

Discrete Event System Simulation 4th Edition

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Introduction to Discrete Event Systems - Christos G. Cassandras
2021-11-11

This unique textbook comprehensively introduces the field of discrete event systems, offering a breadth of coverage that makes the material accessible to readers of varied backgrounds. The book emphasizes a unified modeling framework that

transcends specific application areas, linking the following topics in a coherent manner: language and automata theory, supervisory control, Petri net theory, Markov chains and queueing theory, discrete-event simulation, and concurrent estimation techniques. Topics and features: detailed treatment of automata and language theory in the context of

discrete event systems, including application to state estimation and diagnosis comprehensive coverage of centralized and decentralized supervisory control of partially-observed systems timed models, including timed automata and hybrid automata stochastic models for discrete event systems and controlled Markov chains discrete event simulation an introduction to stochastic hybrid systems sensitivity analysis and optimization of discrete event and hybrid systems new in the third edition: opacity properties, enhanced coverage of supervisory control, overview of latest software tools This proven textbook is essential to advanced-level students and researchers in a variety of disciplines where the study of discrete event systems is relevant: control, communications, computer engineering, computer science, manufacturing engineering, transportation networks, operations

research, and industrial engineering.

Christos G. Cassandras is Distinguished Professor of Engineering, Professor of Systems Engineering, and Professor of Electrical and Computer Engineering at Boston University. Stéphane Lafortune is Professor of Electrical Engineering and Computer Science at the University of Michigan, Ann Arbor.

Handbook of Research on Data Science for Effective Healthcare Practice and Administration - Noughabi, Elham Akhond Zadeh 2017-07-20

Data science has always been an effective way of extracting knowledge and insights from information in various forms. One industry that can utilize the benefits from the advances in data science is the healthcare field. The Handbook of Research on Data Science for Effective Healthcare Practice and Administration is a critical reference source that overviews the

state of data analysis as it relates to current practices in the health sciences field. Covering innovative topics such as linear programming, simulation modeling, network theory, and predictive analytics, this publication is recommended for all healthcare professionals, graduate students, engineers, and researchers that are seeking to expand their knowledge of efficient techniques for information analysis in the healthcare professions.

Design of Enterprise Systems - Ronald Giachetti 2016-04-19

In practice, many different people with backgrounds in many different disciplines contribute to the design of an enterprise. Anyone who makes decisions to change the current enterprise to achieve some preferred structure is considered a designer. What is problematic is how to use the knowledge of separate aspects of the enterprise to achieve a glob
Pedestrian and Evacuation Dynamics -

Richard D. Peacock 2011-06-29
An aging population, increasing obesity and more people with mobility impairments are bringing new challenges to the management of routine and emergency people movement in many countries. These population challenges, coupled with the innovative designs being suggested for both the built environment and other commonly used structures (e.g., transportation systems) and the increasingly complex incident scenarios of fire, terrorism, and large-scale community disasters, provide even greater challenges to population management and safety. *Pedestrian and Evacuation Dynamics*, an edited volume, is based on the *Pedestrian and Evacuation Dynamics (PED) 5th International 2010* conference, March 8th-10th 2010, located at the National Institute of Standards and Technology, Gaithersburg, MD, USA. This volume addresses both pedestrian and

evacuation dynamics and associated human behavior to provide answers for policy makers, designers, and emergency management to help solve real world problems in this rapidly developing field. Data collection, analysis, and model development of people movement and behavior during nonemergency and emergency situations will be covered as well.

Simulation Modeling and Analysis with ARENA - Tayfur Altioek 2010-07-26

Simulation Modeling and Analysis with Arena is a highly readable textbook which treats the essentials of the Monte Carlo discrete-event simulation methodology, and does so in the context of a popular Arena simulation environment. It treats simulation modeling as an in-vitro laboratory that facilitates the understanding of complex systems and experimentation with what-if scenarios in order to estimate their performance metrics. The book contains chapters on the simulation modeling methodology and

the underpinnings of discrete-event systems, as well as the relevant underlying probability, statistics, stochastic processes, input analysis, model validation and output analysis. All simulation-related concepts are illustrated in numerous Arena examples, encompassing production lines, manufacturing and inventory systems, transportation systems, and computer information systems in networked settings. · Introduces the concept of discrete event Monte Carlo simulation, the most commonly used methodology for modeling and analysis of complex systems · Covers essential workings of the popular animated simulation language, ARENA, including set-up, design parameters, input data, and output analysis, along with a wide variety of sample model applications from production lines to transportation systems · Reviews elements of statistics, probability, and stochastic processes relevant to simulation modeling * Ample end-of-

