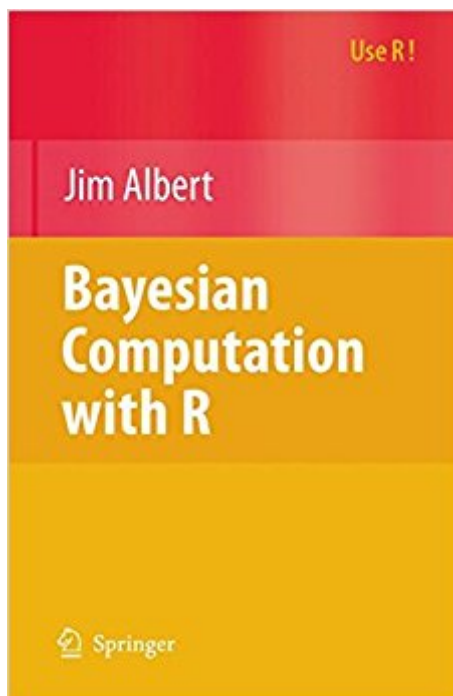


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# Bayesian Computation With R (Use R)



## Synopsis

There has been a dramatic growth in the development and application of Bayesian inferential methods. Some of this growth is due to the availability of powerful simulation-based algorithms to summarize posterior distributions. There has been also a growing interest in the use of the system R for statistical analyses. R's open source nature, free availability, and large number of contributor packages have made R the software of choice for many statisticians in education and industry. Bayesian Computation with R introduces Bayesian modeling by the use of computation using the R language. The early chapters present the basic tenets of Bayesian thinking by use of familiar one and two-parameter inferential problems. Bayesian computational methods such as Laplace's method, rejection sampling, and the SIR algorithm are illustrated in the context of a random effects model. The construction and implementation of Markov Chain Monte Carlo (MCMC) methods is introduced. These simulation-based algorithms are implemented for a variety of Bayesian applications such as normal and binary response regression, hierarchical modeling, order-restricted inference, and robust modeling. Algorithms written in R are used to develop Bayesian tests and assess Bayesian models by use of the posterior predictive distribution. The use of R to interface with WinBUGS, a popular MCMC computing language, is described with several illustrative examples. This book is a suitable companion book for an introductory course on Bayesian methods and is valuable to the statistical practitioner who wishes to learn more about the R language and Bayesian methodology. The LearnBayes package, written by the author and available from the CRAN website, contains all of the R functions described in the book. The second edition contains several new topics such as the use of mixtures of conjugate priors and the use of Zellner's  $g$  priors to choose between models in linear regression. There are more illustrations of the construction of informative prior distributions, such as the use of conditional means priors and multivariate normal priors in binary regressions. The new edition contains changes in the R code illustrations according to the latest edition of the LearnBayes package.

## Book Information

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## Customer Reviews

The book is a concise presentation of a wide range of Bayesian inferential problems and the computational methods to solve them. The detailed and thorough presentation style, with complete R code for the examples, makes it a welcome companion to a theoretical text on Bayesian inference.... Smart students of statistics will want to have both R and Bayesian inference in their portfolio. Jim Albert's book is a good place to try out R while learning various computational methods for Bayesian inference. (Jouni Kerman, *The American Statistician*, February 2009, Vol. 63, No.1)

There has been a dramatic growth in the development and application of Bayesian inferential methods. Some of this growth is due to the availability of powerful simulation-based algorithms to summarize posterior distributions. There has been also a growing interest in the use of the system R for statistical analyses. R's open source nature, free availability, and large number of contributor packages have made R the software of choice for many statisticians in education and industry. *Bayesian Computation with R* introduces Bayesian modeling by the use of computation using the R language. The early chapters present the basic tenets of Bayesian thinking by use of familiar one and two-parameter inferential problems. Bayesian computational methods such as Laplace's method, rejection sampling, and the SIR algorithm are illustrated in the context of a random effects model. The construction and implementation of Markov Chain Monte Carlo (MCMC) methods is introduced. These simulation-based algorithms are implemented for a variety of Bayesian applications such as normal and binary response regression, hierarchical modeling, order-restricted inference, and robust modeling. Algorithms written in R are used to develop Bayesian tests and assess Bayesian models by use of the posterior predictive distribution. The use of R to interface with WinBUGS, a popular MCMC computing language, is described with several illustrative examples. This book is a suitable companion book for an introductory course on Bayesian methods

