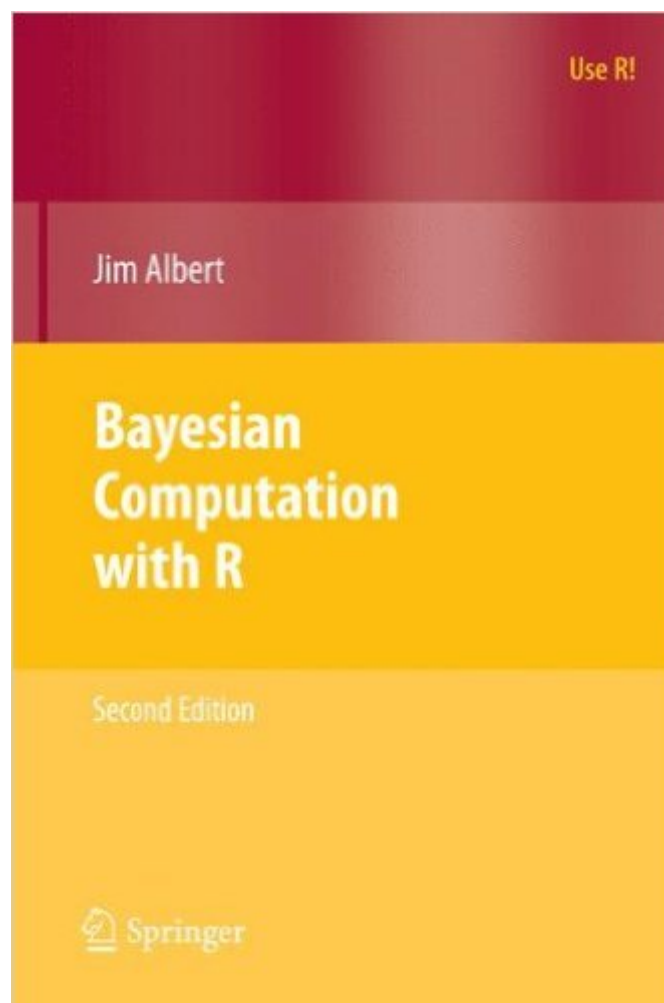


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# Bayesian Computation With R (Use R!)



## Synopsis

There has been dramatic growth in the development and application of Bayesian inference in statistics. Berger (2000) documents the increase in Bayesian activity by the number of published research articles, the number of books, and the extensive number of applications of Bayesian articles in applied disciplines such as science and engineering. One reason for the dramatic growth in Bayesian modeling is the availability of computational algorithms to compute the range of integrals that are necessary in a Bayesian posterior analysis. Due to the speed of modern computers, it is now possible to use the Bayesian paradigm to fit very complex models that cannot be fit by alternative frequentist methods. To fit Bayesian models, one needs a statistical computing environment. This environment should be such that one can: write short scripts to define a Bayesian model use or write functions to summarize a posterior distribution use functions to simulate from the posterior distribution construct graphs to illustrate the posterior inference An environment that meets these requirements is the R system. R provides a wide range of functions for data manipulation, calculation, and graphical displays. Moreover, it includes a well-developed, simple programming language that users can extend by adding new functions. Many such extensions of the language in the form of packages are easily downloadable from the Comprehensive R Archive Network (CRAN).

## Book Information

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## Customer Reviews

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.

Jim Albert is a great teacher and an excellent writer. The R language is becoming one of the most used languages by statistical researchers. This is because it has many similarities to S and can be used freely, Jim makes R easy to learn for statisticians in this book. One of the big breakthroughs in Bayesian statistics over the past 2 decades was the implementation of complicated priors and hierarchical models through the Markov Chain Monte Carlo (MCMC) algorithms. The leader in this field created free software called BUGS (for Bayesian Analysis Using Gibbs Sampling). Gibbs sampling is one of the most commonly used MCMC algorithms. Statisticians using this software have been able to provide more satisfactory solutions to many basic and complex problems using these tools. After Windows became the dominant operating system on personal computers WINBUGS was born. This is a version of BUGS that uses Windows as the operating system and takes advantage of Windows many nice features. Now for the first time to my knowledge Jim Albert show the reader how to incorporate the BUGS technology in the framework of R programming. This can only add to the practical use of Bayesian methods among statisticians for research that advances both the theory and applications. In the late 1990s I was working in the medical device industry where a number of clinical trials were being analyzed using the MCMC methods. Jim

deserves a great deal of credit for moving Bayesian statistics into the framework of R!

This is a great book that introduces practical Bayesian computing for scientists and quantitatively oriented people. Good sections on MCMC and other aspects without getting too mathematical (as opposed to being statistical - Does not mean that you won't find any symbols). Having said that, please be at the level of Casella/Berger on the (frequentist) mathematical statistics level and one of the following books should serve as a good companion for Bayes theory - Peter Lee (2004 - Great introduction), GCSR (Gelman et. al.) or Carlin and Louis. If you want to learn further details of the computational algorithms, MCMC by Casella and Robert is an excellent reference. The book starts out by introducing us to R and then the Bayesian way of thinking and analyzing data. Up until chapter 5, we learn how to summarize posteriors when functional forms exist and how the various author-created functions serve the purpose. (The author's LearnBayes package contains many excellent functions that can be used in a wide variety of situations). Chapters 6, 10 and 11 form the core of how you perform MCMC and the various algorithms behind it. BRugs is introduced as well. I would also recommend the author's website and his excellent blog for learning 'Bayes'. [...] Good resource if you are motivated enough, but you definitely need a companion book on Bayesian Statistics if you are not already well-versed in the theoretical aspects of these techniques. Great book for the Bayes-curious statistician... Of course, if you are reading this review you don't have to be told how great R is. Price has dropped 20% since it first came on the market. I'd say, a steal at 40 bucks.

For me, the idea behind the book - providing some code on the authors package "LearnBayes" appears to be very useful. You can rather easily follow the code and modify it, to help to understand what is going on. The drawback however is that the author is not a good programmer, which makes the code more difficult to understand than necessary. In some of his examples, he uses the same or very similar variable name for up to three times with different meaning, simply by overwriting the values. Similarly, the formulas in the book are sometimes written in a rather sloppy way, omitting conditional variables by a "simplified notation", while the more natural code would be more instructive to learners. I would also have wished some more intermediate steps for deriving formulas, but the focus of the author was clearly on the R implementation. 2 stars appear a fair summary for it: Yes the book is somewhat useful when read (and applied) in conjunction with other introductory books for Bayes, but it is unfortunately not as instructive as it could be.

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