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This is the proceedings of the "8th IMACS Seminar on Monte Carlo Methods" held from August 29 to September 2, 2011 in Borovets, Bulgaria, and organized by the Institute of Information and Communication Technologies of the Bulgarian Academy of Sciences in cooperation with the International Association for Mathematics and Computers in Simulation (IMACS). Included are 24 papers which cover all topics presented in the sessions of the seminar: stochastic computation and complexity of high dimensional problems, sensitivity analysis,

high-performance computations for Monte Carlo applications, stochastic metaheuristics for optimization problems, sequential Monte Carlo methods for large-scale problems, semiconductor devices and nanostructures. Offering a unique balance between applications and calculations, Monte Carlo Methods and Models in Finance and Insurance incorporates the application background of finance and insurance with the theory and applications of Monte Carlo methods. It presents recent methods and algorithms, including the multilevel Monte Carlo method, the statistical Romberg method, and the Heath–Platen estimator, as well as recent financial and actuarial models, such as the Cheyette and dynamic mortality models. The authors separately discuss Monte Carlo techniques, stochastic process basics, and the theoretical background and intuition behind financial and actuarial mathematics, before bringing the topics together to apply the Monte Carlo methods to areas of finance and insurance. This allows for the easy identification of standard Monte Carlo tools and for a detailed focus on the main principles of financial and insurance mathematics. The book describes high-level Monte Carlo methods for standard simulation and the simulation of stochastic processes with continuous and discontinuous paths. It also covers a wide selection of popular models in finance and insurance, from Black–Scholes to stochastic volatility to interest rate to dynamic mortality. Through its many numerical and graphical illustrations and simple, insightful examples, this book provides a deep understanding of the scope of Monte Carlo methods and their use in various financial situations. The intuitive presentation encourages readers to implement and further develop the simulation methods. 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 fisherie This book covers the main tools used in statistical simulation from a programmer’s point of view, explaining the R implementation of each simulation technique and providing the output for better understanding and comparison. This book enables petroleum reservoir engineers to predict the flow of fluids within a hydrocarbon deposit. Laboratory techniques are described for both steady-state and unsteady state measurements, and the calculation of relative permeability from field data is illustrated. A discussion of techniques for determing wettability is included, along with theoretical and empirical methods for the calculation of relative permeability, and prediction techniques. Contents include: Measurement of Rock Relative Permeability; Two-Phase Relative Permeability; Factors Affecting Two-Phase Relative Permeability; Three-Phase Relative Permeability; and Index. In a family study of breast cancer, epidemiologists in Southern California increase the power for detecting a gene-environment interaction. In Gambia, a study helps a vaccination program reduce the incidence of Hepatitis B carriage. Archaeologists in Austria place a Bronze Age site in its true temporal location on the calendar scale. And in France, researchers map a rare disease with relatively little variation. Each of these studies applied Markov chain Monte Carlo methods to produce more accurate and inclusive results. General state-space Markov chain theory has seen several developments that have made it both more accessible and more powerful to the general statistician. Markov Chain Monte Carlo in Practice introduces MCMC methods and their applications, providing some theoretical background as well. The authors are researchers who have made key contributions in the recent development of MCMC methodology and its application. Considering the broad audience, the editors emphasize practice rather than theory, keeping the technical content to a minimum. The examples range from the simplest application, Gibbs sampling, to more complex applications. The first chapter contains enough information to allow the reader to start applying MCMC in a basic way. The following chapters cover main issues, important concepts and results, techniques for implementing MCMC, improving its performance, assessing model adequacy, choosing between models, and applications and their domains. Markov Chain Monte Carlo in Practice is a thorough, clear introduction to the methodology and applications of this simple idea with enormous potential. It shows the importance of MCMC in real applications, such as archaeology, astronomy, biostatistics, genetics, epidemiology, and image analysis, and provides an excellent base for MCMC to be applied