Multiscale Modeling A Bayesian Perspective

Reliability and RiskMultiscale ModelingGeneralized Linear ModelsStatisticsA Bayesian Perspective on ConfidenceReliability, Risk and SurvivalThe Subjectivity of Scientists and the Bayesian ApproachVariable Trends: a Bayesian PerspectiveSmall Area EstimationVariable TrendsTree ModelsA Bayesian Approach to Regression DiagnosticsModel Discrimination in Meta-analysisHypothesis Testing from a Bayesian PerspectiveAssessing the Proportion of Conformance of a Process from a Bayesian PerspectiveVariable Trends: a Bayesian PerspectiveIntroduction to Bayesian StatisticsFunction Registration from a Bayesian PerspectiveNoisy Active Learning from a Bayesian PerspectiveOn the Dangers of Modelling Through Continuous Distributions Nozer D. Singpurwalla Marco A.R. Ferreira Dipak K. Dey Donald A. Berry Stanford University. Computer Science Dept. Knowledge Systems Laboratory Nozer D. Singpurwalla S. James Press Hendrik Hoek David Alan Marker Henk Hoek Iain Brian Pardoe Keith Abrams Baruch Fischhoff Michael Perakis Hendrik Hoek William M. Bolstad Yi Lu Benjamin Rupprechter Carmen Fernández

we all like to know how reliable and how risky certain situations are and our increasing reliance on technology has led to the need for more precise assessments than ever before such precision has resulted

in efforts both to sharpen the notions of risk and reliability and to quantify them quantification is required for normative decision making especially decisions pertaining to our safety and wellbeing increasingly in recent years bayesian methods have become key to such quantifications reliability and risk provides a comprehensive overview of the mathematical and statistical aspects of risk and reliability analysis from a bayesian perspective this book sets out to change the way in which we think about reliability and survival analysis by casting them in the broader context of decision making this is achieved by providing a broad coverage of the diverse aspects of reliability including multivariate failure models dynamic reliability event history analysis non parametric bayes competing risks co operative and competing systems and signature analysis covering the essentials of bayesian statistics and exchangeability enabling readers who are unfamiliar with bayesian inference to benefit from the book introducing the notion of composite reliability or the collective reliability of a population of items discussing the relationship between notions of reliability and survival analysis and econometrics and financial risk reliability and risk can most profitably be used by practitioners and research workers in reliability and survivability as a source of information reference and open problems it can also form the basis of a graduate level course in reliability and risk analysis for students in statistics biostatistics engineering industrial nuclear systems operations research and other mathematically oriented scientists wherein the instructor could supplement the material with examples and problems

this highly useful book contains methodology for the analysis of data that arise from multiscale processes it brings together a number of recent developments and makes them accessible to a wider audience taking a bayesian approach allows for full accounting of uncertainty and also addresses the delicate issue of uncertainty at multiple scales these methods can handle different amounts of prior knowledge at different scales as often occurs in practice

this volume describes how to conceptualize perform and critique traditional generalized linear models glms from a bayesian perspective and how to use modern computational methods to summarize inferences using simulation introducing dynamic modeling for glms and containing over 1000 references and equations generalized linear models considers

contains complete solutions to selected exercises

risk assessment and risk analysis are now firmly fixed in the biostatistician s and engineer s lexicon

reliability is the other key element in the mix for smooth running projects and operations in the modern industrial era economic factors have resulted in the construction and operation of larger and more complex process plant engineers are working to maximize the benefits of modern processing technology while reducing the safety risks to acceptable levels however each processing plant has unique problems and each must be individually assessed to identify evaluate and control associated hazards statistical methods play a key role in the quantification of reliability and since the advent of mcmc bayesian methods have become increasingly important this book addresses the need for a sound introduction to the mathematical and statistical aspects of reliability analysis from a bayesian perspective it features many real examples taken from the author s vast experience and lots of applications from reliability engineering the author is well respected in both the statistical bayesian and reliability communities

intriguing examination of works by aristotle galileo newton pasteur einstein margaret mead and other scientists in terms of subjectivity and the bayesian approach to statistical analysis an insightful work choice 2001 edition

bayesian inference provides a general framework for testing hypotheses it is a normative method in the sense of prescribing how hypotheses should be tested however it may also be used descriptively by characterizing people s actual hypothesis testing behavior in terms of its consistency with or departures from the model such a characterization may facilitate the development of psychological accounts of how that behavior is produced i e as the result of failed attempts to act in a bayesian fashion as the result of attempts of process information in non bayesian ways this essay exploits the descriptive potential of bayesian inference first it identifies a set of logically possible forms of non bayesian behavior second it reviews existing research in a variety of areas in order to see whether these possibilities are ever realized the analysis shows that in some situations several apparently distinct phenomena are usefully viewed as special cases of the same kind of behavior whereas in other situations previous investigations have conferred a common label e g confirmation bias to several distinct phenomena it also calls into question a number of attributions of judgmental bias suggesting that in some cases the bias is different than what has previously been claimed whereas in others there may be no bias at all author

a bayesian technique for assessing the posterior probability that the proportion of conformance of a normally distributed process exceeds a particular value is suggested both exact and approximate formulae for the assessment of this probability are derived

praise for the first edition i cannot think of a better book for teachers of introductory statistics who want a readable and pedagogically sound text to introduce bayesian statistics statistics in medical research this book is written in a lucid conversational style which is so rare in mathematical writings it does an excellent job of presenting bayesian statistics as a perfectly reasonable approach to elementary problems in statistics stats the magazine for students of statistics american statistical association bolstad offers clear explanations of every concept and method making the book accessible and valuable to undergraduate and graduate students alike journal of applied statistics the use of bayesian methods in applied statistical analysis has become increasingly popular yet most introductory statistics texts continue to only present the subject using frequentist methods introduction to bayesian statistics second edition focuses on bayesian methods that can be used for inference and it also addresses how these methods compare favorably with frequentist alternatives teaching statistics from the bayesian perspective allows for direct probability statements about parameters and this approach is now more relevant than ever due to computer programs that allow practitioners to work on problems that contain many parameters this book uniquely covers the topics typically found in an introductory statistics book but from a bayesian perspective giving readers an advantage as they enter fields where statistics is used this second edition provides extended coverage of poisson and gamma distributions two new chapters on bayesian inference for poisson observations and bayesian inference for the standard deviation for normal observations a twenty five percent increase in exercises with selected answers at the end of the book a calculus refresher appendix and a summary on the use of statistical tables new computer exercises that use r functions and minitab macros for bayesian analysis and monte carlo simulations introduction to bayesian statistics second edition is an invaluable textbook for advanced undergraduate and graduate level statistics courses as well as a practical reference for statisticians who require a working knowledge of bayesian statistics

another key component in our approach is a novel markov chain monte carlo mcmc algorithm for obtaining approximate draws from the posterior distribution of the functional parameters the designing principle of the algorithm is to avoid discretization of functional objects for as long as possible thus minimizing the potential pitfalls associated with high dimensional bayesian inference at the implementation stage some dimension reduction of a functional parameter is always needed for instance we cannot store a continuous function on the computer two classes of bayesian models are developed based on how the dimension reduction is achieved for the first class we pre specify a fixed dimension reduction rule for the second class the dimension reduction rule is incorporated in the model as a random

parameter we illustrate our approach via pairwise and multiple functional data registration using both simulated and real datasets

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