

# **Biblioteca del Instituto de Estadística y Cartografía de Andalucía**

**Resúmenes de revistas  
Octubre – Diciembre 2025**

## PRESENTACIÓN

El presente boletín de resúmenes tiene una periodicidad trimestral y con él la Biblioteca del Instituto de Estadística y Cartografía de Andalucía pretende dar a conocer a los usuarios de una forma detallada el contenido de las revistas especializadas que entran en su colección. Se trata de un complemento al boletín de novedades de publicaciones seriadas ya que en él se incluyen los resúmenes de cada uno de los artículos que aparecen publicados en los diferentes números de las revistas en el idioma original de las mismas.

Los resúmenes de este boletín corresponden a las revistas que han ingresado en la Biblioteca del Instituto de Estadística y Cartografía de Andalucía durante el período de **octubre a diciembre de 2025** y que pueden consultarse gratuitamente en sus instalaciones en la siguiente dirección:

Instituto de Estadística y Cartografía de Andalucía

Pabellón de Nueva Zelanda

C/Leonardo Da Vinci, n. 21. Isla de La Cartuja

41071 - SEVILLA

E-mail: [biblio.ieca@juntadeandalucia.es](mailto:biblio.ieca@juntadeandalucia.es)

Teléfono: 955 033 800

Fax: 955 033 816

Horario de atención al público:

Martes: de 9:00h a 14:00h. y de 16:00 a 19:00 h.

Lunes, miércoles, jueves y viernes: de 9:00h a 14:00h.

Horario de verano (del 15 de junio al 15 de septiembre), Semana Santa, Feria de Sevilla y

Navidad (del 24 de diciembre al 6 de enero): de lunes a viernes de 9:00h. a 14:00h.



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**A Multiple Imputation Approach for the Cumulative Incidence, with Implications for Variance Estimation**

P. 291-301

Elizabeth C. Chase ; Philip S. Boonstra ; Jeremy M. G. Taylor

**Abstract**

We present an alternative approach to estimating the cumulative incidence function that uses nonparametric multiple imputation to reduce the problem to that of estimating a binomial proportion. In the standard competing risks setting, we show mathematically and empirically that our imputation-based estimator is equivalent to the Aalen-Johansen estimator of the cumulative incidence given a sufficient number of imputations. However, our approach allows for the use of a wider variety of methods for the analysis of binary outcomes, including preferred options for uncertainty estimation. While we focus on the cumulative incidence function, the multiple imputation approach likely extends to more complex problems in competing risks.

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**An Efficient Computation Strategy for Generalized Single-Index Models and Their Variants by Integrating With GAM**

P. 302-310

Ximin Li ; Haozhe Liang ; Hua Liang

**Abstract**

Various generalizations of single-index models and associated estimation methods have been developed. However, implementing these developed methods requires much effort to program, case by case, due to the lack of a common and flexible vehicle to cover them. We suggest an efficient computation strategy for easily estimating parameters and nonparametric functions in generalized single-index models and generalized partially linear single-index models by integrating with well-developed algorithms and packages for estimating the generalized additive models (Wood; Hastie and Tibshirani, GAM). Such an integration makes estimation in these index-type models much easier, expedient, and flexible and brings a lot of convenience. We briefly introduce the principle and extensively examine numerical performance for various scenarios. Numerical experiments indicate that the proposed strategy works well with finite sample sizes and is especially flexible to model structures. Finally, we analyze two real-data examples as an illustration.

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**Laplace's Law of Succession Estimator and M-Statistics**

P. 311-319

Eugene Demidenko

**Abstract**

The classic formula for estimating the binomial probability as the proportion of successes contradicts common sense for extreme probabilities when the event never occurs or occurs every time. Laplace's law of succession estimator, one of the first applications of Bayesian statistics, has been around for over 250 years and resolves the paradoxes, although rarely discussed in modern statistics texts. This work aims to introduce a new theory for exact optimal statistical inference using Laplace's law of succession estimator as a motivating example. We prove that this estimator may be viewed from a different theoretical perspective as the limit point of the short confidence interval on

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the double-log scale when the confidence level approaches zero. This motivating example paves the road to the definition of an estimator as the inflection point on the cumulative distribution function as a function of the parameter given the observed statistic. This estimator has the maximum infinitesimal probability of the coverage of the unknown parameter and, therefore, is called the maximum concentration (MC) estimator as a part of a more general M-statistics theory. The new theory is illustrated with exact optimal confidence intervals for the normal standard deviation and the respective MC estimators.

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### **A Class of Regression Association Measures based on Concordance**

P. 320-329

Jia-Han Shih ; Yi-Hau Chen

#### **Abstract**

Measures of regression association aiming at predictability of a dependent variable  $Y$  from an independent variable  $X$  have received considerable attention recently. In this article, we provide a unified discussion of some existing measures, including their rationale, properties, and estimation. Motivated by these measures, we consider a general class of regression association measures which views the regression association of  $Y$  from  $X$  as the association of two independent replications from the conditional distribution of  $Y$  given  $X$ . We illustrate that the so-called Markov product copulas can be employed as a neat and convenient building block for this class of measures, and the measures so constructed can be expressed as a common form of the proportion of the variance of some function of  $Y$  that can be explained by  $X$ , rendering the measures a direct interpretation in terms of predictability. Also, the notion of two independent replications from the conditional distribution leads to a simple nonparametric estimation method based on the induced order statistics, hence, no smoothing techniques are required. Under the considered general framework, the performances and utilities of the regression association measures are examined through simulations and real data applications.

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### **Closed-Form Power and Sample Size Calculations for Bayes Factors**

P. 330-344

Samuel Pawel ; Leonhard Held

#### **Abstract**

Determining an appropriate sample size is a critical element of study design, and the method used to determine it should be consistent with the planned analysis. When the planned analysis involves Bayes factor hypothesis testing, the sample size is usually desired to ensure a sufficiently high probability of obtaining a Bayes factor indicating compelling evidence for a hypothesis, given that the hypothesis is true. In practice, Bayes factor sample size determination is typically performed using computationally intensive Monte Carlo simulation. Here, we summarize alternative approaches that enable sample size determination without simulation. We show how, under approximate normality assumptions, sample sizes can be determined numerically, and provide the R package `bfpr` for this purpose. Additionally, we identify conditions under which sample sizes can even be determined in closed-form, resulting in novel, easy-to-use formulas that also help foster intuition, enable asymptotic analysis, and can also be used for hybrid Bayesian/likelihoodist design. Furthermore, we show how power and sample size can be computed without simulation for more complex analysis priors, such as Jeffreys-Zellner-Siow priors or non-local normal moment priors. Case studies from medicine and psychology illustrate how researchers can use our methods to design informative yet cost-efficient studies.

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### **Play-by-Play Volleyball Win Probability Model**

P. 345-354

Nathan Hawkins ; Gilbert W. Fellingham ; Garritt L. Page

#### **Abstract**

This article introduces a volleyball point-by-point win probability model that updates the probability of winning a set after each play in the set. The covariate informed product partition model (PPM<sub>x</sub>) is well suited to flexibly include in-set team performance information when making predictions. However, making predictions in real time would be too expensive computationally as it would require refitting the PPM<sub>x</sub> after each play. Instead, we develop a predictive

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procedure based on a single training of the PPMx that predicts in real-time. We deploy this procedure using data from the 2018 Men's World Volleyball Championship. The procedure first trains a PPMx model using end-of-set team performance statistics from the round robin stage of the tournament. Then based on the PPMx predictive distribution, we predict the win probability after every play of every match in the knockout stages. Finally, we show how the prediction procedure can be enhanced by including pre-set information toward the beginning of the set and set score toward the end.

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**Analyzing Spatial Point Patterns in Digital Pathology: Immune Cells in High-Grade Serous Ovarian Carcinomas**

P. 355-370

Jonatan A. González ; Julia Wrobel ; Simon Vandekar ; Paula Moraga

**Abstract**

Multiplex immunofluorescence (mIF) imaging technology facilitates the study of the tumor microenvironment in cancer patients. Due to the capabilities of this emerging bioimaging technique, it is possible to statistically analyze, for example, the co-varying location and functions of multiple different types of immune cells. Complex spatial relationships between different immune cells have been shown to correlate with patient outcomes and may reveal new pathways for targeted immunotherapy treatments. This tutorial reviews methods and procedures relating to spatial point patterns for complex data analysis. We consider tissue cells as a realization of a spatial point process for each patient. We focus on proper functional descriptors for each observation and techniques that allow us to obtain information about inter-patient variation. Ovarian cancer is the deadliest gynaecological malignancy and can resist chemotherapy treatment effective in cancers. We use a dataset of high-grade serous ovarian cancer samples from 51 patients. We examine the immune cell composition (T cells, B cells, macrophages) within tumors and additional information such as cell classification (tumor or stroma) and other patient clinical characteristics. Our analyses, supported by reproducible software, apply to other digital pathology datasets.