to other fields as well. This collection of methodological developments and applications of simulation-based methods were presented at a workshop at Louisiana State University in November, 2009. Topics include: extensions of the GHK simulator; maximum-simulated likelihood; composite marginal likelihood; and modelling and forecasting volatility in a bayesian approach. This book represents the refereed proceedings of the Eighth International Conference on Monte Carlo (MC)and Quasi-Monte Carlo (QMC) Methods in Scientific Computing, held in Montreal (Canada) in July 2008. It covers the latest theoretical developments as well as important applications of these methods in different areas. It contains two tutorials, eight invited articles, and 32 carefully selected articles based on the 135 contributed presentations made at the conference. This conference is a major event in Monte Carlo methods and is the premiere event for quasi-Monte Carlo and its combination with Monte Carlo. This series of proceedings volumes is the primary outlet for quasi-Monte Carlo research. The 7th International Workshop on Fuzzy Logic and Applications, held in Camogli, Italy in July 2007, presented the latest findings in the field. This volume features the refereed proceedings from that meeting. It includes 84 full papers as well as three keynote speeches. The papers are organized into topical sections covering fuzzy set theory, fuzzy information access and retrieval, fuzzy machine learning, and fuzzy architectures and systems. Mathematical statistics typically represents one of the most difficult challenges in statistics, particularly for those with more applied, rather than mathematical, interests and backgrounds. Most textbooks on the subject provide little or no review of the advanced calculus topics upon which much of mathematical statistics relies and furthermore contain material that is wholly theoretical, thus presenting even greater challenges to those interested in applying advanced statistics to a specific area. Mathematical Statistics with Applications presents the background concepts and builds the technical sophistication needed to move on to more advanced studies in multivariate analysis, decision theory, stochastic processes, or computational statistics. Applications embedded within theoretical discussions clearly demonstrate the utility of the theory in a useful and relevant field of application and allow readers to avoid sudden exposure to purely theoretical materials. With its clear explanations and more than usual emphasis on applications and computation, this text reaches out to the many students and professionals more interested in the practical use of statistics to enrich their work in areas such as communications, computer science, economics, astronomy, and public health. Exploring Monte Carlo Methods is a basic text that describes the numerical methods that have come to be known as "Monte Carlo." The book treats the subject generically through the first eight chapters and, thus, should be of use to anyone who wants to learn to use Monte Carlo. The next two chapters focus on applications in nuclear engineering, which are illustrative of uses in other fields. Five appendices are included, which provide useful information on probability distributions, general-purpose Monte Carlo codes for radiation transport, and other matters. The famous "Buffon’s needle problem" provides a unifying theme as it is repeatedly used to illustrate many features of Monte Carlo methods. This book provides the basic detail necessary to learn how to apply Monte Carlo methods and thus should be useful as a text book for undergraduate or graduate courses in numerical methods. It is written so that interested readers with only an understanding of calculus and differential equations can learn Monte Carlo on their own. Coverage of topics such as variance reduction, pseudo-random number generation, Markov chain Monte Carlo, inverse Monte Carlo, and linear operator equations will make the book useful even to experienced Monte Carlo practitioners. Provides a concise treatment of generic Monte Carlo methods Proofs for each chapter Appendixes include Certain mathematical functions; Bose Einstein functions, Fermi Dirac functions, Watson functions This book provides a broad, mature, and systematic introduction to current financial econometric models and their applications to modeling and prediction of financial time series data. It utilizes real-world examples and real financial data throughout the book to apply the models and methods described. The author begins with basic characteristics of financial time series data before covering three main topics:

