

Editorial, Spanish Journal of Statistics

Presentation of Volume 7, 1, 2025

José María Sarabia

Editor-in-Chief Spanish Journal of Statistics

University of Cantabria, Spain

Dear readers and dear members of the statistical community,

It is my pleasure to present Volume 7, Issue 1, corresponding to the year 2025. This volume consists of six interesting articles, five articles in the general statistics section and one invited article, related to the 2024 Spanish National Award in Statistics.

The first article is entitled “Copula based inference for certain types of actuarial datasets: A brief survey”, whose authors are Indranil Ghosh, Carman Greenway, Hannah Powers, and Brandon Kelly Kortan, from the University of North Carolina, Wilmington, USA. Copulas provide a powerful framework for modeling bivariate and multivariate dependence structures. In this study, the authors investigate several forms of dependence characterized by well-established dependence measures, including Spearman’s ρ , Kendall’s τ , and Blomqvist’s β , for selected actuarial datasets obtained from the CAS data repository in the R software package. The research primarily focuses on insurance claim datasets, the proposed copula-based methodology can be readily applied to other actuarial data types and broader domains. Using the `CDAvine` package in R, the authors identify the best-fitting bivariate copula for each dataset and subsequently examine various structural properties of these optimal copula models. This approach also provides a basis for extending the analysis to multivariate dependence using vine copula constructions, which will be addressed in a separate article.

The next article is entitled, “Gender gap and spatial disparities in the evolution of literacy in Spain, 1860-1910” and its authors are José Manuel Gutiérrez, University of Salamanca, Spain and Gloria Quiroga, Complutense University of Madrid, Spain. This article examines the dynamics of Spanish literacy between 1860 and 1910, a period in which local councils were responsible for public elementary education. To this end, the authors construct a harmonized series of literacy rates for the population aged ten or older, disaggregated by sex and province. Marked spatial differences and a very large gender gap are observed. Five clusters are identified according to provincial male literacy rates in 1860; these clusters retain explanatory power throughout the period and for both sexes. A parsimonious statistical model of the evolution of male literacy, incorporating linguistic variables, shows considerable temporal stability in its spatial distribution. The model for female literacy displays similarities to that of male literacy, although in this case the initial condition (in 1860) is explained not by female literacy but by male literacy. Overall, the evolution of literacy in Spain between 1860 and 1910 did not follow the spatial pattern of economic modernization. Moreover, there was no correlation between birth rates and children’s literacy rates for either sex, nor between urbanization and literacy. In the broader Western European context, Spain’s literacy trajectory during this period was largely a failure, except for the provinces in the top cluster.

The third article is entitled “Feasibility of Implementing Accelerometers in the Spanish Health Survey”, whose authors are Borja del Pozo Cruz, Department of Sport Sciences, European University of Madrid, Spain; Rosa M. Alfonso Rosa, Department of Human Motricity and Sport Performance, University of Seville, Spain and Jesús del Pozo-Cruz, Department of Physical Education and Sports, University of Seville, Spain. Accurately measuring physical activity, sedentary behavior, and sleep is vital for public health monitoring, but self-reported data are often biased. Accelerometers provide objective information, yet their feasibility within the Spanish Health Survey, ESdE, has not been assessed. In this study the authors evaluated the integration of thigh-worn accelerometers in the ESdE by analyzing participant compliance, device usability, data return, and comparisons with self-reported measures. A total of 100 adults aged 30–90 were recruited through five provincial delegations of the National Statistics Institute, INE, with each delegation enrolling 20 participants equally divided between home-based collection and prepaid-return groups. All participants wore a thigh-mounted

SENS accelerometer continuously for 7 to 10 days using a water-resistant patch, with two patches provided in case replacement was needed. INE staff administered the ESdE questionnaire and coordinated device logistics. Valid accelerometry data were obtained from 98 participants, showing excellent compliance. Device return rates were 100% in the collection group and 85% in the prepaid-return group. Comparison with self-reported data was only possible for sedentary behavior, where participants consistently underestimated sitting time. Agreement between self-reports and accelerometry was low, and Bland–Altman plots revealed a clear negative bias. These findings demonstrate the feasibility of incorporating accelerometry into national surveys like the ESdE, with high participant adherence and minimal operational issues. The objective data provided by accelerometers can complement self-reported measures and capture domains such as sleep and incidental activity, which are often overlooked. The authors conclude that their inclusion in future surveys could improve the accuracy and usefulness of lifestyle surveillance in Spain.

The fourth article is entitled, “Semiparametric von Mises kernel circular density estimator”, whose authors are Yasmina Ziane, Nabil Zougab and Kahina Bedouhene, from the Research unit LaMOS, Faculty of Exact Sciences, Bejaia University, Algeria and Kahina Bedouhene, from the Department of Mathematics, University of Tizi-Ouzou, Algeria. In this article, the authors propose estimating the circular density function using a bias-corrected semiparametric circular kernel method based on the von Mises kernel. This approach applies a multiplicative bias correction to the initial parametric model to improve both the estimator’s quality and its bias properties. Two semiparametric estimators-Hjort and Glad (1995) (HG) and Jones, Signorini, and Hjort (1999) (JSH) are applied to estimate the probability density of circular data with support $[0, 2\pi]$. Their properties, including bias, variance, and integrated mean square error (MSE), are presented. A comparative study is performed to evaluate the performance of the semiparametric estimators (HG and JSH). The commonly used cross-validation technique is adapted for bandwidth selection. Finally, a simulation study and an application with real data for circular data illustrate, in terms of integrated squared bias (ISB) and integrated squared error (ISE), that the JSH and JLN semiparametric estimators with the von Mises kernel outperform the classical and HG estimators.

The fifth article in this volume is entitled, “Objective Bayesian goodness-of-fit tests for the alpha-skew-normal distribution”, whose authors are José Rodolfo Olmos-Zepeda and Sergio Pérez-Elizalde, both in the Department of Statistics and Data Science, Colegio de Postgraduados, Mexico. The family of alpha-skew-normal (ASN) distributions constitutes a flexible class of three-parameter probability models defined by their location, scale, and shape. The shape parameter controls both asymmetry and uni-/bimodality, enabling the distribution to capture unimodal or bimodal patterns with varying degrees of skewness. The authors introduce an objective Bayesian goodness-of-fit test for assessing whether a random sample arises from an ASN distribution when the parameters are unknown. The proposed test statistics are constructed from the empirical distribution function, whose sampling distributions depend exclusively on the shape parameter. Their prior predictive distributions, serving as null distributions, are obtained by integrating out the shape parameter with respect to a proper approximation to Jeffreys prior—specifically, a Cauchy prior—selected for its analytical tractability. Critical values are obtained through Monte Carlo simulation. A thorough simulation study shows that the proposed tests maintain the nominal significance level under a wide range of conditions and display strong power against various alternative distributions. The methodology is further illustrated through real-data applications, demonstrating its practical relevance.

The sixth article is an invited contribution based on the speech delivered by Professor Concepción Bielza upon receiving the 2024 Spanish National Statistics Prize, a ceremony made especially notable by the presence of His Majesty the King of Spain. The article offers a personal perspective on her research career, characterized by the long-standing interplay between statistics, artificial intelligence, and their applications in neuroscience and industry. After beginning her professional career in statistical decision theory and probabilistic graphical models, Bayesian networks soon became the central framework of her work, enabling rigorous reasoning under uncertainty across a wide range of fields.

Finally, I would like to express my gratitude to all the authors contributing to this volume for choosing our journal as a platform for disseminating their research. I also wish to acknowledge the work of the editors and reviewers, whose efforts help uphold a high standard of scientific quality.