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Editorial

Special Issue: Advances in Probability Distributions and Social Science Statistics

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Probability distributions, whether discrete or continuous, univariate or multivariate, represent a highly productive area within both theoretical and applied statistics. Recent advancements in computing, along with the availability of numerous statistical packages and specialized software, have significantly evolved in recent years. These developments have enabled the implementation of models that were not feasible a few decades ago, particularly with the capacity to manage vast amounts of data and process it efficiently. This progress underscores the need to introduce new probabilistic approaches in light of the extensive existing catalog: it is now possible to refine data fitting, achieve a more accurate representation of reality, and make predictions, the ultimate goal of any statistical model.

This concept inspired the launch of this special issue, which is dedicated to probability distributions and their applications, initially focusing on the Social Sciences. However, this field is so broad and poorly defined that it can ultimately encompass scenarios that may seem unrelated. Distribution theory is undoubtedly an exciting and practical branch of statistics that has gained considerable attention recently. Thus, the introduction of new distributions and their applications, alongside existing proposals, was regarded as a foundation for this special issue.

This special issue features fourteen articles by researchers from universities in ten countries: Thailand, India, Egypt, Saudi Arabia, Turkey, France, Italy, Chile, Jordan, and Spain. Naturally, other articles were rejected as the submission process underwent the standard rigorous review by the editor and anonymous reviewers. The aim was not merely to populate the special issue with as many articles as possible, but to include those of sufficient scientific quality and interest to the research community. This aim has been successfully achieved.

Based on classical distributions widely used in applied statistics, new alternatives have been proposed, along with various studies on them, both in univariate and bivariate contexts. Among these, the gamma, Weibull, Chi-squared, Pareto, and Lindley distributions are prominent in the univariate case. For the bivariate case, combinations of some of these distributions, along with others, are proposed using copulas, notably the Farlie-Gumbel-Morgenstern and the Sarmanov-Lee families. It

is worth noting that the use of specialized functions facilitates their application to diverse problems and large datasets. Such capabilities would have been unimaginable a few decades ago, especially when employing Bayesian methodology to obtain more efficient parameter estimates, as demonstrated in some of the works published in this issue.

The applications explored in the articles published in this special issue are varied, primarily spanning health, biology, engineering, reliability analysis, economics (income and reinsurance), stochastic processes, computer science, meteorology, and more. Some are approached from a Classical Statistics perspective, while others adopt a Bayesian perspective. Undoubtedly, all of these contributions can serve as inspiration for researchers seeking alternative models.

The editor of this special issue hopes that researchers in any field will find the contributions presented here both useful and beneficial, and that contributors will discover numerous citations that inspire them to continue their research in these and other areas.

Guest Editor:

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Conflict of interest

The Guest Editor declares no conflict of interest.

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