Analysis and application of univariate financial time series The return series of multiple assets Bayesian inference in finance methods Key features of the new edition include additional coverage of modern day topics such as arbitrage, pair trading, realized volatility, and credit risk modeling; a smooth transition from S-Plus to R; and expanded empirical financial data sets. The overall objective of the book is to provide some knowledge of financial time series, introduce some statistical tools useful for analyzing these series and gain experience in financial applications of various econometric methods. This book constitutes the refereed post-conference proceedings of the 10th International Conference on Big Data Technologies and Applications, BDTA 2020, and the 13th International Conference on Wireless Internet, WiCON 2020, held in December 2020. Due to COVID-19 pandemic the conference was held virtually. The 9 full papers of BDTA 2020 were selected from 22 submissions and present all big data technologies, such as storage, search and management. WiCON 2020 received 18 paper submissions and after the reviewing process 5 papers were accepted. The main topics include wireless and communicating networks, wireless communication security, green wireless network architectures and IoT based applications. This volume guides the reader along a statistical journey that begins with the basic structure of Bayesian theory, and then provides details on most of the past and present advances in this field. Markov Chain Monte Carlo (MCMC) originated in statistical physics, but has spilled over into various application areas, leading to a corresponding variety of techniques and methods. That variety stimulates new ideas and developments from many different places, and there is much to be gained from cross-fertilization. This book presents five expository essays by leaders in the field, drawing from perspectives in physics, statistics and genetics, and showing how different aspects of MCMC come to the fore in different contexts. The essays derive from tutorial lectures at an interdisciplinary program at the Institute for Mathematical Sciences, Singapore, which exploited the exciting ways in which MCMC spreads across different disciplines. The book introduces to the reader a number of cutting edge statistical methods which can e used for the analysis of genomic, proteomic and metabolomic data sets. In particular in the field of systems biology, researchers are trying to analyze as many data as possible in a given biological system (such as a cell or an organ). The appropriate statistical evaluation of these large scale data is critical for the correct interpretation and different experimental approaches require different approaches for the statistical analysis of these data. This book is written by biostatisticians and mathematicians but aimed as a valuable guide for the experimental researcher as well computational biologists who often lack an appropriate background in statistical analysis. This text employs a stochastic approach to studying Markov object processes, showing that they form a flexible class of models for a range of problems involving the interpretation of spatial data. Applications can be found in many fields of study. Simulation and Monte Carlo is aimed at students studying for degrees in Mathematics, Statistics, Financial Mathematics, Operational Research, Computer Science, and allied subjects, who wish an up-to-date account of the theory and practice of Simulation. Its distinguishing features are in-depth accounts of the theory of Simulation, including the important topic of variance reduction techniques, together with illustrative applications in Financial Mathematics, Markov chain Monte Carlo, and Discrete Event Simulation. Each chapter contains a good selection of exercises and solutions with an accompanying appendix comprising a Maple worksheet containing simulation procedures. The worksheets can also be downloaded from the web site supporting the book. This encourages readers to adopt a hands-on approach in the effective design of simulation experiments. Arising from a course taught at Edinburgh University over several years, the book will also appeal to practitioners working in the finance industry, statistics and operations research. Demonstrates how to solve reliability problems using practical applications of Bayesian models This self-contained reference provides fundamental knowledge of Bayesian reliability and utilizes numerous examples to show how Bayesian models can solve real life reliability problems. It teaches engineers and scientists exactly what Bayesian analysis is, what its benefits are, and how they can apply the methods to solve their own problems. To help readers get started quickly, the book presents many Bayesian models that use JAGS and which require fewer than 10 lines of command. It also offers a number of short R scripts consisting of simple functions to help them become familiar with R coding. Practical Applications of Bayesian Reliability starts by introducing basic concepts of reliability engineering, including random variables, discrete and continuous probability distributions, hazard function, and censored data. Basic concepts of Bayesian statistics, models, reasons, and theory are presented in the following chapter. Coverage of Bayesian computation, Metropolis-Hastings algorithm, and Gibbs Sampling comes next. The book then goes on to teach the concepts of design capability and design for reliability; introduce Bayesian models for