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**Flexible Distributed Lag Models for Count Data Using mgcv**

P. 371-382

Theo Economou ; Daphne Parliari ; Aurelio Tobias ; Laura Dawkins ; Hamish Steptoe ; Christophe Sarra ; Oliver Stoner ; Rachel Lowe ; Jos Lelieveld

**Abstract**

In this tutorial we present the use of R package mgcv to implement Distributed Lag Non-Linear Models (DLNMs) in a flexible way. Interpretation of smoothing splines as random quantities enables approximate Bayesian inference, which in turn allows uncertainty quantification and comprehensive model checking. We illustrate various modeling situations using open-access epidemiological data in conjunction with simulation experiments. We demonstrate the inclusion of temporal structures and the use of mixture distributions to allow for extreme outliers. Moreover, we demonstrate interactions of the temporal lagged structures with other covariates with different lagged periods for different covariates. Spatial structures are also demonstrated, including smooth spatial variability and Markov random fields, in addition to hierarchical formulations to allow for non-structured dependency. Posterior predictive simulation is used to ensure models verify well against the data.

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**An Example to Illustrate Randomized Trial Estimands and Estimators**

P. 383-392

Linda J. Harrison ; Sean S. Brummel

**Abstract**

Recently, the International Conference on Harmonisation finalized an estimand framework for randomized trials that was adopted by regulatory bodies worldwide. The framework introduced five strategies for handling post-randomization events; namely the treatment policy, composite variable, while on treatment, hypothetical and principal stratum estimands. We describe an illustrative example to elucidate the difference between these five strategies for handling intercurrent events and provide an estimation technique for each. Specifically, we consider the intercurrent event of treatment discontinuation and introduce potential outcome notation to describe five estimands and

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corresponding estimators: (1) an intention-to-treat estimator of the total effect of a treatment policy; (2) an intention-to-treat estimator of a composite of the outcome and remaining on treatment; (3) a per-protocol estimator of the outcome in individuals observed to remain on treatment; (4) a g-computation estimator of a hypothetical scenario that all individuals remain on treatment; and (5) a principal stratum estimator of the treatment effect in individuals who would remain on treatment under the experimental condition. Additional insight is provided by defining situations where certain estimands are equal, and by studying the while on treatment strategy under repeated outcome measures. We highlight relevant causal inference literature to enable adoption in practice.

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**Analytics, Have Some Humility: A Statistical View of Fourth-Down Decision Making**

P. 393-409

Ryan S. Brill ; Ronald Yurko ; Abraham J. Wyner

**Abstract**

The standard mathematical approach to fourth-down decision-making in American football is to make the decision that maximizes estimated win probability. Win probability estimates arise from machine learning models fit from historical data. These models attempt to capture a nuanced relationship between a noisy binary outcome variable and game-state variables replete with interactions and non-linearities from a finite dataset of just a few thousand games. Thus, it is imperative to knit uncertainty quantification into the fourth-down decision procedure; we do so using bootstrapping. We find that uncertainty in the estimated optimal fourth-down decision is far greater than that currently expressed by sports analysts in popular sports media.

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**Connections between Statistics and Mathematics/Probability**

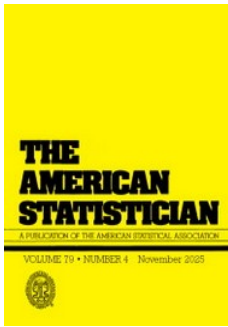
P. 410-415

Michael A. Proschan ; Pamela A. Shaw

**Abstract**

There are many connections between probability, other mathematics courses, and statistics. Understanding these connections provides insights that might not be fully appreciated when considering each discipline in isolation. While the typical instruction of statistics courses relies on elucidating its foundational principles from mathematical and probability theory, it is generally less appreciated that statistics can in turn provide a deeper understanding of results in mathematics and probability. We offer several examples for which knowledge of statistics can shed new light on probability and other mathematics results. Examples span both undergraduate and graduate level material. In today's data driven-world, many students are naturally curious about statistics and are exposed to this field early in their undergraduate curriculum. Leveraging connections between statistics and mathematics and probability makes theoretical concepts more intuitive and relevant, fostering a better understanding.

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## ARTICLES

### Interpretable Model Summaries Using the Wasserstein Distance

P. 421-434

Eric Dunipace & Lorenzo Trippa

#### Abstract

Large-parameter statistical and machine learning models are widely used in many fields but often lack interpretability. This limits the ability of practitioners to make informed decisions based on models; this can be especially challenging in multivariate analyses or Bayesian inference where there is a distribution of predictions to summarize. In response to these challenges, we propose a new method that uses the Wasserstein distance to find low-dimensional linear models that approximate the predictions of complex multivariate models, effectively summarizing them in a way that prioritizes the preservation of their predictive distributions. These summaries can facilitate the communication and understanding of complex models by practitioners in various fields and we provide diagnostic tools to assess their performance. We demonstrate our method on simulated data with different data generating processes and also apply our method to a Bayesian additive regression tree model that predicts survival time for glioblastoma multiforme (GBM) patients.

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### Toward Explainable Data and Sports Analytics: A Case Study on Pass Completion Prediction in American Football

P. 435-448

Anton Augustine, Gabe P. Redding & Steven Le Moan

#### Abstract

The sports analytics industry has seen a rapid influx of data, driving widespread adoption of machine learning for predictive analytics. However, this shift has often sidelined conceptual understanding and explainability. Focusing on pass completion prediction in American football, we develop transparent models matching black-box performance. In this work, we use pass completion prediction as a case study and build explainable models that achieve comparable performance to black-box approaches when trained on spatio-temporal features. Our approach involves two key strategies: first, developing a conceptual understanding to engineer a small explainable feature set; second, leveraging this understanding to create a physics-based probabilistic model as a single equation. Surprisingly, both logistic regression and the transparent model achieved 72% accuracy, matching complex models. Using the small explainable feature set, an ensemble model reached 78% accuracy, outperforming the state of the art while maintaining interpretability. Beyond prediction, explainable models provide actionable insights into play dynamics, player performance, and training strategies. In contrast, black-box models, while potentially improving prediction accuracy, obscure which features contribute to predictions, how they interact, and why specific outcomes occur. This lack of transparency limits their ability to inform decision-making and guide future investigations.

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### A New General Class of Discrete Bivariate Distributions Constructed by the Usual Stochastic Order

P. 449-466

Min Ju Lee, Na Young Yoo & Ji Hwan Cha

#### Abstract

In this article, we develop a new general class of discrete bivariate distributions that can model the effect of the so-called “load-sharing configuration.” Under such load-sharing configuration, after the failure of one component, the surviving component has to shoulder extra load, which eventually results in its failure at an earlier time than what is expected under the case of independence. To model such effect, in this article, the residual lifetime of the surviving component is assumed to be shortened according to the usual stochastic order. We derive the joint probability mass function, the joint survival function and the marginal distributions. The identifiability of the proposed model is thoroughly investigated. We discuss a bivariate ageing property of the developed class. It will be seen that the obtained joint distribution can be expressed in terms of existing underlying distributions, which increases the applicability of the developed bivariate distributions. It will also be shown that the developed class has a high degree of flexibility in the sense that numerous families of distributions can be generated just by specifying different underlying distributions and different parameter functions for modeling stochastic dependence. Some specific families of discrete bivariate distributions which can be usefully applied in practice are obtained, and their usefulness is illustrated by some real dataset analyses.

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**Bayesian Inference and the Principle of Maximum Entropy**

P. 467-473

Duncan K. Foley &amp; Ellis Scharfenaker

**Abstract**

Bayes' theorem incorporates distinct types of information through the likelihood and prior. Direct observations of state variables enter the likelihood and modify posterior probabilities through consistent updating. Information in terms of expected values of state variables modify posterior probabilities by constraining prior probabilities to be consistent with the information. Constraints on the prior can be exact, limiting hypothetical frequency distributions to only those that satisfy the constraints, or be approximate, allowing residual deviations from the exact constraint to some degree of tolerance. When the model parameters and constraint tolerances are known, posterior probabilities follow directly from Bayes' theorem. When parameters and tolerances are unknown a prior for them must be specified. When the system is close to statistical equilibrium the computation of posterior probabilities is simplified due to the concentration of the prior on the maximum entropy hypothesis. The relationship between maximum entropy reasoning and Bayes' theorem from this point of view is that maximum entropy reasoning is a special case of Bayesian inference with a constrained entropy-favoring prior.

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**High Dimensional Space Oddity**

P. 474-479

Haim Bar &amp; Vladimir Pozdnyakov

**Abstract**

In his 1996 paper, Talagrand highlighted that the Law of Large Numbers (LLN) for independent random variables can be viewed as a geometric property of multidimensional product spaces. This phenomenon is known as the concentration of measure. To illustrate this profound connection between geometry and probability theory, we consider a seemingly intractable geometric problem in multidimensional Euclidean space and solve it using standard probabilistic tools such as the LLN and the Central Limit Theorem (CLT).

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**Much Ado About Survey Tables: A Comparison of Chi-Square Tests and Software to Analyze Categorical Survey Data**

P. 480-491

Li-Yen R. Hu, Yulei He, Katherine E. Irimata &amp; Vladislav Beresovsky

**Abstract**

Chi-square tests are often employed to examine the association of categorical variables, the homogeneity of proportions between two or more samples, and the goodness-of-fit for a specified distribution. To account for the complex design of survey data, variants of Chi-square tests as well as software packages that implement these tests have been developed. Nevertheless, from a survey practitioner's perspective, there is a lack of applied literature that reviews and compares alternative options of survey Chi-square tests and their associated programming and output.

