Dirichlet and Related Distributions: Theory, Methods and Applications (Wiley Series in Probability and Statistics)

Kai Wang Ng, Guo-Liang Tian, Man-Lai Tang

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The Dirichlet distribution appears in many areas of application, which include modelling of compositional data, Bayesian analysis, statistical genetics, and nonparametric inference. This book provides a comprehensive review of the Dirichlet distribution and two extended versions, the Grouped Dirichlet Distribution (GDD) and the Nested Dirichlet Distribution (NDD), arising from likelihood and Bayesian analysis of incomplete categorical data and survey data with non-response.

The theoretical properties and applications are also reviewed in detail for other related distributions, such as the inverted Dirichlet distribution, Dirichlet-multinomial distribution, the truncated Dirichlet distribution, the generalized Dirichlet distribution, Hyper-Dirichlet distribution, scaled Dirichlet distribution, mixed Dirichlet distribution, Liouville distribution, and the generalized Liouville distribution.

Key Features:

- Presents many of the results and applications that are scattered throughout the literature in one single volume.
- Looks at the most recent results such as survival function and characteristic function for the uniform distributions over the hyper-plane and simplex; distribution for linear function of Dirichlet components; estimation via the expectation-maximization gradient algorithm and application; etc.
- Likelihood and Bayesian analyses of incomplete categorical data by using GDD, NDD, and the generalized Dirichlet distribution are illustrated in detail through the EM algorithm and data augmentation structure.
- Presents a systematic exposition of the Dirichlet-multinomial distribution for multinomial data with extra variation which cannot be handled by the multinomial distribution.
- S-plus/R codes are featured along with practical examples illustrating the methods.

Practitioners and researchers working in areas such as medical science, biological science and social science will benefit from this book.

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