estimating system reliability; discuss Bayesian Hierarchical Models and their applications; present linear and logistic regression models in Bayesian Perspective; and more. Provides a step-by-step approach for developing advanced reliability models to solve complex problems, and does not require in-depth understanding of statistical methodology Educates managers on the potential of Bayesian reliability models and associated impact Introduces commonly used predictive reliability models and advanced Bayesian models based on real life applications Includes practical guidelines to construct Bayesian reliability models along with computer codes for all of the case studies JAGS and R codes are provided on an accompanying website to enable practitioners to easily copy them and tailor them to their own applications Practical Applications of Bayesian Reliability is a helpful book for industry practitioners such as reliability engineers, mechanical engineers, electrical engineers, product engineers, system engineers, and materials scientists whose work includes predicting design or product performance. This monograph proposes several approaches to convergence monitoring for MCMC algorithms which are centered on the theme of discrete Markov chains. After a short introduction to MCMC methods, including recent developments like perfect simulation and Langevin Metropolis-Hastings algorithms, and to the current convergence diagnostics, the contributors present the theoretical basis for a study of MCMC convergence using discrete Markov chains and their specificities. The contributors stress in particular that this study applies in a wide generality, starting with latent variable models like mixtures, then extending the scope to chains with renewal properties, and concluding with a general Markov chain. They then relate the different connections with discrete or finite Markov chains with practical convergence diagnostics which are either graphical plots (allocation map, divergence graph, variance stabilizing, normality plot), stopping rules (normality, stationarity, stability tests), or confidence bounds (divergence, asymptotic variance, normality). Most of the quantitative tools take advantage of manageable versions of the CLT. The different methods proposed here are first evaluated on a set of benchmark examples and then studied on three full scale realistic applications, along with the standard convergence diagnostics: A hidden Markov modelling of DNA sequences, including a perfect simulation implementation, a latent stage modelling of the dynamics of HIV infection, and a modelling of hospitalization duration by exponential mixtures. The monograph is the outcome of a monthly research seminar held at CREST, Paris, since 1995. The seminar involved the contributors to this monograph and was led by Christian P. Robert, Head of the Satistics Laboratory at CREST and Professor of Statistics at the University of Rouen since 1992. In recent years, a wealth of research has emerged addressing various aspects of mobile communications signal processing. New applications and services are continually arising, and future mobile communications offer new opportunities and exciting challenges for signal processing. The Signal Processing for Mobile Communications Handbook provi 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. This book presents a systematic treatment of Markov chains, diffusion processes and state space models, as well as alternative approaches to Markov chains through stochastic difference equations and stochastic differential equations. It illustrates how these processes and approaches are applied to many problems in genetics, carcinogenesis, AIDS epidemiology and other biomedical systems. One feature of the book is that it describes the basic MCMC (Markov chain and Monte Carlo) procedures and illustrates how to use the Gibbs sampling method and the multilevel Gibbs sampling method to solve many problems in genetics, carcinogenesis, AIDS and other biomedical systems. As another feature, the book develops many state space models for many genetic problems, carcinogenesis, AIDS epidemiology and HIV pathogenesis. It shows in detail how to use the multilevel Gibbs sampling method to estimate (or predict) simultaneously the state variables and the unknown parameters in cancer chemotherapy, carcinogenesis, AIDS epidemiology and HIV pathogenesis. As a matter of fact, this book is the first to develop many state space models for many genetic problems, carcinogenesis and other biomedical problems. Contents:Discrete Time Markov Chain Models in Genetics and Biomedical SystemsStationary Distributions and MCMC in Discrete Time Markov ChainsContinuous-Time Markov Chain Models in Genetics, Cancers and AIDSAbsorption Probabilities and Stationary Distributions in Continuous-Time Markov Chain ModelsDiffusion Models in Genetics, Cancer and AIDSAsymptotic Distributions, Stationary Distributions and Absorption Probabilities in Diffusion ModelsState Space Models and Some Examples from Cancer and AIDSSome General Theories of State Space Models and Applications Readership: Graduate students and researchers in probability & statistics and the life sciences. Keywords:Stochastic;Genetics;Cancers;AIDS;Biomedical SystemsReviews:“Its strengths include the large number of models described, many of which have previously been published only in research journals; its clear presentation of many detailed analyses; and good accounts of the biology behind the models.”Mathematical Reviews While there have been few theoretical contributions on the Markov Chain Monte Carlo (MCMC) methods in the past decade, current understanding and application of MCMC to the solution of inference problems has increased by leaps and bounds. Incorporating changes in theory and highlighting new applications, Markov Chain Monte Carlo: Stochastic Simulation for Bayesian Inference, Second Edition presents a concise, accessible, and comprehensive introduction to the methods of this valuable simulation technique. The second edition includes access to an internet site that provides the code, written in R and WinBUGS, used in many of the previously existing and new examples and exercises. More importantly, the self-explanatory nature of the codes will enable modification of the inputs to the codes and variation on many directions will be available for further exploration. Major changes from the previous edition: · More examples with discussion of computational details in chapters on Gibbs sampling and Metropolis-Hastings algorithms · Recent developments in MCMC, including reversible jump, slice sampling, bridge sampling, path sampling, multiple-try, and delayed rejection · Discussion of computation using both R and WinBUGS · Additional exercises and selected solutions within the text, with all data sets and software available for download from the Web · Sections on spatial models and model adequacy The self-contained text units make MCMC accessible to scientists in other disciplines as well as statisticians. The book will appeal to everyone working with MCMC techniques, especially research and graduate statisticians and biostatisticians, and scientists handling data and formulating models. The book has been substantially reinforced as a first reading of material on MCMC and, consequently, as a textbook for modern Bayesian computation and Bayesian inference courses. Thepastthree decadeshaveseenrapiddevelopmentin the areaofmodelpred- tive control with respect to both theoretical and application aspects. Over these 30 years, model predictive control for linear systems has been widely applied, especially in the area of process control. However, today’s applications often require driving the process over a wide region and close to the boundaries of - erability, while satisfying constraints and achieving near-optimal performance. Consequently, the application of linear control methods does not always lead to satisfactory performance, and here nonlinear methods must be employed. This is one of the reasons why nonlinear model predictive control (NMPC) has - joyed signi?cant attention over the past years,with a number of recent advances on both the theoretical and application frontier. Additionally, the widespread availability and steadily increasing power of today’s computers, as well as the development of specially tailored numerical solution methods for NMPC, bring thepracticalapplicabilityofNMPCwithinreachevenforveryfastsystems.This has led to a series of new, exciting developments, along with new challenges in the area of NMPC. This textbook explains the fundamentals of Markov Chain Monte Carlo (MCMC) without assuming advanced knowledge of mathematics and programming. MCMC is a powerful technique that can be used to integrate complicated functions or to handle complicated probability distributions. MCMC is frequently used in diverse fields where statistical methods are important – e.g. Bayesian statistics, quantum physics, machine learning, computer science, computational biology, and mathematical economics. This book aims to equip readers with a sound understanding of MCMC and enable them to write simulation codes by themselves. The content consists of six chapters. Following Chap. 2, which introduces readers to the Monte Carlo algorithm and highlights the advantages of MCMC, Chap. 3 presents the general aspects of MCMC. Chap. 4 illustrates the essence of MCMC through the simple example of the Metropolis algorithm. In turn, Chap. 5 explains the HMC algorithm, Gibbs sampling algorithm and Metropolis-Hastings algorithm, discussing their pros, cons and pitfalls. Lastly, Chap. 6 presents several applications of MCMC. Including a wealth of examples and exercises with solutions, as well as sample codes and further math topics in the Appendix, this book offers a valuable asset for students and beginners in various fields. Through expanded intelligence, the use of robotics has fundamentally transformed a variety of fields, including manufacturing, aerospace, medicine, social services, and agriculture. Continued research on robotic design is critical to solving various dynamic obstacles individuals, enterprises, and humanity at large face on a daily basis. Robotic