This article aims to fill such a gap. Many modern statistical software packages for survey analysis are capable of computing either the Wald Chi-square test or the Rao-Scott Chi-square test, along with other types of Chi-square tests, including the Rao-Scott likelihood ratio Chi-square test and the Wald log-linear Chi-square test. This article focuses on these four types of Chi-square tests, and examines four statistical packages that compute them in SAS®, R, Python, and SUDAAN®. While the same type of tests using different packages yield similar results, different types of Chi-square tests may yield variations in  $p$ -values when conducting the same comparison. Sample programming code is included in Appendix for readers' reference.

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**Zero-Truncated Modelling in a Meta-Analysis on Suicide Data after Bariatric Surgery**

P. 492-499

Layna Charlie Dennett, Antony Overstall & Dankmar Böhning

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**Abstract**

Meta-analysis is a well-established method for integrating results from several independent studies to estimate a common quantity of interest. However, meta-analysis is prone to selection bias, notably when particular studies are systematically excluded. This can lead to bias in estimating the quantity of interest. Motivated by a meta-analysis to estimate the rate of completed-suicide after bariatric surgery, where studies which reported no suicides were excluded, a novel zero-truncated count modeling approach was developed. This approach addresses heterogeneity, both observed and unobserved, through covariate and overdispersion modeling, respectively. Additionally, through the Horvitz-Thompson estimator, an approach is developed to estimate the number of excluded studies, a quantity of potential interest for researchers. Uncertainty quantification for both estimation of suicide rates and number of excluded studies is achieved through a parametric bootstrapping approach.

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**On Devon Allen's Disqualification at the 2022 World Track and Field Championships**

P. 500-507

Owen Fiore, Elizabeth D. Schifano & Jun Yan

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**Abstract**

Devon Allen's disqualification at the men's 110-meter hurdle final at the 2022 World Track and Field Championships, due to a reaction time (RT) of 0.099 sec—just 0.001 sec below the allowable threshold—sparked widespread debate over the fairness and validity of RT rules. This study investigates two key issues: variations in timing systems and the justification for the 0.1-sec disqualification threshold. We pooled RT data from men's 110-meter hurdles and 100-meter dash, as well as women's 100-meter hurdles and 100-meter dash, spanning national and international competitions. Using a rank-sum test for clustered data, we compared RTs across multiple competitions, while a generalized Gamma model with random effects for venue and heat was applied to evaluate the threshold. Our analyses reveal significant differences in RTs between the 2022 World Championships and other competitions, suggesting systematic variations in timing systems. Additionally, the model shows that RTs below 0.1 sec, though rare, are physiologically plausible. These findings highlight important variation sources in evaluating the 0.1-sec disqualification threshold to promote fairness in elite competition.

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**SHORT TECHNICAL NOTE****Bayesian Model Checking by Betting: A Game-Theoretic Alternative to Bayesian  $p$ -values and Classical Bayes Factors**

P. 508-519

David R. Bickel

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**Abstract**

A strictly Bayesian model consists of a set of possible data distributions and a prior distribution over that set. If there are other models available, how well they predicted the data may be compared using Bayes factors. If not, a model may be checked using a Bayesian  $p$ -value such as a prior predictive  $p$ -value or a posterior predictive  $p$ -value. However, recent criticisms of ordinary  $p$ -values apply with equal force against Bayesian  $p$ -values. Many of those criticisms are overcome by  $e$ -values, martingales interpreted as the amount of evidence discrediting a null hypothesis, measured as a payoff for betting against it. This article proposes the use of  $e$ -values to check Bayesian

models by testing their prior predictive distributions as null hypotheses. Two generally applicable methods for checking strictly Bayesian models are provided. The first method calibrates Bayesian  $p$ -values by transforming them into Bayesian  $e$ -values. The second method uses Bayes factors or their approximations as Bayesian  $e$ -values. A robust Bayesian model, a set of strictly Bayesian models, may be checked using various functions that use the  $e$ -values of those strictly Bayesian models. Other functions measure how much the data support a Bayesian model. Relations to possibility theory are discussed.

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## TEACHERS CORNER

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### **An Undergraduate Course on the Statistical Principles of Research Study Design**

P. 520-528

Lee Kennedy-Shaffer

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#### **Abstract**

The undergraduate curriculum in statistics and data science is undergoing changes to accommodate new methods, newly interested students, and the changing role of statistics in society. Because of this, it is more important than ever that students understand the role of study design and how to formulate meaningful scientific and statistical research questions. While the traditional Design of Experiments course is still extremely valuable for students heading to industry and research careers, a broader study design course that incorporates survey sampling, observational studies, and the basics of causal inference with randomized experiment design is particularly useful for students with a wide range of applied interests. Here, I describe such a course at a small liberal arts college, along with ways to adapt it to meet different student and instructor background and interests. The course serves as a valuable bridge to advanced statistical coursework, meets key statistical literacy and communication learning goals, and can be tailored to the desired level of computational and mathematical fluency. Through reading, discussing, and critiquing actual published research studies, students learn that statistics is a living discipline with real consequences and become better consumers and producers of scientific research and data-driven insights.

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### **Near-Peer Mentoring in Data Science: A Plot for Mutual Growth**

P. 529-537

Chiara Sabatti & Qian Zhao

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#### **Abstract**

Universities have been expanding undergraduate data science programs. Involving graduate students in these new opportunities can foster their growth as data science educators. We describe two programs that employ a near-peer mentoring structure, in which graduate students mentor undergraduates, to (a) strengthen their teaching and mentoring skills and (b) provide research and learning experiences for undergraduates from diverse backgrounds. In the Data Science for Social Good program, undergraduate participants work in teams to tackle a data science project with social impact. Graduate mentors guide project work and provide just-in-time teaching and feedback. The Stanford Mentoring in Data Science course offers training in effective and inclusive mentorship strategies. In an experiential learning framework, enrolled graduate students are paired with undergraduate students from non-R1 schools, whom they mentor through weekly one-on-one remote meetings. In end-of-program surveys, mentors reported growth through both programs. Drawing from these experiences, we developed a self-paced mentor training guide, which engages teaching, mentoring and project management abilities. These initiatives and the shared materials can serve as prototypes of future programs that cultivate mutual growth of both undergraduate and graduate students in a high-touch, inclusive, and encouraging environment.

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### **A Cornucopia of Maximum Likelihood Algorithms**

P. 538-548

Kenneth Lange, Xun-Jian Li & Hua Zhou

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#### **Abstract**

Classroom expositions of maximum likelihood estimation (MLE) rely on traditional calculus methods to construct analytic solutions. This creates in students a false sense of the ease with which MLE problems can be attacked. In a nod to reality, some teachers mention and apply Newton's method, Fisher scoring, and the expectation-

maximization (EM) algorithm. Although preferable to leaving students in a state of ignorance, such brief expositions ultimately fail to expose the full body of relevant techniques. Some of these techniques extend more readily to high-dimensional data problems than Newton's method and scoring. The current paper emphasizes block ascent and descent, profile likelihoods, the minorization-maximization (MM) principle, and their creative combination. These themes are put to work in readable Julia code to solve several MLE problems.



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**Preventing False Memories and Revitalizing Collective Memory with the Help of Historical Cartographic Materials and GIS: An Examination of the Lost Piers of Mersin** P. 177-191

Burak Beyhan ; Mehtap Çelik

**Abstract**

Piers are vital elements in the formation of collective memory in Mediterranean port cities and they played an important role in Mersin's urban life until the 1950s. Although there are some oral history-based studies attempting to spatialize them, they lack any measure of accuracy and reliability, and carry the risk of leading to false memories. In this context, the aim of this paper is to illustrate that collective memory can be properly reconstructed by using historical maps only if appropriate methods of analysis and reliable maps are used. In this study, which is based on various historical maps of Mersin city, the locations of the lost piers have been determined by using georeferencing tools available in QGIS. The study reveals that the tendency to construct false memories could be prevented by using reliable maps and appropriate tools in GIS in combination with the archive records.

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**How Can We Organize Narrative Maps? A Visual Storytelling Application for Nanjing Ming City Wall** P. 192-206

Fei Yang ; Jie Shen ; Haoyu Yang ; Shuai Hong

**Abstract**

The design of visual narrative products and the expression of visual representations in videos are typically carried out independently, resulting in a lack of unified logic and systematic organization in multi-dimensional, multi-scale and multi-scenario narrative maps. To address this issue, this research project applies the concept of conceptual story model to the design of narrative map products and uses the hand-rolled map as a carrier to design an interactive narrative system. It utilizes a three-level model based on emotional design theory to design narrative videos and employs narrative theory to organize the storyline of the Nanjing Ming City Wall (NMCW). The experimental and statistical results show that the proposed method effectively represents the historical and cultural characteristics of the NMCW, aiding participants' understanding and supporting public dissemination of historical knowledge. It contributes to the multidimensional representation of historical scenes, enhancing public awareness and encouraging participation in cultural heritage conservation.

