



Handbook of Markov Chain Monte Carlo (Chapman & Hall/CRC Handbooks of Modern Statistical Methods)

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Since their popularization in the 1990s, Markov chain Monte Carlo (MCMC) methods have revolutionized statistical computing and have had an especially profound impact on the practice of Bayesian statistics. Furthermore, MCMC methods have enabled the development and use of intricate models in an astonishing array of disciplines as diverse as fisheries science and economics. The wide-ranging practical importance of MCMC has sparked an expansive and deep investigation into fundamental Markov chain theory.

The **Handbook of Markov Chain Monte Carlo** provides a reference for the broad audience of developers and users of MCMC methodology interested in keeping up with cutting-edge theory and applications. The first half of the book covers MCMC foundations, methodology, and algorithms. The second half considers the use of MCMC in a variety of practical applications including in educational research, astrophysics, brain imaging, ecology, and sociology.

The in-depth introductory section of the book allows graduate students and practicing scientists new to MCMC to become thoroughly acquainted with the basic theory, algorithms, and applications. The book supplies detailed examples and case studies of realistic scientific problems presenting the diversity of methods used by the wide-ranging MCMC community. Those familiar with MCMC methods will find this book a useful refresher of current theory and recent developments.

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Editorial Review

Review

"... the uninitiated would greatly benefit from carefully reading the first three chapters For a more experienced and hands-on reader who is looking for up-to-date developments and implementations of cutting-edge MCMC tools for highly complex problems, the **Handbook** brings twelve chapters with applications and case studies from areas ranging from genetics to high-energy astrophysics to item response theory to fisheries science. ...

To sum up, it is my opinion that the **Handbook** might play, for the next decade or so at least, more or less the same role played by *MCMC in Practice* in the mid 90s. More precisely, the **Handbook** is bounded to provide theoretical and practical guidance to Bayesian researchers and practitioners (and why not non-Bayesians alike) to design, implement (and debug), and package their own MCMC routines by taking advantage of the various inexpensive computational tools and the pressing need to analyze larger and more complex data frames."

?Hedibert Freitas Lopes, *Biometrics*, September 2013

"I found this to be a remarkable book on the current state of MCMC methods in statistics. Any newcomer to the field will appreciate the thoughtful collection of articles, all written by well-known people in the field (including some pioneers of MCMC), but also experts will find new aspects and the book as a valuable reference book."

?Wolfgang Polasek, *International Statistical Review*, 2012

"This handbook is edited by Steve Brooks, Andrew Gelman, Galin Jones, and Xiao-Li Meng, all first-class jedis of the MCMC galaxy. ... the outcome truly is excellent! ...the quality of the contents is clearly there and the book appears as a worthy successor to the tremendous *Markov Chain Monte Carlo in Practice* by Wally Gilks, Sylvia Richardson and David Spiegelhalter. ... there are a few R codes here and there. ... I think the book can well be used at a teaching level as well as a reference on the state-of-the-art MCMC technology."

?Christian Robert (Université Paris Dauphine) on his blog, September 2011

"... a valuable resource for those new to MCMC as well as to experienced practitioners. ... it is a collection of valuable information regarding a powerful computational approach to evaluating complex statistical models."

?John D. Cook, *MAA Reviews*, June 2011

"The **Handbook of Markov Chain Monte Carlo** becomes the third volume in the attractive and useful *Chapman & Hall/CRC Handbooks of Modern Statistical Methods Series*. The author list is world-class, developing 24 chapters, half on the theory side, half on applications. The handbook provides a state-of-the-art view of a technology that has revolutionized contemporary model fitting. Researchers at all levels of familiarity with MCMC will find novel morsels of material to chew on."

?Alan E. Gelfand, James B. Duke Professor of Statistical Science, Duke University, Durham, North Carolina, USA

"Another home run for the *Chapman & Hall/CRC Handbooks of Modern Statistical Methods Series*! This is a wonderful assemblage of the state of the art in MCMC methods from a world-class collection of

probabilists, statisticians, and biostatisticians known for their accomplishments in this area. The first half of the book reviews and extends the key methodological ideas (often beyond the usual Bayesian settings), while the second half offers a dozen beautiful case studies over a very broad range of modern applied statistical endeavor. In my opinion, this is the most significant book of its kind since the 1995 Chapman & Hall/CRC book, *MCMC in Practice*, edited by Gilks, Richardson and Spiegelhalter. It is a must-read for anyone wanting a comprehensive, modern, and in-depth look at MCMC."

?Bradley P. Carlin, Professor and Head of Division of Biostatistics, University of Minnesota, Minneapolis, USA

About the Author

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University of Minnesota, Minneapolis, Minnesota, USA Harvard University, Cambridge, Massachusetts, USA

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proficiency in writing, they also doing some analysis before they write for their book. One of them is this Handbook of Markov Chain Monte Carlo (Chapman & Hall/CRC Handbooks of Modern Statistical Methods).

Robert Beaubien:

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