Systems: Concepts, Methodologies, Tools, and Applications is a vital reference source that delves into the current issues, methodologies, and trends relating to advanced robotic technology in the modern world. Highlighting a range of topics such as mechatronics, cybernetics, and human-computer interaction, this multi-volume book is ideally designed for robotics engineers, mechanical engineers, robotics technicians, operators, software engineers, designers, programmers, industry professionals, researchers, students, academicians, and computer practitioners seeking current research on developing innovative ideas for intelligent and autonomous robotics systems. State space models play a key role in the estimation of time-varying sensitivities in financial markets. The objective of this book is to analyze the relative merits of modern time series techniques, such as Markov regime switching and the Kalman filter, to model structural changes in the context of widely used concepts in finance. The presented material will be useful for financial economists and practitioners who are interested in taking time-variation in the relationship between financial assets and key economic factors explicitly into account. The empirical part illustrates the application of the various methods under consideration. As a distinctive feature, it includes a comprehensive analysis of the ability of time-varying coefficient models to estimate and predict the conditional nature of systematic risks for European industry portfolios. Probabilistic Finite Element Model Updating Using Bayesian Statistics: Applications to Aeronautical and Mechanical Engineering Tshilidzi Marwala and Ilyes Boulkaibet, University of Johannesburg, South Africa Sondipon Adhikari, Swansea University, UK Covers the probabilistic finite element model based on Bayesian

statistics with applications to aeronautical and mechanical engineering Finite element models are used widely to model the dynamic behaviour of many systems including in electrical, aerospace and mechanical engineering. The book covers probabilistic finite element model updating, achieved using Bayesian statistics. The Bayesian framework is employed to estimate the probabilistic finite element models which take into account of the uncertainties in the measurements and the modelling procedure. The Bayesian formulation achieves this by formulating the finite element model as the posterior distribution of the model given the measured data within the context of computational statistics and applies these in aeronautical and mechanical engineering. Probabilistic Finite Element Model Updating Using Bayesian Statistics contains simple explanations of computational statistical techniques such as Metropolis-Hastings Algorithm, Slice sampling, Markov Chain Monte Carlo method, hybrid Monte Carlo as well as Shadow Hybrid Monte Carlo and their relevance in engineering. Key features: Contains several contributions in the area of model updating using Bayesian techniques which are useful for graduate students. Explains in detail the use of Bayesian techniques to quantify uncertainties in mechanical structures as well as the use of Markov Chain Monte Carlo techniques to evaluate the Bayesian formulations. The book is essential reading for researchers, practitioners and students in mechanical and aerospace engineering. Bridging the gap between research and application, Markov Chain Monte Carlo: Stochastic Simulation for Bayesian Inference provides a concise, and integrated account of Markov chain Monte Carlo (MCMC) for performing Bayesian inference. This volume, which was developed from a short course taught by the author at a meeting of Brazilian statisticians and probabilists, retains the didactic character of the original course text. The self-contained text units make MCMC accessible to scientists in other disciplines as well as statisticians. It describes each component of the theory in detail and outlines related software, which is of particular benefit to applied scientists. Issues in Ecological Research and Application: 2011 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Ecological Research and Application. The editors have built Issues in Ecological Research and Application: 2011 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Ecological Research and Application in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Ecological Research and Application: 2011 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/. This volume shows how sophisticated spatial statistical and computational methods apply to a range of problems of increasing importance for applications in science and technology. It introduces topics of current interest in spatial and computational statistics, which should be accessible to postgraduate students as well as to experienced statistical researchers. In a family study of breast cancer, epidemiologists in Southern California increase the power for detecting a gene-environment interaction. In Gambia, a study helps a vaccination program reduce the incidence of Hepatitis B carriage. Archaeologists in Austria place a Bronze