



STOCHASTIC MODELS AN ALGORITHMIC APPROACH

HENK C. TIJMS

SUMMARY

Wiley Series in Probability and Mathematical Statistics

Editors

Stochastic Models:

An Algorithmic Approach

Henk C. Tijms, Vrije Universiteit, Amsterdam.

Stochastic Models: An Algorithmic Approach fulfils the widely perceived need for an introductory text which demonstrates the effective use of simple stochastic models to gain insight into the behaviour of complex stochastic systems.

The author's earlier book, Stochastic Modeling and Analysis: A Computational Approach (1986) has become a leading text in the fields of applied probability and stochastic optimization. While this new book retains the features of providing theory, realistic examples and practically useful algorithms it is written with a wider readership in mind and is more student-oriented.

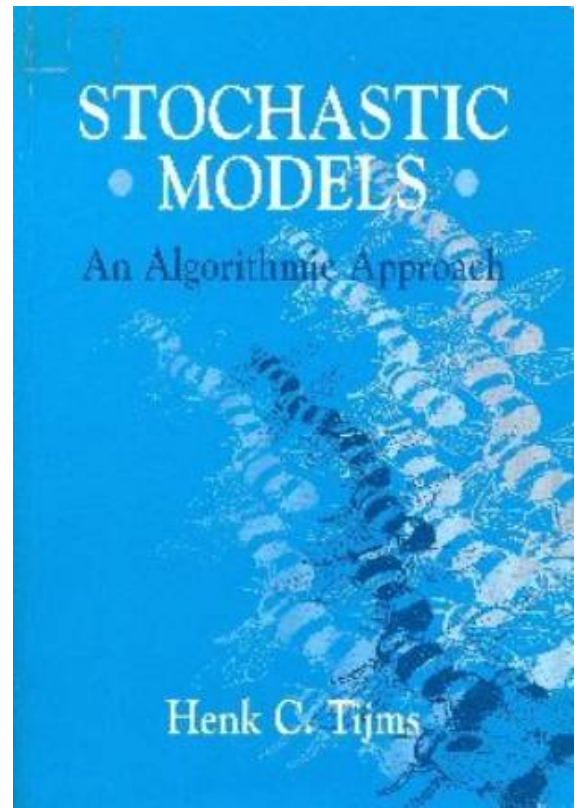
Covering renewal and regenerative processes, discrete-time and continuous-time

Markov chains, Markovian decision processes, inventory and

queuing theory the book will enable students to perform algorithmic analysis for specific problems.

Chosen to illustrate the basic models and their associated solution methods, the examples are drawn from a variety of applications fields, such as inventory control, reliability, maintenance, insurance and teletraffic. Each chapter concludes with a range of interesting and thought-provoking exercises, some of which require the use of computer software.

The accessible yet rigorous exposition ensures that the book will be an invaluable resource for senior undergraduate and graduate students of operations research, statistics and engineering.



CONTENTS

Préface	ix
Chapter 1 Renewal Processes with Applications	1
1.0 Introduction	1
1.1 Renewal Theory	2
1.1.1 The renewal function	3
1.1.2 Asymptotic expansions	7
1.1.3 Computation of the renewal functio	14
1.2 Poisson Process and Extensions	18
1.2.1 Poisson process	18
1.2.2 Compound Poisson process	27
1.2.3 Nonstationary Poisson process	30
1.3 Renewal-Reward Processes	32
1.4 Reliability Applications	43
1.5 Inventory Applications	51
1.5.1 The continuous-review (s, Q) inventory model	52
1.5.2 The periodic-review (R, S) inventory model	58
1.5.3 The periodic-review (R, s, S) inventory model	61
1.5.4 The continuous-review (s, S) inventory model	68
1.5.5 Rational approximations for inventory calculations	69
1.6 Little's Formula	71
1.7 Poisson Arrivals See Time Averages	73
1.8 Asymptotic Expansion for Ruin and Waiting-time Probabilities	78
Exercises	84
Bibliographie Notes	90
References	90