and is valuable to the statistical practitioner who wishes to learn more about the R language and Bayesian methodology. The LearnBayes package, written by the author and available from the CRAN website, contains all of the R functions described in the book. The second edition contains several new topics such as the use of mixtures of conjugate priors and the use of Zellner's g priors to choose between models in linear regression. There are more illustrations of the construction of informative prior distributions, such as the use of conditional means priors and multivariate normal priors in binary regressions. The new edition contains changes in the R code illustrations according to the latest edition of the LearnBayes package. Jim Albert is Professor of Statistics at Bowling Green State University. He is Fellow of the American Statistical Association and is past editor of The American Statistician. His books include Ordinal Data Modeling (with Val Johnson), Workshop Statistics: Discovery with Data, A Bayesian Approach (with Allan Rossman), and Bayesian Computation using Minitab. --This text refers to an alternate Paperback edition.

The good: The first three chapters gives the reader a nice introduction to using R for Bayesian statistics and some well worked out examples: a necessity when dealing with a program that one is unfamiliar with. The text does a decent job of complementing the material found in another text on basic Bayesian methodology such as Gelman et al. (2004) or Carlin and Lewis (2008). Furthermore, Jim Albert is a great writer and presents the material well. The Facts: Towards the latter half of the text the author begins to use a program from the 'Learn Bayes' package entitled "Laplace". It is of my belief that this black box could be elaborated on some. I had some trouble getting many of the examples from the text as well as exercises from the sections to run simply because of this black box. None of nine graduate students working together and independently were able to get this function to perform its duties on a regular basis. However, the examples and problems were instructive. The Opinion: I was not a fan of the functions from the Learn Bayes package and did not feel as though the reader gained an adequate background on how to program R to perform Bayesian methods on his/her own. The book, I believe, relied to much (in the latter half of the text) on the functions of the Learn Bayes package. Overall the text is great resource to complement another text. The only real 'issue' I had with this text was not the text itself but rather the "Learn Bayes" package. If you are looking for a resource for R this might not be the right book. As a quick and dirty introduction to Bayesian methods using R (as the title suggests) this isn't a BAD text.

I was hoping for a good, solid, book explaining Bayesian methods in R. This book has 2-problems though: 1. Makes assumptions on what you already know. I guess the author assumes that you

already are familiar with Bayesian computations as they are described here. Well, I'm not totally, so I was totally unsure how he arrived at some of the conclusions that he arrived at or how he managed to set certain constants during some computations.<sup>2</sup> Like others, I had difficulty getting some of the examples to work.

I have only read a few chapters of this book so far, but it relies heavily and easy-to-grasp examples to illustrate the subject matter. It does not give much background, so this is definitely more of a supplemental book, though that is what I expected upon purchasing. I will update my rating after reading more.

Not as good as many of the others in the use R! series, this book definitely has a split personality and the first few chapters do not logically lead into the second half. Even though this is not meant as a stand alone text, I would still be hesitant to recommend it to anyone not already well versed in Bayesian Inference.

Great book - good concrete examples. It COULD, IMHO, have gone farther into using Bayesian methods with regression models and how the likelihood function for the posterior is generated. It also needs solutions to the chapter exercises in order to improve its utility as a tool for self-education.

It meets my expectations. Thank you Mr Jim Albert.

Full of examples and codes. Really helped also LearnBayes package SO helpful strong recommending to buy

Excellent Short Intro to Subject - starts simple, introducing R and then moves onto the more complicated cases, including WinBUGS

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