Hindawi Publishing Corporation
Journal of Probability and Statistics
Volume 2013, Article ID 462917, 2 pages
http://dx.doi.org/10.1155/2013/462917

Editorial

Recent Advances in Univariate and Multivariate Models

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Received 6 March 2013; Accepted 6 March 2013

This volume constitutes the special issue of the Recent Advances in Univariate and Multivariate Models. First, the editors wish to record their thanks to all those who helped with both the selection and referring of papers of this issue. Seventeen papers were submitted to this special issue and only five accepted in this volume represent the contributed papers selected by the editors as suitable for publication.

A wide range of new theoretical aspects related to the topics of this special issue are discussed, for example, two procedures for testing the hypothesis of no main random effects under fully nonparametric modeling of the mixed and random effects designs, explicit expressions for the masses of negative multinomial distributions, the complementary exponentiated exponential geometric distribution, local linear technique and the L_1 method to estimate all the functions in the functional-coefficient partially linear regression model, and graphical method associated with local acceptance regions.

The classical F statistic for testing the significance of main random effects in two-factor mixed and random effects model is very sensitive to violations of the assumptions under which it is derived, in particular those of symmetry, homoscedasticity, and consider of symmetry and homoscedasticity. T. Gaugler and M. Akritas developed two new test procedures for testing the hypothesis of no main random effects under fully nonparametric modeling of the mixed and random effects designs. The test statistics are defined as differences (as opposed to ratios) of suitably defined mean squares, and their asymptotic theory is derived as the number of levels tends to infinity. Some simulations suggest that the new procedures perform reasonably well in situations where the F statistic does not work. P. Bernardoff et al. derive explicit expressions for the masses of negative multinomial distributions. These masses can be maximized to obtain the maximum likelihood estimators of the model parameters. They provide an application to polarimetric image processing and study these estimators of the polarization degree of polarimetric images using different combinations of images. F. Louzada et al. propose a new family of lifetime distributions called the complementary exponentiated exponential geometric distribution, which arises on a latent competing risk scenario, where the lifetime associated with a particular risk is not observable but only the maximum lifetime value among all risks is. They discuss some mathematical properties of this distribution including explicit expressions for its survival and hazard functions, moments, order statistic, mean residual lifetime, modal value, and the observed Fisher information matrix. They implement maximum likelihood inference straightforwardly. The potentiality of the new model is demonstrated in three applications and provided the best fit in comparison with some other known distributions.

Further, Y. Feng et al. investigate the local linear technique and employ the L_1 method to estimate all the functions in the functional-coefficient partially linear regression model. This regression model is a useful generalization of the nonparametric model, partial linear model, and varying coefficient model. They describe the estimation method and the associated bandwidth selection procedure and study the mathematical properties of the proposed estimators. They conduct simulation studies to show the validity of the estimate procedure and a real application of their method. High-dimensional data with a small sample size, such as microarray data and image data, are commonly encountered in some practical problems for which many variables have to be measured but it is too costly or time consuming to repeat the measurements for many times. Finally, J. Liang develops a new graphical method for testing spherical symmetry that is especially suitable for high-dimensional data with small sample size. The new graphical method associated with the local acceptance regions can provide a quick visual perception on the assumption of spherical symmetry. The performance of the new graphical method is demonstrated by a Monte Carlo study and illustrated by real data.

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