



Topical collection on “goodness-of-fit, change-point and related problems”

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Received: 2 December 2024 / Accepted: 16 December 2024
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Since the seminal works by Pearson, who coined the term “goodness-of-fit”, at the beginning of the twentieth century to refer to the problem of fitting a distribution to a set of observations, much effort has been made in the statistical methodology with the objective of developing different goodness-of-fit techniques. Firstly, for distributions and densities, and more recently, in the last 30 years, for more complex regression models with related aspects, as the change-point analysis, in one context of massive data or high-dimensional data.

This topical collection, published in the TEST website, is devoted to the mentioned topics corresponding to the title of this document and contains a selection of papers presented at the 5th Workshop on Goodness-Of-Fit, Change-Point and Related Problems (GOFCP2022) celebrated in Rennes (France), 2–4 September 2022, following the previous workshops held in Seville (Spain) 2012, Athens (Greece) 2015, Bad Herrenalb (Germany) 2017 and Trento (Italy) 2019. This conference was hosted by ENSAI at the Ker Lann campus of the University of Rennes, with the main organizer being Professor Valentin Patilea on behalf of the CREST laboratory.

The collection represents a subset of all invited or contributed papers presented during the conference and were screened through a rigorous refereeing process according to the high standards of the journal TEST with a special collaboration of the Associate Editor Prof. Wenceslao González-Manteiga, under the main supervision of the Editors of the journal: Ana M. Aguilera and José M. Angulo. We thank the authors of the works and the reviewers for the excellent job. Thanks also to the Scientific Committee,

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Yongmiao Hong (Cornell University), Ingrid Van Keilegom (KU Leuven), Juan Carlos Escanciano (Universidad Carlos III de Madrid) and Lixing Zhu (Beijing Normal University and Hong King Baptist University). The collaboration of all members of the Organizing Committee was crucial for the successful celebration of the event.

This excellent selection of papers, published in different issues of TEST in the last two years, covers many important aspects of recent advances in the context of the methodology of “Goodness of fit” or “Change point analysis”. We now list the contributions included in this topical collection with a concise description of their content.

In the paper by Fernández-de Marcos and García-Portugués (2023), a new omnibus test for the uniformity on the hypersphere in the context of directional data is given. The topic of goodness-of-fit for directional data has been of high interest in the last years, for the case of distributions, densities, and regression models. The mentioned paper is a nice example of the recent advances in the topic.

Over the past years, we can find in top journals in the field of Statistics different publications oriented to methodological problems related to the high-dimensional population vector, the presence of massive data in the sample size and the problem motivated by the need of multiple tests. In the context of this topical collection, we can also find recent published papers related to the specification of the models for these three important situations. The paper by Jiménez-Gamero and de Uña-Álvarez (2024) is one example, where a testing methodology of Poisson distribution for a large k number of populations is given, for the case of pilot independent samples with extensions to the situation of dependent samples. Theoretical limit distributions of the different tests with bootstrap calibration are offered with illustration for simulated and real data.

In the recent years, we also can find new developments on testing of identification models when the data can be observed partially, as for example with missing or censored data, especially in the context of the econometrical world. In the paper by Crommen et al. (2024), an instrumental variable approach, under dependent censoring, is developed for the estimation and in the analysis of the model specification, with very important advances in the context of testing the causality in variables used in the Economical Science.

It is very well known in the analysis of financial time series the importance of the specification about the volatility and its corresponding distribution. Of special interest is the context of multivariate random vectors and its distribution with heavy tails in the financial context. In the paper by Meintanis et al. (2024), goodness-of-fit procedures for the multivariate stable-Paretian laws for independent and for conditionally heteroskedastic data are given. The methods developed are based on the empirical characteristic function and implemented in different contexts, including the innovations with GARCH models.

An important contribution for the present context of big data, when high dimensionality and sparsity is present, is the paper published in this collection by Zhao et al. (2024), where a multiple change-point detection is given for the situations of high-dimensional data. The approach proposed by the authors uses for the asymptotic analysis tools of U -statistics in the properties of the statistical tests. The methodology

developed in the paper takes care in its design of the costly computation, typical in high-dimensional modelling.

Coming back to the very important task of specification models, as for example the partial linear models, we can find in the paper by Florens and Lapenta (2024) an interesting work where partial linear instrumental variables regressions without smoothing on the instruments are considered. Asymptotic properties are given for the different semiparametric models, including the estimation of the parameters and the associated nonparametric curves in the complete semiparametric model.

Finally, in the paper by Lago et al. (2024), the classical problem of comparison of two samples for testing equality of distributions is analysed. A Kolmogorov–Smirnov-type test is offered for the complex situation of left-truncated data. The tests are calibrated with bootstrap and compared in simulations with other methods such as the log rank test, and a real data illustration is provided.

Funding Open Access funding provided thanks to the CRUE-CSIC agreement with Springer Nature.

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