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**Evaluating Map Projections for Globemaking** P. 207-217

Jonathan Huck

**Abstract**

Cartographic globes are known to have been in production for over two centuries. Though no longer used as a navigational aid, globes remain in high demand as scientific and artistic artefacts, both in physical and virtual form. However, the cartographic quality of many modern manuscript globes (i.e. those in which paper maps are attached to a sphere, usually in the form of 'gores') is poor, in part due to a lack of detailed evaluation of the mathematical approach to their creation. This work provides a robust quantitative methodology for the evaluation of map projections for globe

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production, as well as the first such evaluation of a range of map projections to see which perform the best. The Cassini projection (for gores) and the Azimuthal Equidistant projection (for the accompanying polar caps) are the best-performing projections for a general-purpose globe in most circumstances.

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**Opportunities and Challenges for the Next Generation of Cartographers: An Inclusive Workshop Study with Early-Career Cartography Professionals**

P. 218-226

Chelsea Nestel ; Katarzyna Słomska-Przech ; Florian Ledermann ; Edyta P. Bogucka ; Fanni Vörös, Sebastian Meier ; Robert E. Roth

**Abstract**

Here, we introduce Next Generation Cartographers, a Working Group of the International Cartographic Association (ICA) Students and early-career professionals today learn cartographic design alongside a diverse array of conceptual and technical competencies and, therefore, are working at the forefront of the discipline. However, they typically are not among the leading voices within the cartography community simply due to experience. To this end, we organized a Next Generation Cartographers (NGC) workshop at EuroCarto 2022 to identify opportunities and challenges for the next generation of cartographers. During our discussions, advocacy, peer support, mentorship, and outreach emerged as key needs of next generation cartographers and, ultimately, the need for NGC to have a voice in ICA planning. Inclusion became a core value of NGC to promote safety and diversity across the cartography community. NGC opened to global membership in August 2023 at the International Cartographic Conference in Cape Town, South Africa, and became a Working Group in autumn 2023.

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**An Overview of Al-Biruni's Lasting Contributions to Cartographic Science**

P. 227-235

Young-Jin Ahn ; Zuhridin Juraev

**Abstract**

In an increasingly interconnected world, the cross-cultural exchange of scientific knowledge has become crucial for tackling the challenges of our time. This paper examines the profound influence of Abu Rayhan Al-Biruni, a pioneering figure of the Islamic Golden Age, on modern cartography. Al-Biruni's innovative approaches to mapping and geographical analysis centred on the need for cross-cultural scientific exchange and empirical precision. This paper shows how his methods continue to address geographical challenges today, particularly through the use of advanced technologies for accurate geographical measurements. The successful implementation of Al-Biruni's methods in modern technologies emphasizes the continued relevance of his work. This study aims to inspire a deeper appreciation of historical contributions to the field and encourage the integration of timeless insights into modern cartographic practices.

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**3D-Terrain Mapping and Mixed Reality Cartography Supporting Edutainment in Landscape Genesis – The Saarschleife Geotope Application**

P. 236-245

Jochen Kubiniok ; Peter Fischer-Stabel ; Joshua Azvedo

**Abstract**

The Saarschleife geotope (SE-Germany) represents one of the most prominent geotopes of the SaarLorLux region and is known far beyond the borders of the greater region. Surprisingly, there is no visual representation of the relief history and genesis of this river meander, which is unique for Central Europe. The visualization presents the relief history and geological evolution of the last 400 million years in selected geological epochs. To make the results of geological and geomorphological research accessible to a broad audience, several measures have been taken to enhance

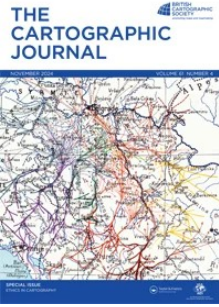
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understanding and interaction: A sequential representation of the relief and geological conditions, an animation depicting the landscape development, exemplary relief forms or panoramic views from the studied epochs supplemented with photo documentation and block diagrams as well as interactive info points on Google Maps and a GPX track supporting the exploration of the fascinating geological history of the Saarschleife.

Key Policy Highlights

- The reconstruction of the space-time genesis of a landscape requires the analysis of a variety of historical and recent data sources, including extensive field work.
  - New technologies in the field of immersive computing open up new opportunities to interest younger sections of the population in geoscientific research findings.
  - To make the results of geological and geomorphological research accessible to a broad audience, we need to use the social media tools that people currently use in the field, such as Google Maps or geocaching toys.
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**Ethical Challenges Arising from the Mapping of Mobile Phone Location Data**

P. 256-269

Louise Sieg, Hamish Gibbs, Maurizio Gibin & James Cheshire

**Abstract**

Mobile phone location datasets offer opportunities to conduct spatial analysis at very granular levels. In most jurisdictions their collection and use are subject to legal requirements to protect the privacy of the individuals generating the data and to prevent its disclosure. However, it can be the case that geographically referenced datasets, which meet the legal and statistical requirements of non-disclosure, reveal much more when they are plotted on a map. This paper provides an overview of the particular ethical challenges posed to mapmakers by mobile phone location data, whilst keeping in mind the potential benefits of harnessing these data to inform research and public policy. We identify the principal ethical concern pertaining to the use of such location datasets: preventing disclosure and protecting privacy, but also considering the spatial and socio-political contexts that the data are collected and produced from. We then discuss case studies that highlight the context-specific considerations necessary to create ethical maps from sensitive location datasets, and offer experience-based recommendations for users considering the ethical implications of using mobile phone location data in research.

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**Misleading Whom? Assumptions about Map Users and Engagement Contexts in COVID-19 Map Misleadingness Claims**

P. 270-287

Johanna Meyer, Danaë Stanton Fraser & Julie Barnett

**Abstract**

The potential of maps to 'mislead' is flagged as an ethical issue in the academic literature and beyond. This potential resurfaced in discussions around COVID-19 mapping practices. Using Alvesson and Sandberg's (2020) problematizing review framework, we explore what assumptions are made about the map user and map engagement context when a disease map, or mapping or distribution practice is labelled as misleading, and how this conceptualization can be both a help and a hindrance for studying (engagement with) public health maps. We argue that further empirical research and theoretical development are needed to better understand map-based misleadingness in the context of public health crises, and that the label of misleadingness should be used with caution.

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**On the Ethics of Cartographic Ethics**

P. 288-305

Kenneth Field & Ian Muehlenhaus

**Abstract**

Whether or not a map can be 'right' or 'wrong', each maintains an aura of authority and correctness which reinforces or challenges a reader's perspective of the truth. Each map is a product of its maker, its reader, and multiple competing, and constraining contexts. Maps offer an idiosyncratic version of the truth with pre-existing perspectives and personal bias impacting every aspect of the communication process. In identifying maps that seek to propagate mis- or disinformation, some researchers argue a set of 'cartographic ethics' might function as a

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standard against which cartographers and mapmakers could be held accountable. This paper critiques cartographic ethics through the lens of truthfulness. If there is no single right or wrong truth, only competing perspectives, are cartographic ethics even practicable? And how might ethical codes be counter-productive? We offer some ideas on how we might go beyond our own internal discussions to generate practical ways of helping people to make better, perhaps more ethical maps.

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**On The Living Black Atlas: Learning Geospatial Ethics from the African American Freedom Struggle**

P. 306-314

Derek H. Alderman & Joshua Inwood

**Abstract**

The Living Black Atlas seeks to create space within geospatial classrooms and workplaces for curating, amplifying, and learning from the seldom-discussed cartographic practices undergirding the African American Freedom Struggle. Beyond a static collection of maps, the Atlas comprises dynamic understandings of the Black experience that challenge staid notions of what a map is and how and where mapping takes place. African American communities have long engaged in countermapping, restorative cartographies, radical geospatial intelligence, visual story-telling, and embodied productions of geographic knowledge that affirm the value of Black life and imagine more just futures. The Living Black Atlas can help create the inclusive education necessary for broadening participation in the geospatial field, acknowledging the social power relations and different spatial epistemologies circulating through maps, and inspiring us to conceive of mapping and its ethical possibilities in more creative and community-centred ways outside of industry standards, professionalized practices, and scientific conventions.

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**Geospatial Ethical Frameworks: A Preliminary Analysis of Current Models**

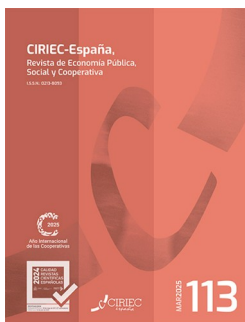
P. 315-327

Doug Specht & Alexander J. Kent

**Abstract**

Geospatial technologies have become increasingly ubiquitous in various fields, including (but not limited to) urban planning, environmental management and disaster response. The growing use of these technologies has raised significant ethical concerns, arising from issues such as privacy, data security, spatial justice and environmental impacts. To address these concerns, scholars, practitioners and organizations have developed frameworks, models and principles to promote and guide the ethical and responsible use of geospatial technologies. There is now an abundance of ethical frameworks operating at several scales and focusing on a wide range of applications. This paper offers a preliminary review and analysis of these frameworks to identify where synergies could strengthen approaches and where gaps might remain.