Chapter 2	Markov Chains: Theory and Applications	93
2.0	Introduction	93
2.1	Discrete-time Markov Chains	94
2.2	State Classification	98
2.3	Long-run Analysis of Discrete-time Markov Chains	106
2.3.1	Finite-state Markov chains	107
2.3.2	Infinite-state Markov chains	116
2.3.3	A numerical approach for the infinite-state balance equations	119
2.4	Applications of Discrete-time Markov Chains	120
2.5	Continuous-time Markov Chains	130
2.6	Long-run Analysis of Continuous-time Markov Chains	135
2.7	Applications of Continuous-time Markov Chains	143
2.8	Transient Analysis of Continuous-time Markov Chains	152
2.8.1	Transient probabilities	152
2.8.2	First-passage time probabilities	157
2.9	Phase Method	162
	Exercises	169
	Bibliographic Notes	177
	References	177
Chapter 3	Markovian Decision Processes and their Applications	181
3.0	Introduction	181
3.1	Discrete-time Markov Decision Processes	182
3.2	Policy-iteration Algorithm	191
3.3	Linear Programming Formulation	199
3.4	Value-iteration Algorithm	206
3.5	Semi-Markov Decision Processes	218
3.6	Tailor-made Policy-iteration Algorithms	233
	Exercises	249
	Bibliographic Notes	254
	References	255
Chapter 4	Algorithmic Analysis of Queuing Models	259
4.0	Introduction	259
4.1	Basic Concepts for Queuing Systems	261
4.2	The M/G/1 Queue	265
4.2.1	The state probabilities	266
4.2.2	The waiting-time probabilities	270
4.3	The $M^X/G/1$ Queue with Batch Input	274
4.3.1	The state probabilities	275
4.3.2	The waiting-time probabilities	277
4.4	The GI/G/1 Queue	281
4.5	Multi-server Queues with Poisson Input	286
4.5.1	The M/M/c queue	287
4.5.2	The MID/c queue	288
4.5.3	The M/G/c queue	292
4.5.4	The MIC/ ∞ queue	301
4.5.5	The $M^X/C/c$ queue	303
4.6	The GI/C/e Queue	310
4.6.1	The GI/M/c queue	311
4.6.2	The GI/D/c queue	316
4.7	Multi-server Queues with Finite-source Input	321
4.7.1	Exponential service times	322
4.7.2	General service times	323
4.8	Finite-capacity Queuing Systems	324
4.8.1	The M/G/c/c+N queuing system	325
4.8.2	Heuristic for the rejection probability	328
4.8.3	Two-moment approximation for the minimal buffer size	335
	Exercises	337
	Bibliographic Notes	341
	References	342
	Appendices	345
Appendix A	Useful Tools in Applied Probability	345
Appendix B	Useful Probability Distribution Functions	352
Appendix C	Laplace Transforms and Generating Functions	361
Appendix D	Numerical Solution of Markov Chain Equations	368
	References	371
	Index	373

X, 375 pages : 24 cm. Stochastic Models: An Algorithmic Approach fulfills the widely perceived need for an introductory text which demonstrates the effective use of simple stochastic models to gain insight into the behaviour of complex stochastic systems. The author's earlier book, Stochastic Modelling and Analysis: A Computational Approach (1986) has become a leading text in the fields of applied probability and stochastic optimization. While this new book retains the features of providing theory, realistic examples and practically useful algorithms it is written with a wider readership Volume 8, Number 1 (1983), 97-99. Review: Marcel F. Neuts, Matrix-geometric solutions in stochastic models, an algorithmic approach. Luis G. Vargas. More by Luis G. Vargas. Permanent link to this document <https://projecteuclid.org/euclid.bams/1183550026>. Citation. Vargas, Luis G. Review: Marcel F. Neuts, Matrix-geometric solutions in stochastic models, an algorithmic approach. Bull. Amer.

A New Algorithmic Approach for Detection and Identification of Vehicle Plate Numbers. A. Akoum, B. Daya, P. Chauvet. Radiological Mimics of Popliteal Cysts: An Algorithmic Approach Using US and MRI to Identify the Potentially Malignant Lesions: Case Series. CreditGrades Framework within Stochastic Covariance Models. Computing stochastic continuous-time models from ARMA models. June 1991 International Journal of Control. TORSTEN SÄDERSTROM. Some algorithms for computing the underlying continuous-time stochastic model from a sampled ARMA model are presented. Three algorithms are given, all having a modest computational complexity. The properties of the algorithms are analysed and also illustrated by means of numerical examples. Incorporate stochastic programming modeling into your current line of research. Paper survey Read and report on three separate papers in a chosen area of stochastic programming. I will develop a bibliography of some suggested papers. Please arrange a time to contact me if you have questions about the project. Learn the algorithmic techniques used to solve stochastic programs. Learn new computational tools. Objectives. A scenario-based approach is by no means the only approach to dealing with randomness, but it does seem to be a reasonable one. The scenario approach assumes that there are a finite number of decisions that nature can make (outcomes of randomness). Each of these possible decisions is called a scenario. Ex. Stochastic Models: An Algorithmic Approach (Wiley Series in Probability and Statistics - Applied Probability and Statistics Section) 1st Edition. by Henk C. Tijms (Author). ISBN-13: 978-0471951230. This bar-code number lets you verify that you're getting exactly the right version or edition of a book. The 13-digit and 10-digit formats both work. Scan an ISBN with your phone Use the Amazon App to scan ISBNs and compare prices. Have one to sell? Sell on Amazon. 2 The traditional stochastic approach. 3 Apparent randomness in financial markets. 4 An information-theoretic approach. 5 The study of the real time series vs. the simulation of an algorithmic market. 6 Experiments and Results. 7 Further considerations. 8 Conclusions and further work. stochastic models. We think that the study of frequency distributions and the application of algorithmic probability could constitute a tool for estimating and eventually understanding the information assimilation process in the market, making it possible to characterise the information content of prices. From the point of view of cryptanalysis, the algorithmic view based on frequency analysis presented herein may be taken as a hacker approach to the financial market.

