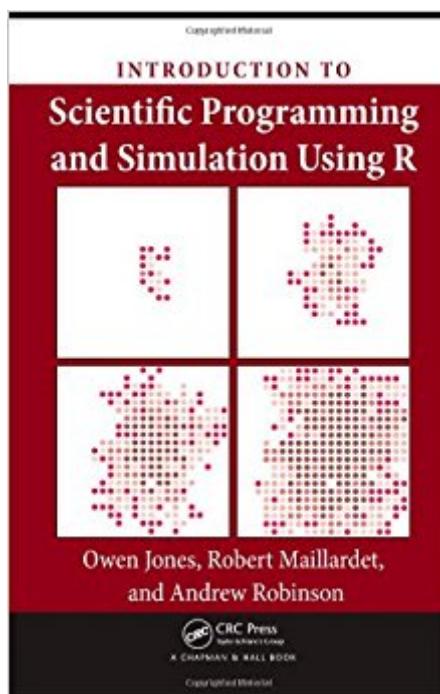


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Introduction To Scientific Programming And Simulation Using R (Chapman & Hall/CRC The R Series)



Synopsis

Known for its versatility, the free programming language R is widely used for statistical computing and graphics, but is also a fully functional programming language well suited to scientific programming. An Introduction to Scientific Programming and Simulation Using R teaches the skills needed to perform scientific programming while also introducing stochastic modelling. Stochastic modelling in particular, and mathematical modelling in general, are intimately linked to scientific programming because the numerical techniques of scientific programming enable the practical application of mathematical models to real-world problems. Following a natural progression that assumes no prior knowledge of programming or probability, the book is organised into four main sections: Programming In R starts with how to obtain and install R (for Windows, MacOS, and Unix platforms), then tackles basic calculations and program flow, before progressing to function based programming, data structures, graphics, and object-oriented code A Primer on Numerical Mathematics introduces concepts of numerical accuracy and program efficiency in the context of root-finding, integration, and optimization A Self-contained Introduction to Probability Theory takes readers as far as the Weak Law of Large Numbers and the Central Limit Theorem, equipping them for point and interval estimation Simulation teaches how to generate univariate random variables, do Monte-Carlo integration, and variance reduction techniques In the last section, stochastic modelling is introduced using extensive case studies on epidemics, inventory management, and plant dispersal. A tried and tested pedagogic approach is employed throughout, with numerous examples, exercises, and a suite of practice projects. Unlike most guides to R, this volume is not about the application of statistical techniques, but rather shows how to turn algorithms into code. It is for those who want to make tools, not just use them.

Book Information

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Customer Reviews

This book is a good resource for someone who wants to learn R and use R for statistical computing and graphics. It will also serve well as a textbook or a reference book for students in a course related to computational statistics. *Hon Keung Tony Ng, Technometrics, May 2011*

A very coherent and useful account of its chosen subject matter. The programming section is more comprehensive than Braun & Murdoch (2007), but more accessible than Venables & Ripley (2000). The book deserves a place on university library shelves. One very useful feature of the book is that nearly every chapter has a set of exercises. There are also plenty of well-chosen examples throughout the book that are used to explain the material. I also appreciated the clear and attractive programming style of the R code presented in the book. I found very little in the way of typos or solecisms. I can strongly recommend the book for its intended audience. If I ever again have to teach our stochastic modelling course, I will undoubtedly use some of the exercises and examples from *Scientific Programming and Simulation Using R*. *David Scott, Australian & New Zealand Journal of Statistics, 2011* It is not often that I think that a statistics text is one that most scientific statisticians should have in their personal libraries. *Introduction to Scientific Programming and Simulation Using R* is such a text. This text provides scientific researchers with a working knowledge of R for both reviewing and for engaging in the statistical evaluation of scientific data. It is particularly useful for understanding and developing modeling and simulation software. I highly recommend the text, finding it to be one of the most useful books I have read on the subject. *Journal of Statistical Software, September 2010, Volume 36* The authors have written an excellent introduction to scientific programming with R. Their clear prose, logical structure, well-documented code and realistic examples made the book a pleasure to read. One particularly useful feature is the chapter of cases studies at the end, which not only demonstrates complete analyses but also acts as a pedagogical tool to review and integrate material introduced throughout the book. I would strongly recommend this book for readers interested in using R for simulations, particularly for those new to scientific programming or R. It is also very student-friendly and would be suitable either as a course textbook or for

self-study. *Significance*, September 2009 I think that the techniques of scientific programming presented will soon enable the novice to apply statistical models to real-world problems. The writing style is easy to read and the book is suitable for private study. If you have never read a book on scientific programming and simulation, then I recommend that you start with this one. *International Statistical Review*, 2009