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**Innovación y eficiencia en cooperativas agroalimentarias: la influencia de las tecnologías de la información y del liderazgo orientado al conocimiento**

P. 5-35

Autor/es: M<sup>a</sup> Jesús Moreno-Domínguez, Tomás Escobar-Rodríguez, Yolanda M<sup>a</sup> Pelayo-Díaz

**Resumen**

Las cooperativas agroalimentarias juegan un papel crucial en el desarrollo económico y social, especialmente en áreas rurales, convirtiéndose en un motor económico, social y cultural para las regiones menos pobladas del país. El objetivo del artículo es analizar cómo las tecnologías de la información, la capacidad de innovación y un liderazgo orientado al conocimiento pueden mejorar la eficiencia de las cooperativas agroalimentarias. La metodología empleada se fundamenta en los mapas cognitivos difusos (FCM). Los FCM permiten expresar el conocimiento de manera gráfica e inferir relaciones de causa y efecto entre los conceptos objeto de análisis. En el estudio participaron 20 expertos en gestión de cooperativas agroalimentarias andaluzas, cada uno con más de 20 años de experiencia en puestos directivos. Los resultados muestran que el liderazgo basado en el conocimiento tiene una relación positiva con la capacidad de innovación y la eficiencia de las cooperativas. Las tecnologías de la información juegan un papel mediador esencial, facilitando tanto la innovación radical como incremental. Además, las cooperativas que invierten en tecnologías de la información y en el desarrollo de habilidades de los empleados tienden a ser más eficientes y competitivas. Este trabajo pone de manifiesto que las cooperativas agroalimentarias deben apostar por la innovación apoyada por un liderazgo orientado al conocimiento y la utilización intensiva de tecnologías de la información para ser competitivas en el mercado global. Estos factores son claves para mejorar la eficiencia y asegurar el desarrollo sostenible en el sector agroalimentario.

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**La economía popular urbana en la Argentina durante la salida de la pandemia**

P. 36-67

Autor/es: Agustín Salvia, Santiago Poy, Eduardo Donza

**Resumen**

Este estudio examina la estructura económico-ocupacional urbana en la Argentina tras la pandemia, por COVID-19 con foco en la economía popular, un sector emergente en el ámbito laboral y político. Se exploran su naturaleza, características y vínculos con la economía de mercado, así como su dinámica en el contexto de recuperación económica. La investigación enfrenta desafíos debido a la heterogeneidad e inestabilidad de este segmento y a la limitada información disponible. Utilizando microdatos de encuestas nacionales, se propone una clasificación ocupacional que distingue entre los sectores formal, público, micro informal y de economía popular, constituido por trabajadores autónomos o asociados. El análisis incluye un perfil sociodemográfico y sociolaboral descriptivo de estos trabajadores, una comparación de los factores asociados a cada segmento mediante regresiones logísticas multinomiales, y una descripción de las transiciones ocupacionales a partir de datos de panel y modelos de regresión de efectos fijos. Los hallazgos sugieren que la denominada economía popular en la Argentina constituye una economía de subsistencia que actúa como sector "refugio" frente a la desocupación, generando su propia demanda en ocupaciones de bajos ingresos.

**Resumen**

La igualdad de género es una preocupación creciente en la economía social. Aunque existen numerosos estudios sobre género, falta un análisis exhaustivo de los sistemas de distribución de riqueza en Europa, especialmente en organizaciones. Este trabajo presenta el GWEI (Gender Wage Equality Index), un indicador diseñado para evidenciar desigualdades salariales de género mediante la contabilidad social. El GWEI opera en dos niveles: uno basado en datos secundarios que analiza la masa salarial y otro que utiliza la contabilidad social analítica para evaluar transferencias de valor entre stakeholders. El análisis se centra en siete empresas, destacando el caso de Lantegi Batuak, y aborda la implementación del GWEI en la Economía Social. Se introducen innovaciones como: análisis del equilibrio en el empleo, mapeo de stakeholders sensibles a desequilibrios de género, evaluación del diálogo con stakeholders, preguntas sobre valor generado y desequilibrios, segmentación de datos por género y uso del GWEI como ratio específica. Los resultados demuestran el potencial del GWEI para abordar desequilibrios de género en organizaciones, tanto públicas como privadas, y su contribución al desarrollo de estrategias sostenibles de género.

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**¿Por qué en Mondragón, al contrario del ejemplo europeo, no se optó por el cooperativismo de consumo para cooperativizar la industria?**

P. 101-129

Autor/es: Igor Ortega-Sunsundegi, Marixe Ruiz-de-Austri Arexolaleiba

**Resumen**

Hay aspectos de la historia del cooperativismo de Mondragón no suficientemente explicados aún. Esta experiencia cooperativa es internacionalmente reconocida por su éxito en el desarrollo del cooperativismo industrial de trabajo asociado. Pero la opción por el modelo de trabajo asociado no era una elección lógica a la luz del contexto del movimiento cooperativo internacional y europeo. Este contexto, en la época que los fundadores de Mondragón comenzaban a desarrollar sus primeras cooperativas industriales, se caracterizaba por la fortaleza del cooperativismo de consumo, el dominio ideológico de la doctrina de la hegemonía del consumidor y el descrédito del cooperativismo de trabajo asociado. Se da la circunstancia que la primera cooperativa impulsada por Arizmendiarieta fue la cooperativa de consumo San José, pero es un hecho que ha pasado desapercibido por los investigadores de esta experiencia cooperativa. En el artículo se analizan las razones que motivaron la opción por las cooperativas de trabajo asociado. Por un lado, se indaga en la proyección que los fundadores de Mondragón daban a la cooperativa de consumo San José y, por otro, se describen los motivos de orden filosófico y conceptual que alejaban a los fundadores de Mondragón de la vía del consumo para cooperativizar la industria. El análisis nos permite profundizar en el conocimiento de la concepción cooperativa de los fundadores de Mondragón.

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**Las Cooperativas de Iniciativa Social en España: contexto y características en 2022**

P. 131-160

Autor/es: Elvira Plana Royo, Millán Díaz Foncea, Cristina Bernad Morcate

**Resumen**

Las Cooperativas de Iniciativa Social (CIS) son consideradas una de tres las tipologías tradicionales de empresas sociales en España, junto a las empresas de inserción y los centros especiales de empleo; destacan por su labor en la inclusión social y en la mejora del bienestar social, medioambiental y local. Hasta la fecha, son escasas las investigaciones empíricas que las han abordado, centrándose su estudio principalmente en los ámbitos jurídico, normativo e institucional. Esta investigación pretende cubrir este gap, y proporcionar conocimiento acerca de su situación en el contexto español a finales de 2022 y de sus características generales. La metodología utilizada se basa en el análisis cuantitativo de la población de las Cooperativas de Iniciativa Social en España a partir de la información proporcionada por todos los registros autonómicos de cooperativas. Los resultados muestran la existencia de 856 CIS activas, las cuales configuran la población existente en España a diciembre de 2022. Presentan una amplia distribución a lo largo de todo el territorio, especialmente destacable en cuatro comunidades autónomas (Cataluña, País Vasco, Madrid y Andalucía). La mayoría centra su actividad en los sectores: social, sanitario y educativo, aunque

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las CIS abarcan 16 de los 21 epígrafes de la clasificación CNAE-2009. Su tamaño inicial es limitado, generalmente se constituyen con menos de diez socios y 5.000 euros de capital social inicial.

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**Mujeres, deporte y Economía Social. Participación, evolución e impacto de los programas de fomento en federaciones deportivas españolas**

P. 161-190

Autor/es: Rosana Montalbán Moya, Antonio González-Rojas

**Resumen**

Este artículo analiza la presencia y evolución de la participación de las mujeres en el deporte federado en España en la última década y se centra en las medidas públicas de promoción de la igualdad en el deporte en el marco de la Economía Social (ES). Las preguntas que guían el estudio son tres. Primero, dado que el ámbito de la ES constituye un espacio propio para la participación equilibrada de mujeres, se pretende desvelar si existe una participación (in)equitativa en los diferentes roles del deporte federado y su tendencia reciente. Segundo, describir los programas públicos que promocionan la igualdad en este marco y revelar su empleo y desempeño. Por último, conocer la opinión de estas organizaciones sobre diferentes aspectos cualitativos, como las barreras a la hora de incorporar a la mujer, las acciones concretas que han implementado, los convenios suscritos o la formación impartida. Las fuentes de información para desarrollar este trabajo son, por una parte, fuentes secundarias como anuarios estadísticos deportivos del Consejo Superior de Deportes, el Instituto de las Mujeres, el Ministerio de Igualdad y publicaciones de federaciones; de otro lado, como fuente primaria, un cuestionario para describir las acciones encaminadas a la igualdad en el ámbito deportivo federado. La investigación concluye que estas entidades de la ES, pese a mostrar un paulatino aumento de la equidad, se constatan como lugares poco equilibrados en la participación de mujeres, y que el impulso de acciones y políticas públicas de igualdad resulta escaso para dicho fin.