chapter problems and full Solutions Manual * Includes CD with sample ARENA modeling programs
Modeling and Tools for Network Simulation - Klaus Wehrle 2010-09-22
A crucial step during the design and engineering of communication systems is the estimation of their performance and behavior; especially for mathematically complex or highly dynamic systems network simulation is particularly useful. This book focuses on tools, modeling principles and state-of-the art models for discrete-event based network simulations, the standard method applied today in academia and industry for performance evaluation of new network designs and architectures. The focus of the tools part is on two distinct simulation engines: OmNet++ and ns-3, while it also deals with issues like parallelization, software integration and hardware simulations. The parts dealing with modeling and models for

network simulations are split into a wireless section and a section dealing with higher layers. The wireless section covers all essential modeling principles for dealing with physical layer, link layer and wireless channel behavior. In addition, detailed models for prominent wireless systems like IEEE 802.11 and IEEE 802.16 are presented. In the part on higher layers, classical modeling approaches for the network layer, the transport layer and the application layer are presented in addition to modeling approaches for peer-to-peer networks and topologies of networks. The modeling parts are accompanied with catalogues of model implementations for a large set of different simulation engines. The book is aimed at master students and PhD students of computer science and electrical engineering as well as at researchers and practitioners from academia and industry that are dealing with

network simulation at any layer of the protocol stack.

Fundamentals of Performance Evaluation of Computer and Telecommunication Systems - Mohammed S. Obaidat 2010-01-26

The only singular, all-encompassing textbook on state-of-the-art technical performance evaluation *Fundamentals of Performance Evaluation of Computer and Telecommunication Systems* uniquely presents all techniques of performance evaluation of computers systems, communication networks, and telecommunications in a balanced manner. Written by the renowned Professor Mohammad S. Obaidat and his coauthor Professor Nouredine Boudriga, it is also the only resource to treat computer and telecommunication systems as inseparable issues. The authors explain the basic concepts of performance evaluation, applications, performance evaluation metrics,

workload types, benchmarking, and characterization of workload. This is followed by a review of the basics of probability theory, and then, the main techniques for performance evaluation—namely measurement, simulation, and analytic modeling—with case studies and examples. Contains the practical and applicable knowledge necessary for a successful performance evaluation in a balanced approach Reviews measurement tools, benchmark programs, design of experiments, traffic models, basics of queueing theory, and operational and mean value analysis Covers the techniques for validation and verification of simulation as well as random number generation, random variate generation, and testing with examples Features numerous examples and case studies, as well as exercises and problems for use as homework or programming assignments *Fundamentals of Performance Evaluation of Computer*

and Telecommunication Systems is an ideal textbook for graduate students in computer science, electrical engineering, computer engineering, and information sciences, technology, and systems. It is also an excellent reference for practicing engineers and scientists.

Use Cases of Discrete Event

Simulation - Steffen Bangsow
2012-04-24

Over the last decades Discrete Event Simulation has conquered many different application areas. This trend is, on the one hand, driven by an ever wider use of this technology in different fields of science and on the other hand by an incredibly creative use of available software programs through dedicated experts. This book contains articles from scientists and experts from 10 countries. They illuminate the width of application of this technology and the quality of problems solved using Discrete Event Simulation. Practical

applications of simulation dominate in the present book. The book is aimed to researchers and students who deal in their work with Discrete Event Simulation and which want to inform them about current applications. By focusing on discrete event simulation, this book can also serve as an inspiration source for practitioners for solving specific problems during their work. Decision makers who deal with the question of the introduction of discrete event simulation for planning support and optimization this book provides a contribution to the orientation, what specific problems could be solved with the help of Discrete Event Simulation within the organization. System Design, Modeling, and Simulation - Claudius Ptolemaeus
2013-09-27

This book is a definitive introduction to models of computation for the design of complex, heterogeneous systems. It has a

particular focus on cyber-physical systems, which integrate computing, networking, and physical dynamics. The book captures more than twenty years of experience in the Ptolemy Project at UC Berkeley, which pioneered many design, modeling, and simulation techniques that are now in widespread use. All of the methods covered in the book are realized in the open source Ptolemy II modeling framework and are available for experimentation through links provided in the book. The book is suitable for engineers, scientists, researchers, and managers who wish to understand the rich possibilities offered by modern modeling techniques. The goal of the book is to equip the reader with a breadth of experience that will help in understanding the role that such techniques can play in design.

Introduction to Modeling and Analysis of Stochastic Systems - V. G. Kulkarni 2010-11-03

This book provides a self-contained review of all the relevant topics in probability theory. A software package called MAXIM, which runs on MATLAB, is made available for downloading. Vidyadhar G. Kulkarni is Professor of Operations Research at the University of North Carolina at Chapel Hill.