University of Melbourne, Parkville, Australia

This is a well written book which is designed for a mathematically sophisticated audience that wants to get a deeper understanding of statistics using simulations. University level calculus is a must and more advanced math, especially matrix algebra, is highly recommended. If you have the math background this is a very good book. Everything you want in a textbook is here, the writing is clear, the examples are useful and the advice for additional reading is spot on. On the other hand, the problems are at times unnecessarily difficult. The coverage of the R programming language is good but novices will struggle to go from the well written explanations of the syntax to the fairly hardcore end of chapter exercises. The book covers a huge amount of material: basic to advanced programming and data structures, computer science issues (like numeric accuracy), hardcore math topics like root finding algorithms and integration, fundamentals of statistics like basic probably and common distributions are all here. Basically, this book covers a huge swath of material needed for statistics and statistical programming. If you have some exposure to the topics and if you have a strong background in math this book should be superb for you. If you are starting from scratch and/or if you do not have a strong math background this book will probably blow you away.

This book is NOT just about learning R programming. Many other comments seem to focus on using this book for learning R programming. But if you had programming experiences in any other programming language and you want to learn the concepts of numeric methods and simulation, this is a perfect book. There is only one minor flaw: there is no instructor's guide available. However, if you contact the author, a brief set of R programs for some selected problems will be available. With these solutions, this book becomes excellent for learning/teaching Scientific Programming and Simulation. Students enjoyed the simulation of forest fire greatly. The book starts with introduction to R programming just enough for learning numeric methods later. Once the basics are covered, the subject of numeric methods is the major focus. Finally, the book culminates when the subject of simulation is covered. Students left with a desire wanting to learn more. If you are looking for a book

for covering R only, this is not the one. If you don't enjoy doing scientific programming, this book is not for you. But, if you are look for a book for teaching scientific programming and simulation in a computer science department, this is the book.

I have reviewed some very good books on R programming, but this one really stands above the others. If I could only keep one reference book for R, this would be the one. Even though the authors clearly intended this as a university textbook, the examples are interesting and accessible to anyone who wants to learn R (I use the book for self-study). Part I introduces the basic features of the R language, data analysis, and graphics. Throughout the text, the authors use clear and interesting examples. Part II presents some interesting applications of R, but there are probably other packages better suited to these types of numerical techniques. Part III, a concise overview of Probability, is primarily a reference--Don't expect to learn probability and statistics from this book. That said, I keep coming back to this book. It is a great resource. Although textbooks can have pretty scary price tags, if you can find it used or at a discount, then it is worth adding to your collection.

I share the generally held view that R has a steep learning curve but the effort spent learning it is well rewarded. I study both statistics and econometrics and I find that R straddles both more easily than most statistical packages, because of its flexibility and the fact that someone, somewhere has thought about your problem and written a solution for it. However, once the fundamentals of R are grasped it is not long before one is left craving to know how to tap into the core strength of R, which is its programming capability. This is where "SP&SUR" comes into its own. It is easy to follow and builds up well. The examples are clear and easy to follow. This book is undoubtedly the key that unlocks R. Highly recommended.

If you are a graduate student in statistics, biostatistics, or the like, and are struggling with R programming, then this book should do the trick. So many books are out there regarding how to do DATA ANALYSIS with R. This book is not another one of those. This book is what is needed to learn to program R for statistical computing NOT data analysis, and there is a big difference. This book will prepare you for classes in statistical computing and after doing some of the exercises, you will be ready for books like Maria Rizzo's Statistical Computing with R and Givens and Hoeting's Computational Statistics. You will learn how to write loops (I know everybody is trying to avoid this) and functions and how to do simulations, numerical optimization, root finding, and there is even some goodies about graphics. The book obviously doesn't cover everything, no book could, but if

you combine this book with one of the others mentioned above, then you should be well equipped for statistical research using R.

This is my first time writing a review for a book. I bought about 10 books on R at the same time...this was the book that really helped me out in learning the R programming language. What I loved the most about this book is that there are programming exercises at the end of each chapter so you can practice what you just learned which is how I really learn. Also the book is very clear....the first 7 chapters are on R programming basics only. Reading those 7 chapters is the fastest way to get you going with R programming--

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