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**El capital social organizacional como herramienta para potenciar la viabilidad de cooperativas recién creadas en Costa Rica dentro del spin-off social entre 2019 y 2024**

P. 191-217

Autor/es: Oscar Sanabria Garro, Federico Li Bonilla

**Resumen**

El estudio examina el impacto del capital social organizacional (CSO) y el spin-off social en la viabilidad de las cooperativas recién creadas en Costa Rica. Históricamente, las cooperativas han sido clave en la democratización financiera y el empoderamiento de la propiedad en el país. Sin embargo, desde el año 2000, la creación de cooperativas ha disminuido significativamente, afectando su impacto económico. Este trabajo emplea un enfoque mixto para analizar la influencia del CSO en la sostenibilidad de 23 cooperativas agroindustriales involucradas en un programa de Spin-Off Social de la UNED entre 2019 y 2024. Se proponen cinco hipótesis, de las cuales cuatro son validadas, destacando la importancia de la densidad asociativa, la participación cívica y las prácticas sostenibles en la operatividad de las cooperativas. La investigación concluye que, si bien la confianza institucional en la municipalidad tiene un impacto negativo inesperado en la operatividad, factores como la cohesión interna y el compromiso cívico son fundamentales para el éxito cooperativo. Se recomiendan estrategias para reducir la dependencia institucional y fortalecer las redes asociativas, la participación cívica y las prácticas sostenibles, sugiriendo que estas medidas pueden mejorar la viabilidad y sostenibilidad de las cooperativas en Costa Rica.

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**Social Capital and Corporate Volunteering: A Study in a Cooperative in Southern Brazil**

P. 219-241

Autor/es: Lucas Varela do Amaral, Anete Alberton, Franciane Reinert Cé

**Resumen**

Cooperatives are recognized for their substantial involvement in the communities where they operate, governed by principles and values that serve as guidelines for action management. The main objective of this work is to analyze corporate volunteering as an action of corporate social responsibility and its relationship with social capital and

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cooperative principles. The research employs a qualitative approach through a case study, combining data collection methods such as documents and interviews. Interviews and focus groups were transcribed, and MaxQDA Analytics Pro 2022 software was used for information analysis. All components involved in generating social capital were identified and described according to the theoretical model, highlighting the strong presence and influence of cooperative principles, thus enhancing the generation of social capital through corporate volunteering practices. The presence of the Sustainable Development Goals (SDGs) aligned with voluntary actions was also noted, generating social capital with value for participants. Our results also demonstrate that corporate volunteering serves as a response to the challenges of COVID-19, thereby reinforcing the idea that companies with more substantial social capital have a greater capacity to respond to social challenges. As a suggestion for future research, it is recommended to explore other aspects that can strengthen social capital in cooperativism, such as values and principles in isolation and complementary projects to volunteering, also studying the generation of social capital through corporate volunteering in other organizational contexts.

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## **Cuantificación del non-take-up en los programas de Rentas Mínimas de Inserción autonómicos en España**

P. 243-274

Autor/es: Diego Muñoz-Higueras, Amadeo Fuenmayor, Rafael Granell

### **Resumen**

Las rentas mínimas de inserción son un tipo de prestación económica que actúa como última red de seguridad ante la pérdida de ingresos y situaciones de exclusión social. El desarrollo regional de estas prestaciones ha generado diferencias importantes a nivel normativo y presupuestario, así como problemas de equidad interterritorial en España. A pesar de la extensa literatura que ha evaluado la cobertura y resultados de los programas de rentas mínimas de inserción autonómicas en España, hasta donde conocemos no existen estimaciones de non-take-up para estas prestaciones. Este indicador, que mide el porcentaje de población que cumple los criterios de elegibilidad pero no solicita la prestación, debe acompañar a la tasa de cobertura al evaluar el desempeño de una política pública. Esta laguna en la evaluación se ha debido, entre otros factores, a la falta de una base de datos adecuada.

Este estudio, realizado con datos del Panel de Hogares, estima que el non-take-up de las rentas mínimas de inserción de las Comunidades Autónomas de Régimen Común en 2019 osciló entre el 55% y el 94%, dependiendo del programa analizado. Este porcentaje es superior al de otros países de nuestro entorno. El estudio también analiza la capacidad protectora del conjunto de rentas mínimas autonómicas, que expulsa a más del 50% de la población en riesgo de pobreza debido a los requisitos de acceso.

En 2020 se implementó en toda España el Ingreso Mínimo Vital, prestación que tiene entre sus objetivos la homogeneización y racionalización de las prestaciones de ingresos mínimos. Sin embargo, hasta el momento, tampoco se ha logrado reducir de manera significativa el non-take-up existente.

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## **Análisis de los recursos de emprendimiento en la Economía Social Española**

P. 275-296

Autor/es: Francisco Rincón-Roldán, Pedro Baena-Luna

### **Resumen**

En las últimas décadas cada vez más personas deciden incursionar en el mundo del emprendimiento. La llegada del COVID-19 supuso un momento disruptivo que puso de manifiesto la necesidad de revisar el modelo económico actual para aumentar su conexión con la mejora de la sociedad a través de modelos de gestión más sostenibles. La opción emprendedora en economía social se manifiesta por medio de la creación de empresas en las que la finalidad social es una prioridad incontestable, generando empleo de calidad y estable, facilitando la inserción de personas desfavorecidas al mercado de empleo e incentivando el respeto al medio ambiente. Este trabajo analiza los recursos de emprendimiento en Economía Social en España, en concreto su situación actual y potenciales carencias para la propuesta de acciones para su mejora. El estudio es de naturaleza cualitativa utilizando el instrumento de la entrevista semiestructurada. Se han realizado un total de veinte entrevistas a personas designadas por las entidades seleccionadas, de acuerdo con los siguientes criterios de elección: ámbito geográfico, tipo de entidad e interés y especificidad de su trabajo. Los hallazgos de nuestra investigación muestran importantes implicaciones prácticas para

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los agentes que desarrollan e implementan políticas de emprendimiento. Suponen por tanto una importante diagnosis de la situación actual del emprendimiento en el contexto español y además un significativo punto de anclaje para poder comparar el impacto de todas las medidas de impulso al emprendimiento que se están desarrollando tanto en el contexto nacional como europeo.

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**Los fondos de inversión de los asalariados en Suecia: potencial y límites de una estrategia socialdemócrata hacia la democracia industrial**

P. 297-330

Autor/es: Mario del Rosal

**Resumen**

En los años setenta del siglo XX, los sindicatos mayoritarios de Suecia y el Partido Socialdemócrata en el gobierno diseñaron y presentaron un proyecto que, de haberse implantado, podría haber cuestionado los cimientos del capitalismo en ese país: los fondos de inversión de los asalariados. En su versión original, constituía un paso hacia la socialización del capital a través de la paulatina transferencia de los medios de producción y del poder de gestión de las empresas a los trabajadores. Este artículo explica la historia de esta idea desde el enfoque de la crítica marxista de la economía política. El objetivo es enriquecer el debate profundizando en cuatro aspectos: 1) las características y el potencial relativamente rupturista del proyecto original; 2) las subsiguientes dificultades políticas para su implantación derivadas del rechazo por parte del capital y de una fracción de la propia socialdemocracia; 3) las diferencias entre el plan original y el que finalmente se llegó a implantar; 4) el funcionamiento real de los fondos a lo largo de los noventa, sus resultados y su abolición final.

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**Bonos sociales y verdes para financiar proyectos sostenibles en la Unión Europea**

P. 331-360

Autor/es: Javier García-Escobar, Josefina Fernández-Guadaño, Juan Mascareñas

**Resumen**

En el ámbito de la Inversión Socialmente Responsable (ISR) es destacable, en los últimos años, la labor de la Unión Europea (UE) por su protagonismo como principal impulsor de las inversiones verdes a través del Pacto Verde Europeo. Por otro lado, para mitigar los efectos negativos socioeconómicos derivados de la pandemia, la UE se ha convertido en uno de los principales emisores de deuda en Euros. Además de emitir bonos verdes, dentro del programa de Fondos de Recuperación Europeo, ha emitido, por primera vez, bonos sociales para financiar el programa de protección para el desempleo establecido en el reglamento UE 2020/672. En este trabajo se analizan los bonos verdes y sociales destinados a la financiación de programas medioambientales y sociales de la UE, y se comparan con los convencionales del mismo emisor, para determinar si existe una diferencia de rendimiento que nos permita inferir la existencia de una prima verde o social, según el caso, y tratar de explicarlo mediante un análisis de regresión lineal múltiple. Aunque en la literatura científica abundan los estudios sobre la prima verde, no ocurre lo mismo con la social. Entre los hallazgos de esta investigación se destacan, por un lado, que los bonos verdes y sociales con mayores niveles de liquidez, también presentan mayores rendimientos, y por otro lado, que la volatilidad implica que los inversores del mercado secundario requieran mayores tasas. Además, los bonos sociales tienen mayores diferencias de rendimiento en comparación con los verdes, lo que apunta a que, la prima social, de los bonos emitidos por la UE, es más amplia que la verde, en el mercado secundario.

