
This book consists of a collection of articles concerning Bayesian nonparametric. The recent theoretical and practical aspects of Dirichlet process have been discussed. The book covers the theoretical aspects in the first four chapters, while the last four chapters document a wide range of applications from biostatistics to signal processing.

The theory of Bayesian nonparametric presents flexible models, whose complexity increases with increasing amount of data and dimensionality. The theorems of ‘stick-breaking’ representation, Chinese restaurant process, Indian buffet process, Bernshtein-von Mises have been covered repeatedly throughout the first four chapters.

On the practical aspects, the Bayesian nonparametric techniques (such as the hierarchical Dirichlet process) have been widely applied to the areas of information retrieval, speaker diarization, word segmentation, bioinformatics, and microarray.

The contribution of this book is to collect most recent research of Bayesian nonparametric techniques together, with main emphasis on the use of Dirichlet process. The popularity of Dirichlet process is because that the Dirichlet prior is nonparametric and conjugate, thus presents many opportunities to flexibly model complex data structure. The book incorporates the Bayesian philosophy into the nonparametric concept. It also introduces Bayesian computational tools (such as the Metropolis-Hasting and Gibbs algorithms) for dealing with possibly infinite number of parameters. A statistical software package in R called DRpackage has been introduced to implement Dirichlet process mixture density estimation, Pólya tree priors for density estimations, nonparametric random effects models including generalized linear models.

The authors have fulfilled their main aim which is to introduce Bayesian nonparametric. However, I feel this book could cover even further by combining the Bayesian computational techniques with frequentist nonparametric methods. In other words, could the Bayesian techniques well suited for solving frequentist nonparametric problems? If so, this would bring the Bayesian philosophy and frequentist philosophy one step closer.

Overall, I enjoyed reading and reviewing this book and I feel that this book gives nice theoretical and practical viewpoints on Bayesian nonparametric. The use of Bayesian nonparametric techniques is suitable for any statistician, who aims to analyze complex data structure with possibly infinite number of parameters. Although this book covers mainly on the Dirichlet process, it servers perfectly as a reference for scientists and graduate students working in the field of Bayesian data analysis.