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Bayesian Analysis for Population Ecology

Ruth King, Byron J. T. Morgan, Olivier Gimenez, Stephen P. Brooks
Chapman & Hall/CRC, Boca Raton, Florida, 2010.

ISBN 978-1-4398-1187-0. 442 pp. USD 79.95.

<http://www.ncse.org.uk/books/bayesian/>

The text is essentially a book on Bayesian methodology with examples taken from population ecology. In this respect it serves as a solid introduction to Bayesian modeling. The book also incorporates instruction on the use of both R and **WinBUGS** for constructing and executing Bayesian models. Three appendices come with the text: A, a description of the major probability distributions employed in Bayesian models; B, a tutorial on R, specifically on developing Markov chain Monte Carlo (MCMC) and reversible jump MCMC (RJMCMC) functions. A step-by-step approach to modeling provides the reader with excellent schemata of how to model their own data. Finally, Appendix C is a tutorial on programming with **WinBUGS**, with an emphasis of calling **WinBUGS** from within R. Both tutorials are very well done.

The main text is divided into three main parts. The first addresses classical frequentist methods. The second provides a thorough overview of Bayesian methodology, and the third relates to the use of more complex Bayesian models using population ecological data.

Chapter 7, the final chapter of part 2, is a central chapter in the book. After reading the Appendices for a basic education in Bayesian modeling and MCMC procedures in particular, Chapter 7 gives more depth to the analyses. The reader is asked to download the example data and relevant libraries, and to use the code provided in R, **WinBUGS** and **Mark**, a program designed for analyzing capture-recapture data within the classical framework. A clear discussion of how to define priors, the likelihood function, the data and initial values, and both trace and autocorrelation plots of the parameters. Complete code is also given for modeling uncertainty.

Models discussed in the third section, titled “Ecological Applications”, include handling missing values, modeling random effects, multiple-state models, and state-space models. A final chapter is provided that speaks to strictly a population ecological problem: handling closed populations.

The authors have produced a text that is not only of good use to those who are analyzing population ecological data, but to anyone desiring a good overview of Bayesian modeling in general. The examples are interesting and do not hinder those not in the discipline of

population ecology from understanding the explanation of the statistical principles being discussed.

I recommend the book for a graduate level course on Bayesian modeling, as well as any course related to the Bayesian modeling of population ecological data. The reader is not expected to have a prior knowledge of Bayesian modeling, nor is there an assumption that readers are familiar with R or **WinBUGS**. Only a well-rounded knowledge of classical linear statistical modeling is required.

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Hilbe is an Emeritus Professor of Philosophy at the University of Hawaii, an adjunct professor of statistics at Arizona State University (since 1992), and a Solar System Ambassador with NASA/Jet Propulsion Laboratory [http://www2.jpl.nasa.gov/ambassador/profiles/Joseph_Hilbe.htm The Solar System Ambassadors Program] . He is author of "Negative Binomial Regression" (Cambridge University Press, 2007), [[<http://www.cambridge.org/catalogue/catalogue.asp?isbn=9780521857727> Negative Binomial Regression - Cambridge University Negative Binomial Regression Second Edition JOSEPH M. HILBE Jet Propulsion Laboratory, California Institute of Technology and Arizona State University. Cambridge university press.] Denis Shah, Department of Plant Pathology at Kansas State University, in particular, asked many insightful questions whose answers found their way into the text. I also wish to again express my appreciation to Diana Gillooly, statistics editor at Cambridge University Press, for her advice and for her continued confidence in the value of my work. Joseph Michael Hilbe, President, International Astrostatistics Association (2012-2015), Elected Fellow, American Statistical Association, elected Member, International Statistical Institute, Full member, American Astronomical Society. Author, 18 books in statistical modeling. Born in Los Angeles (Dec 30, 1944), grew up in Arcadia, CA (near Los Angeles); Eagle Scout (with gold and silver palms); High school from 1958-61 at Woodside Priory HS in Portola Valley, CA, graduated Paradise HS in 1962. Graduated from Calif State Univ, Chico; PhD programs at UCLA and Univ of Hawaii. Won national AAU Pentathlon Championships two times and world list sprinter during 1960s. Professor of Philosophy and head track coach at the Univ of Hawaii. Joseph M. Hilbe. Department of Statistics, T. Denny Sanford School of Social and Family Dynamics, Arizona State University, Tempe, AZ 85287-3701. Find this author on Google Scholar. Find this author on PubMed. Search for this author on this site. Edited* by Susan T. Fiske, Princeton University, Princeton, NJ, and approved May 14, 2014 (received for review February 13, 2014). Article. Figures & SI. Female hurricanes are deadlier. Kiju Jung, Sharon Shavitt, Madhu Viswanathan, Joseph M. Hilbe. Proceedings of the National Academy of Sciences Jun 2014, 111 (24) 8782-8787; DOI: 10.1073/pnas.1402786111. Citation Manager Formats.