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**Mixed causal-noncausal count process**

P. 325-360

Jian Pei ; Yang Lu ; Fukang Zhu

**Abstract**

Recently, Gouriéroux and Lu (Electron J Stat 15(2):3852–3891, 2021) introduced a class of (Markov) noncausal count processes. These processes are obtained by time-reverting a standard count process (such as INAR(1)), but have quite different dynamic properties. In particular, they can feature bubble-type phenomena, which are epochs of steady increase, followed by sharp decreases. This is in contrast to usual INAR and INGARCH type models, which only feature “reverse bubbles”, that are epochs of sharp increase followed by steady decreases. In practice, however, in many datasets, sudden jumps and crashes are rare, while it is more frequent to observe epochs of steady increase or decrease. This paper introduces the mixed causal-noncausal integer-valued autoregressive (m-INAR(1,1)) process, obtained by superposing a causal and a noncausal INAR(1) process sharing the same sequence of error terms. We show that this process inherits some key properties from the noncausal INAR(1), such as the bimodality of the predictive distribution and the irreversibility of the dynamics, while at the same time allowing different accumulation and burst speeds for the bubble. We propose a GMM estimation method, investigate its finite sample performance, develop testing procedures, and apply the methodology to stock transaction data.

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**Copula based dependent censoring in cure models**

P. 361-382

**Morine Delhelle**

Morine Delhelle ; Ingrid Van Keilegom

**Abstract**

In this paper we consider a time-to-event variable  $T$  that is subject to random right censoring, and we assume that the censoring time  $C$  is stochastically dependent on  $T$  and that there is a positive probability of not observing the event. There are various situations in practice in which this happens, and appropriate models and methods need to be considered to avoid biased estimators of the survival function or incorrect conclusions in clinical trials. In this work we propose a fully parametric mixture cure model for the bivariate distribution of  $(T, C)$ , which deals with all these features. The model depends on a parametric copula and on parametric marginal distributions for  $T$  and  $C$ . A major advantage of our approach in comparison to existing approaches in the literature is that the copula which models the dependence between  $T$  and  $C$  is not assumed to be known, nor is the association parameter. Furthermore, our model allows for the identification and estimation of the cure fraction and the association between  $T$  and  $C$ , despite the fact that only the smallest of these variables is observable. Sufficient conditions are developed under which the model is identified, and an estimation procedure is proposed. The asymptotic behaviour of the estimated parameters is studied, and their finite sample performance is illustrated by means of a thorough simulation study and an analysis of breast cancer data.

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Yuzi Liu ; Haiqiang Ma ; Jiming Jiang

**Abstract**

The nested-error regression (NER) models are widely used to analyze unit-level data in small area estimation. Concerned about possible model misspecification, Jiang et al. (Surv Methodol 41:37–55, 2015) suggested a new prediction procedure, entitled observed best prediction (OBP), for the NER models and showed its desirable properties under such a setting. However, how to assess the uncertainty of OBP in such a case remains poorly addressed. This paper investigates this issue by developing a new estimator relying on the so-called one-bring-one route. It is shown that the new estimator is second-order unbiased under some mild conditions. Some simulations are conducted to confirm its finite sample performance. Finally, we applied the proposed estimator to a real-data example.

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Wan-Lun Wang ; Victor Hugo Lachos ; Tsung-I Lin

**Abstract**

The Gaussian mixture model (GMM) is a versatile and widely used tool for model-based clustering and classification of multivariate data with heterogeneity. While there are existing software packages designed to fit the GMM with varying numbers of mixture components and covariance structures, they are inapplicable when dealing with data containing both censored and missing values. This paper addresses this limitation by proposing an extended framework of the GMM, called the GPMM-CM, which incorporates 14 specifications of parsimonious component–covariance matrices to accommodate the complex situation of existing censored and missing values. Under the missing at random mechanism, an analytically feasible expectation conditional maximization algorithm is devised for carrying out maximum likelihood estimation of the GPMM-CM approach. The superiority and utility of the proposed methodology are demonstrated through analyses of both real and simulated datasets.

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Zhuo Qu ; Wenlin Dai ; Marc G. Genton

**Abstract**

With the advance of technology, functional data are being recorded more frequently, whether over one-dimensional or multi-dimensional domains. Due to the high dimensionality and complex features of functional data, exploratory data analysis (EDA) faces significant challenges. To meet the demands of practical applications, researchers have developed various EDA tools, including visualization tools, outlier detection techniques, and clustering methods that can handle diverse types of functional data. This paper offers a comprehensive overview of recent procedures for exploratory functional data analysis (EFDA). It begins by introducing fundamental statistical concepts, such as mean and covariance functions, as well as robust statistics such as the median and quantiles in multivariate functional data. Then, the paper reviews popular visualization methods for functional data, such as the rainbow plot, and various versions of the functional boxplot, each designed to accommodate different features of functional data. In addition to visualization tools, the paper also reviews outlier detection methods, which are commonly integrated with visualization methods to identify anomalous patterns within the data. Finally, the paper focuses on functional data clustering techniques which provide another set of practical tools for EFDA. The paper concludes with a brief discussion of future directions for EFDA. All the reviewed methods have been implemented in an R package named [EFDA](#).

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**Comments on: Exploratory functional data analysis**

P. 483-487

Rob J. Hyndman

**Abstract**

A useful approach to exploratory functional data analysis is to work in the lower-dimensional principal component space rather than in the original functional data space. I demonstrate this approach by finding anomalies in age-specific US mortality rates between 1933 and 2022. The same approach can be employed for many other standard data analysis tasks and has the advantage that it allows immediate use of the vast array of multivariate data analysis tools that already exist, rather than having to develop new tools for functional data.

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**Comments on: Exploratory functional data analysis**

P. 488-489

Jeff Goldsmith

**Abstract**

Exploratory FDA is a critical step in understanding functional data. In this article, the authors present a range of compelling real-data examples to illustrate best practices in visualization and initial analyses. My comments include suggestions to incorporate covariates in exploratory approaches and note a new software package to facilitate these techniques.

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**Comments on: Exploratory functional data analysis**

P. 490-493

Rosa E. Lillo

**Abstract**

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**Comments on: Exploratory functional data analysis**

P. 494-497

Sara Lopez-Pintado

**Abstract**

In this invited paper we highlight some of the exploratory functional data methods described in the systematic review paper by Qu et al. (TEST, 2024. 10.1007/s11749-024-00952-8). We discuss recent developments related to functional boxplots and consider possible extensions of exploratory methods to non-Euclidean object data.

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**Comments on: exploratory functional data analysis**

P. 498-501

Anna Maria Paganoni ; Laura M. Sangalli

**Abstract**

The paper “Exploratory Functional Data Analysis” provides a comprehensive review of recent exploratory approaches for functional data, highlighting the challenges posed by the high dimensionality and complexity of these data objects. Here, we further comment on challenging aspects for the exploratory analysis of these data, which present opportunities for future research.

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**Rejoinder to the discussion on “Exploratory Functional Data Analysis”**

P. 502-507

Zhuo Qu ; Wenlin Dai ; Marc G. Genton

**Abstract**

The authors thank all participants for their excellent discussions on various aspects of our paper. We were very pleased to see comments on the different aspects of exploratory functional data analysis that could provide a pathway to future research directions in this area. Throughout this rejoinder, we denote the discussion of Jeff

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Goldsmith as G, Rob Hyndman as H, Rosa Lillo as L, Sara López-Pintado as L-P, and Anna Maria Paganoni and Laura Sangalli as PS. These discussants have made foundational contributions to the development and application of EFDA tools. Their insights offer a balanced and constructive perspective that greatly enriches the discussion. This rejoinder covers the different points raised by the discussants in different sections. Section [2](#) discusses enhancements to EFDA methodologies, including visualization strategies and alternative analytical workflows. Section [3](#) focuses on the central role of data depth, its application in visualization tools such as the functional boxplot, and various approaches to outlier detection. Section [4](#) addresses the challenges presented by complex functional data structures and the consequent need for robust and scalable methods. Finally, Section [5](#) highlights other specific future research directions identified by the discussants.

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**Measuring Bayesian sensitivity in the compound Poisson process**

P. 509-529

F. Ruggeri ; M. Sánchez-Sánchez ; A. Suárez-Llorens

**Abstract**

Bayesian methods are widely used to determine insurance premiums, though they are sometimes criticized for the arbitrariness in selecting prior distributions. To mitigate this issue, classes of priors incorporating expert knowledge have been proposed, allowing for the analysis of uncertainty through upper and lower bounds on Bayesian premiums. In this paper, we employ a recently introduced class of priors based on stochastic orders, where the induced order on prior distributions is preserved in the corresponding posterior distributions. Uncertainty around a prior is captured through weighted functions, and the extremal elements of the class define premium bounds. We also show how dependence among parameters can be integrated using suitable weight functions. Our approach is developed within the framework of the compound Poisson process, a fundamental model for claim frequency and severity in car insurance. Additionally, we present a sensitivity analysis method for a bonus–malus system (BMS).

