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4.2.2 FDR Analysis with Gene Expression Arrays4.3 Bayesian False Discovery Rate Analysis; 4.3.1 Theoretical Developments; 4.4 Bayesian Estimation of FDR; 4.5 FDR and Decision Theory; 4.6 FDR and bFDR Summary; 5 Bayesian Classification for Microarray Data; 5.1 Introduction; 5.2 Classification and Discriminant Rules; 5.3 Bayesian Discriminant Analysis; 5.4 Bayesian Regression Based Approaches to Classification; 5.4.1 Bayesian Analysis of Generalized Linear Models; 5.4.2 Link Functions; 5.4.3 GLM using Latent Processes; 5.4.4 Priors and Computation
5.4.5 Bayesian Probit Regression using Auxiliary Variables5.5 Bayesian Nonlinear Classification; 5.5.1 Classification using Interactions; 5.5.2 Classification using Kernel Methods; 5.6 Prediction and Model Choice; 5.7 Examples; 5.8 Discussion; 6 Bayesian Hypothesis Inference for Gene Classes; 6.1 Interpreting Microarray Results; 6.2 Gene Classes; 6.2.1 Enrichment Analysis; 6.3 Bayesian Enrichment Analysis; 6.4 Multivariate Gene Class Detection; 6.4.1 Extending the Bayesian ANOVA Model; 6.4.2 Bayesian Decomposition; 6.5 Summary; 7 Unsupervised Classification and Bayesian Clustering
7.1 Introduction to Bayesian Clustering for Gene Expression Data7.2 Hierarchical Clustering; 7.3 K-Means Clustering; 7.4 Model-Based Clustering; 7.5 Model-Based Agglomerative Hierarchical Clustering; 7.6 Bayesian Clustering; 7.7 Principal Components; 7.8 Mixture Modeling; 7.8.1 Label Switching; 7.9 Clustering Using Dirichlet Process Prior; 7.9.1 Infinite Mixture of Gaussian Distributions; 8 Bayesian Graphical Models; 8.1 Introduction; 8.2 Probabilistic Graphical Models; 8.3 Bayesian Networks; 8.4 Inference for Network Models; 8.4.1 Multinomial-Dirichlet Model; 8.4.2 Gaussian Model
8.4.3 Model Search

Sommario/riassunto

The field of high-throughput genetic experimentation is evolving rapidly, with the advent of new technologies and new venues for data mining. Bayesian methods play a role central to the future of data and knowledge integration in the field of Bioinformatics. This book is devoted exclusively to Bayesian methods of analysis for applications to high-throughput gene expression data, exploring the relevant methods that are changing Bioinformatics. Case studies, illustrating Bayesian analyses of public gene expression data, provide the backdrop for students to develop analytical skills, while the mo