Age site in its true temporal location on the calendar scale. And in France, Dealing with methods for sampling from posterior distributions and how to compute posterior quantities of interest using Markov chain Monte Carlo (MCMC) samples, this book addresses such topics as improving simulation accuracy, marginal posterior density estimation, estimation of normalizing constants, constrained parameter problems, highest posterior density interval calculations, computation of posterior modes, and posterior computations for proportional hazards models and Dirichlet process models. The authors also discuss model comparisons, including both nested and non-nested models, marginal likelihood methods, ratios of normalizing constants, Bayes factors, the Savage-Dickey density ratio, Stochastic Search Variable Selection, Bayesian Model Averaging, the reverse jump algorithm, and model adequacy using predictive and latent residual approaches. The book presents an equal mixture of theory and applications involving real data, and is intended as a graduate textbook or a reference book for a one-semester course at the advanced masters or Ph.D. level. It will also serve as a useful reference for applied or theoretical researchers as well as practitioners. Shorter, more concise chapters provide flexible coverage of the subject. Expanded coverage includes: uncertainty and randomness, prior distributions, predictivism, estimation, analysis of variance, and classification and imaging. Includes topics not covered in other books, such as the de Finetti Transform. Author S. James Press is the modern guru of Bayesian statistics. Data assimilation (DA) has been recognized as one of the core techniques for modern forecasting in various earth science disciplines including meteorology, oceanography, and hydrology. Since early 1990s DA has been an important s- sion topic in many academic meetings organized by leading societies such as the American Meteorological Society, American Geophysical Union, European G- physical Union, World Meteorological Organization, etc. nd Recently, the 2 Annual Meeting of the Asia Oceania Geosciences Society (AOGS), held in Singapore in June 2005, conducted a session on DA under the - tle of "Data Assimilation for Atmospheric, Oceanic and Hydrologic Applications." nd This rst DA session in the 2 AOGS was a great success with more than 30 papers presented and many great ideas exchanged among scientists from the three different disciplines. The scientists who participated in the meeting suggested making the DA session a biennial event. th Two years later, at the 4 AOGS Annual Meeting, Bangkok, Thailand, the DA session was of cially named "Sasaki Symposium on Data Assimilation for At- spheric, Oceanic and Hydrologic Applications," to honor Prof. Yoshi K. Sasaki of the University of Oklahoma for his life-long contributions to DA in geosciences. The rapid evolution of technology continuously changes the way people interact, work, and learn. By examining these advances from a sociological perspective, researchers can further understand the impact of cyberspace on human behavior, interaction, and cognition. Multigenerational Online Behavior and Media Use: Concepts, Methodologies, Tools, and Applications is a vital reference source covering the impact of social networking platforms on a variety of relationships, including those between individuals, governments, citizens, businesses, and consumers. The publication also highlights the negative behavioral, physical, and mental effects of increased online usage and screen time such as mental health issues, internet addiction, and body image. Showcasing a range of topics including online dating, smartphone dependency, and cyberbullying, this multi-volume book is ideally designed for sociologists, psychologists, computer scientists, engineers, communication specialists, academicians, researchers, and graduate-level students seeking current research on media usage and its behavioral effects. Markov Chain Monte Carlo (MCMC) methods are now an indispensable tool in scientific computing. This book discusses recent developments of MCMC methods with an emphasis on those making use of past sample information during simulations. The application examples are drawn from diverse fields such as bioinformatics, machine learning, social science, combinatorial optimization, and computational physics. Key Features: Expanded coverage of the stochastic approximation Monte Carlo and dynamic weighting algorithms that are essentially immune to local trap problems. A detailed discussion of the Monte Carlo Metropolis-Hastings algorithm that can be used for sampling from distributions with intractable normalizing constants. Up-to-date accounts of recent developments of the Gibbs sampler. Comprehensive overviews of the population-based MCMC algorithms and the MCMC algorithms with adaptive proposals. This book can be used as a textbook or a reference book for a one-semester graduate course in statistics, computational biology, engineering, and computer sciences. Applied or theoretical researchers will also find this book beneficial.