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**Testing high-dimensional mediation effect with arbitrary exposure–mediator coefficients**

P. 530-579

Yinan Lin ; Zijian Guo ; Zhenhua Lin

**Abstract**

In response to the unique challenge created by high-dimensional mediators in mediation analysis, this paper presents a novel procedure for testing the nullity of the mediation effect in the presence of high-dimensional mediators. The procedure incorporates two distinct features. Firstly, the test remains valid under all cases of the composite null hypothesis, including the challenging scenario where both exposure–mediator and mediator–outcome coefficients are zero. Secondly, it does not impose structural assumptions on the exposure–mediator coefficients, thereby allowing for an arbitrarily strong exposure–mediator relationship. To the best of our knowledge, the proposed test is the first of its kind to provably possess these two features in high-dimensional mediation analysis. The validity and consistency of the proposed test are established, and its numerical performance is showcased through simulation studies. The application of the proposed test is demonstrated by examining the mediation effect of DNA methylation between smoking status and lung cancer development.

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**A kernel-based test for the first-order separability of spatio-temporal point processes**

P. 580-611

Mohammad Ghorbani ; Nafiseh Vafaei ; Mari Myllymäki

**Abstract**

We present an innovative statistical test designed to assess the first-order separability of a spatio-temporal point process. Our proposed test employs block permutations and a novel test statistic that incorporates a machine learning technique known as the Hilbert–Schmidt independence criterion. To enhance the practicality of the criterion, we apply the kernel trick. The block permutations are designed to maintain the second-order structure of the point pattern, disrupting it only at the block borders. This design enables the application of our test to a general spatio-temporal point process, which may exhibit small-scale clustering or regularity. We investigated the empirical level of

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the block permutation-based tests with the new and two previously proposed test statistics for clustered and regular point processes, represented in our study by log Gaussian Cox processes and determinantal point processes. By comparing our results with those obtained from a previously proposed permutation-based test, we confirmed the effectiveness of our method in terms of significance level, power, and notably computational cost. We applied the test to real-world datasets, namely the UK's 2001 foot-and-mouth disease epidemic and varicella data from Valencia.

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**Mixed membership estimation for categorical data with weighted responses**

P. 612-659

Huan Qing

**Abstract**

The Grade-of-Membership (GoM) model, which allows subjects to belong to multiple latent classes, is a powerful tool for inferring latent classes in categorical data. However, its application is limited to categorical data with nonnegative integer responses, as it assumes that the response matrix is generated from Bernoulli or Binomial distributions, making it inappropriate for datasets with continuous or negative weighted responses. To address this, this paper proposes a novel model named the Weighted-Grade-of-Membership (WGoM) model. Our WGoM is more general than GoM because it relaxes GoM's distribution constraint by allowing the response matrix to be generated from distributions like Bernoulli, Binomial, Normal, and Uniform as long as the expected response matrix has a block structure related to subjects' mixed memberships under the distribution. We show that WGoM can describe any response matrix with finite distinct elements. We then propose an algorithm to estimate the latent mixed memberships and other WGoM parameters. We derive the error bounds of the estimated parameters and show that the algorithm is statistically consistent. We also propose an efficient method for determining the number of latent classes  $K$  for categorical data with weighted responses by maximizing fuzzy-weighted modularity. The performance of our methods is validated through both synthetic and real-world datasets. The results demonstrate the accuracy and efficiency of our algorithm for estimating latent mixed memberships, as well as the high accuracy of our method for estimating  $K$ , indicating their high potential for practical applications.

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**Resistant dispersion estimation for nonparametric regression**

P. 660-690

Ioannis Kalogridis ; Stefan Van Aelst

**Abstract**

Estimation of the dispersion of the errors is a central problem in regression analysis. An estimate of this dispersion is needed for most statistical inference procedures such as the construction of confidence intervals. In the context of robustness, it also plays a crucial role in the identification of outliers. Several nonparametric methods to estimate the dispersion function in heteroscedastic regression models have been proposed through the years. However, the vast majority of them rely on Gaussian likelihood and least-squares procedures, leading to estimators that are sensitive to atypical observations such as gross errors in the response space. To remedy this deficiency, a novel class of resistant nonparametric dispersion estimators is introduced and studied. This class of estimators builds upon the likelihood principle and spline smoothing. Estimators in this class can combine resistance towards atypical observations with high efficiency at the Gaussian model. It is shown that the new class of estimators is computationally efficient and enjoys optimal asymptotic properties. Its highly competitive performance is illustrated through a simulation study and a real-data example containing atypical observations.

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**Abstract**

It is the purpose of this paper to investigate the issue of estimating the regularity index  $\beta > 0$  of a discrete heavy-tailed r.v.  $S$ , i.e. a r.v.  $S$  valued in  $\mathbb{N}^*$  such that  $\mathbb{P}(S > n) = L(n) \cdot n^{-\beta}$  for all  $n \geq 1$ , where  $L : \mathbb{R}_+^* \rightarrow \mathbb{R}_+$  is a slowly varying function. Such discrete probability laws, referred to as generalized Zipf's laws sometimes, are commonly used to model rank-size distributions after a preliminary range segmentation in a wide variety of areas such as e.g. quantitative linguistics, social sciences or information theory. As a first go, we consider the situation where inference is based on independent copies  $S_1, \dots, S_n$  of the generic variable  $S$ . The estimator  $\hat{\beta}$  we propose can be derived by means of a suitable reformulation of the regularly varying condition, replacing  $S$ 's survivor function by its empirical counterpart. Under mild assumptions, a non-asymptotic bound for the deviation between  $\hat{\beta}$  and  $\beta$  is established, as well as limit results (consistency and asymptotic normality). Beyond the i.i.d. case, the inference method proposed is extended to the estimation of the regularity index of a regenerative  $\beta$ -null-recurrent Markov chain. Since the parameter  $\beta$  can be then viewed as the tail index of the (regularly varying) distribution of the return time of the chain  $X$  to any (pseudo-) regenerative set, in this case, the estimator is constructed from the successive regeneration times. Because the durations between consecutive regeneration times are asymptotically independent, we can prove that the consistency of the estimator promoted is preserved. In addition to the theoretical analysis carried out, simulation results provide empirical evidence of the relevance of the inference technique proposed.

**Abstract**

It is frequently observed in dose response trials that increasing the dosage of a particular ingredient has a monotone effect on cure rate, survival times and mortality levels. Here, we consider the problem of testing the homogeneity of treatment effects against ordered alternatives in a two-way additive ANCOVA with heterogeneous error variances. The likelihood ratio test is developed for the case of one covariate and further extended to the case of several covariates. Algorithms to obtain the maximum likelihood estimators of model parameters under the null and full parameter spaces are proposed. The convergence of the iterative schemes to the true MLEs is established. Two union-intersection type tests are also proposed. The tests are modified for possible extension to tree and umbrella order alternatives. For the implementation of all the tests, a parametric bootstrap approach is used and is shown to be asymptotically accurate. An extensive simulation study is carried out to assess the size and power performance of proposed tests. It is observed that the bootstrap methods are indeed satisfactory, even for small and moderate samples and highly heterogeneous variances. Robustness of these tests is also investigated under the deviation from normality of the error distribution. The proposed tests are illustrated using a breast cancer data set on survival ages

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and a clinical nutrition study data set on body weights. An ‘R’ package has been developed and shared on ‘GitHub’ for implementation on real data sets.

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**Robust penalized estimators for high-dimensional generalized linear models**

P. 742-785

Marina Valdora ; Claudio Agostinelli

**Abstract**

Robust estimators for generalized linear models (GLMs) are not easy to develop due to the nature of the distributions involved. Recently, there has been growing interest in robust estimation methods, particularly in contexts involving a potentially large number of explanatory variables. Transformed M-estimators (MT-estimators) provide a natural extension of M-estimation techniques to the GLM framework, offering robust methodologies. We propose a penalized variant of MT-estimators to address high-dimensional data scenarios. Under suitable assumptions, we demonstrate the consistency and asymptotic normality of this novel class of estimators. Our theoretical development focuses on re-descending  $\psi$ -functions and penalization functions that satisfy specific regularity conditions. We present an iterative re-weighted least-squares algorithm, together with a deterministic initialization procedure, which is crucial since the estimating equations may have multiple solutions. We evaluate the finite-sample performance of this method for Poisson distribution and well-known penalization functions through Monte Carlo simulations that consider various types of contamination, as well as an empirical application using a real dataset.

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**Testing linearity in semi-functional partially linear regression models**

P. 786-814

Yongzhen Feng ; Jie Li ; Xiaojun Song

**Abstract**

This paper proposes a Kolmogorov–Smirnov-type statistic and a Cramér–von Mises-type statistic to test linearity in semi-functional partially linear regression models. Our test statistics are based on a residual marked empirical process indexed by a randomly projected functional covariate, which can circumvent the “curse of dimensionality” caused by the functional covariate. The asymptotic properties of the proposed test statistics under the null, the fixed alternative and a sequence of local alternatives converging to the null at the parametric rate are established. A straightforward wild bootstrap procedure is suggested to estimate the critical values that are required to carry out the tests in practical applications. Results from an extensive simulation study show that our tests perform reasonably well in finite samples. Finally, we apply our tests to the Tecator and AEMET data sets to check whether the assumption of linearity is supported by these data sets.

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