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Nota di contenuto	Dirichlet and Related Distributions: Theory, Methods and Applications; Contents; Preface; Acknowledgments; List of abbreviations; List of symbols; List of figures; List of tables; 1 Introduction; 1.1 Motivating examples; 1.2 Stochastic representation and the d= operator; 1.2.1 Definition of stochastic representation; 1.2.2 More properties on the d = operator; 1.3 Beta and inverted beta distributions; 1.4 Some useful identities and integral formulae; 1.4.1 Partial-fraction expansion; 1.4.2 Cambanis-Keener-Simons integral formulae; 1.4.3 Hermite-Genocchi integral formula 1.5 The Newton-Raphson algorithm1.6 Likelihood in missing-data problems; 1.6.1 Missing-data mechanism; 1.6.2 The expectation-maximization (EM) algorithm; 1.6.3 The expectation/conditional maximization (ECM) algorithm; 1.6.4 The EM gradient algorithm; 1.7 Bayesian MDPs and inversion of Bayes' formula; 1.7.1 The data augmentation (DA) algorithm; 1.7.2 True nature of Bayesian MDP: inversion of Bayes' formula; 1.7.3 Explicit solution to the DA integral

equation; 1.7.4 Sampling issues in Bayesian MDPs; 1.8 Basic statistical distributions; 1.8.1 Discrete distributions
1.8.2 Continuous distributions2 Dirichlet distribution; 2.1 Definition and basic properties; 2.1.1 Density function and moments; 2.1.2 Stochastic representations and mode; 2.2 Marginal and conditional distributions; 2.3 Survival function and cumulative distribution function; 2.3.1 Survival function; 2.3.2 Cumulative distribution function; 2.4 Characteristic functions; 2.4.1 The characteristic function of u ~ U(Tn); 2.4.2 The characteristic function of v ~ U(Tn); 2.4.3 The characteristic function of a Dirichlet random vector; 2.5 Distribution for linear function of a Dirichlet random vector
2.5.1 Density for linear function of v ~ U(Vn)2.5.2 Density for linear function of u ~ U(Tn); 2.5.3 A unified approach to linear functions of variables and order statistics; 2.5.4 Cumulative distribution function for linear function of a Dirichlet random vector; 2.6 Characterizations; 2.6.1 Mosimann's characterization; 2.6.2 Darroch and Ratcliff's characterization; 2.6.3 Characterization through neutrality; 2.6.4 Characterization through complete neutrality; 2.6.5 Characterization through global and local parameter independence; 2.7 MLEs of the Dirichlet parameters
2.7.1 MLE via the Newton-Raphson algorithm2.7.2 MLE via the EM gradient algorithm; 2.7.3 Analyzing serum-protein data of Pekin ducklings; 2.8 Generalized method of moments estimation; 2.8.1 Method of moments estimation; 2.8.2 Generalized method of moments estimation; 2.9 Estimation based on linear models; 2.9.1 Preliminaries; 2.9.2 Estimation based on individual linear models; 2.9.3 Estimation based on the overall linear model; 2.10 Application in estimating ROC area; 2.10.1 The ROC curve; 2.10.2 The ROC area; 2.10.3 Computing the posterior density of the ROC area
2.10.4 Analyzing the mammogram data of breast cancer

Sommario/riassunto

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 in