X, 375 pages : 24 cm. Stochastic Models: An Algorithmic Approach fulfills the widely perceived need for an introductory text which demonstrates the effective use of simple stochastic models to gain insight into the behaviour of complex stochastic systems. The author's earlier book, Stochastic Modelling and Analysis: A Computational Approach (1986) has become a leading text in the fields of applied probability and stochastic optimization. While this new book retains the features of providing theory, realistic examples and practically useful algorithms it is written with a wider readership Stochastic Models book. Read reviews from world's largest community for readers. An integrated presentation of theory, applications and algorithms that d... Goodreads helps you keep track of books you want to read. Start by marking "Stochastic Models: An Algorithmic Approach" as Want to Read: Want to Read saving! Want to Read. Currently Reading. Read. Stochastic Models: An by H.C. Tijms. Other editions. Stochastic Models (1st edition). Find similar editions. Some editions change by only 10%. An integrated presentation of theory, applications and algorithms that demonstrates how useful simple stochastic models can be for gaining insight into the behavior of complex stochastic systems. Shows students how to obtain numerical solutions to specific situations. Includes a wide variety of realistic examples carefully chosen to illustrate the basic models and associated solution techniques. A New Algorithmic Approach for Detection and Identification of Vehicle Plate Numbers. A. Akoum, B. Daya, P. Chauvet. Radiological Mimics of Popliteal Cysts: An Algorithmic Approach Using US and MRI to Identify the Potentially Malignant Lesions: Case Series. CreditGrades Framework within Stochastic Covariance Models.

Computing stochastic continuous-time models from ARMA models. June 1991. *International Journal of Control*. TORSTEN SÄDERSTROM. Some algorithms for computing the underlying continuous-time stochastic model from a sampled ARMA model are presented. Three algorithms are given, all having a modest computational complexity. The properties of the algorithms are analysed and also illustrated by means of numerical examples. Start by marking "Matrix-Geometric Solutions in Stochastic Models: An Algorithmic Approach" as Want to Read: Want to Read saving...! Want to Read. Topics include matrix-geometric invariant vectors, buffer models, queues in a random environment and more. Get A Copy. Amazon. Online Stores 3/4. An Algorithmic Introduction to Numerical Simulation of Stochastic Differential Equations*. Desmond J. Higham. Abstract. A practical and accessible introduction to numerical methods for stochastic differential equations is given. Stochastic differential equation (SDE) models play a prominent role in a range of application areas, including biology, chemistry, epidemiology, mechanics, microelectronics, economics, and finance. A complete understanding of SDE theory requires familiarity with advanced probability and stochastic processes; picking up this material is likely to be daunting for a typical applied mathematics student. a Monte Carlo approach: random variables are simulated with a random number generator and expected values are approximated by computed averages. A Physical Approach for Stochastic Modeling of TERO-based TRNG. A Physical Approach for Stochastic Modeling of TERO-based TRNG. This rate has to be evaluated using an appropriate stochastic model. The stochastic model proposed in this paper is dedicated to the transition effect ring oscillator (TERO) based true random number generator (TRNG) proposed by Varchola and Drutarovsky in 2010. based on algorithmic processes and are thus not truly random, TRNGs exploit an unpredictable process, such as analog phenomena in electronic devices, to produce a random binary sequence or a sequence of random numbers. The unpredictability of DRNGs is guaranteed computationally and that of TRNGs is guaranteed physically.