consistent with other national statistics, and also with observations at the European level on the drop in revenues and financial situation as one of the most important risks faced by the SME sector.

Dorota Żebrowska-Suchodolska discusses *Elimination of characteristics concerning the performance of open-ended equity funds using PCA*. The aim of the research was to apply principal component analysis (PCA) to reduce the dimension of the indicators that help the investor in selecting a fund, and to find the main factors determining the choice of an appropriate investment fund in terms of its performance and risk. The subject of the study was 15 equity funds that had been on the Polish market for many years. The research showed that it is possible to reduce the primary

variables to two dimensions. 13 groups were selected for the study. The groups were selected in terms of correlation of indicators. They contained from 1 to 10 indicators. The pairs of indicators included in the principal components have been placed in other parts of the circle, allowing the investor to assess the fund from the point of view of completely different information. The resulting indicators found in each group are based on a combination of classical and non-classical measures.

Research Communicates and Letters

Yong You's paper entitled *An empirical study of hierarchical Bayes small area estimators using different priors for model variances* describes hierarchical Bayes (HB) estimators based on different priors for small area estimation. In particular, the inverse gamma and flat priors for variance components in the HB small area models of You and Chapman (2006) and You (2021) were used. The authors evaluate the HB estimators through a simulation study and real data analysis. The results indicate that using the inverse gamma prior for the variance components in the HB models can be very effective. The simulation study and real data analysis demonstrate that proper IG prior should be used in the HB small area models for variance components. For future work, informative priors such as IG prior with parameter values based on previous survey data could also be used in the model to improve the HB small area estimators.

In the last paper, **Sławomir Dorocki** and **Mariusz Cembruch-Nowakowski** consider *Application of statistical methods in socio-economic geography and spatial management based on selected scientific journals listed in the Web of Sciences database*. The authors present an analysis of the use of statistical methods and tools in scientific articles related to socio-economic geography and spatial management published in the years 2012–2021. They focused on papers published in three selected journals relating to social geography (Geoforum), economic geography (Applied Geography) and spatial management (Landscape and Urban Planning). There is no doubt that conducting research with the support of statistical methods increases the credibility and reliability of their results as well as ensures the correctness of inference. This is particularly important for the analysis of spatial phenomena, which is becoming more and more complex. The conclusions presented in the text are based on the analysis of the representative but relatively small sample of the literature resources available.

Włodzimierz Okrasa

Editor