Simio and Simulation - W. David Kelton 2013-11-19

Enjoy learning a key technology. Undergraduates and beginning graduates in both first and second simulation courses have responded positively to the approach taken in this text, which illustrates simulation principles using the popular Simio product. This economy version substitutes grayscale interior graphics to keep costs low for students. Content: This textbook explains how to use simulation to make better business decisions in application domains from healthcare to mining, heavy manufacturing to

supply chains, and everything in between. It is written to help both technical and non-technical users better understand the concepts and usefulness of simulation. It can be used in a classroom environment or in support of independent study. Modern software makes simulation more useful and accessible than ever and this book illustrates simulation concepts with Simio, a leader in simulation software. Author Statement: This book can serve as the primary text in first and second courses in simulation at both the undergraduate and beginning-graduate levels. It is written in an accessible tutorial-style writing approach centered on specific examples rather than general concepts, and covers a variety of applications including an international flavor. Our experience has shown that these characteristics make the text easier to read and absorb, as well as appealing to students from many different cultural

and applications backgrounds. A first simulation course would probably cover Chapter 1 through 8 thoroughly, and likely Chapters 9 and 10, particularly for upper class or graduate level students. For a second simulation course, it might work to skip or quickly review Chapters 1-3 and 6, thoroughly cover all other chapters up to Chapter 10, and use Chapter 11 as reinforcing assignments. The text or components of it could also support a simulation module of a few weeks within a larger survey course in programs without a stand-alone simulation course (e.g., MBA). For a simulation module that's part of a larger survey course, we recommend concentrating on Chapters 1, 4, and 5, and then perhaps lightly touch on Chapters 7 and 8. The extensibility introduced in Chapter 10 could provide some interesting project work for a graduate student with some programming background, as it could be easily linked to other

research topics. Likewise Appendix A could be used as the lead-in to some advanced study or research in the latest techniques in simulation-based planning and scheduling. Supplemental course material is also available on-line. Third Edition: The new third edition adds sections on Randomness in Simulation, Model Debugging, and Monte Carlo simulation. In addition, the coverage of animation, input analysis and output analysis has been significantly expanded. There is a new appendix on simulation-based scheduling, end-of-chapter problems have been improved and expanded, and we have incorporated many reader suggestions. We have reorganized the material for improved flow, and have updates throughout the book for many of the new Simio features recently added. A new format better supports our e-book users, and a new publisher supports significant cost reduction for our readers.

Handbook of Simulation - Jerry Banks

1998-09-14

The only complete guide to all aspects and uses of simulation—from the international leaders in the field. There has never been a single definitive source of key information on all facets of discrete-event simulation and its applications to major industries. The Handbook of Simulation brings together the contributions of leading academics, practitioners, and software developers to offer authoritative coverage of the principles, techniques, and uses of discrete-event simulation. Comprehensive in scope and thorough in approach, the Handbook is the one reference on discrete-event simulation that every industrial engineer, management scientist, computer scientist, operations manager, or operations researcher involved in problem-solving should own, with an in-depth examination of: * Simulation methodology, from experimental design

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to data analysis and more * Recent advances, such as object-oriented simulation, on-line simulation, and parallel and distributed simulation * Applications across a full range of manufacturing and service industries * Guidelines for successful simulations and sound simulation project management * Simulation software and simulation industry vendors

Handbooks in Operations Research and Management Science: Simulation -

Shane G. Henderson 2006-09-02

This Handbook is a collection of chapters on key issues in the design and analysis of computer simulation experiments on models of stochastic systems. The chapters are tightly focused and written by experts in each area. For the purpose of this volume "simulation refers to the analysis of stochastic processes through the generation of sample paths (realization) of the processes. Attention focuses on design and

analysis issues and the goal of this volume is to survey the concepts, principles, tools and techniques that underlie the theory and practice of stochastic simulation design and analysis. Emphasis is placed on the ideas and methods that are likely to remain an intrinsic part of the foundation of the field for the foreseeable future. The chapters provide up-to-date references for both the simulation researcher and the advanced simulation user, but they do not constitute an introductory level 'how to' guide. Computer scientists, financial analysts, industrial engineers, management scientists, operations researchers and many other professionals use stochastic simulation to design, understand and improve communications, financial, manufacturing, logistics, and service systems. A theme that runs throughout these diverse applications is the need to evaluate system performance

in the face of uncertainty, including uncertainty in user load, interest rates, demand for product, availability of goods, cost of transportation and equipment failures. * Tightly focused chapters written by experts * Surveys concepts, principles, tools, and techniques that underlie the theory and practice of stochastic simulation design and analysis * Provides an up-to-date reference for both simulation researchers and advanced simulation users

Maintenance, Replacement, and Reliability - Andrew K.S. Jardine
2013-05-28

A completely revised and updated edition of a bestseller, *Maintenance, Replacement, and Reliability: Theory and Applications*, Second Edition supplies the tools needed for making data-driven physical asset management decisions. The well-received first edition quickly became a mainstay for professors, students, and

professionals, with its clear prese
Simulation and Modeling of Systems of Systems - Pascal Cantot 2013-03-04
Systems engineering is the design of a complex interconnection of many elements (a system) to maximize a specific measure of system performance. It consists of two parts: modeling, in which each element of the system and its performance criteria are described; and optimization in which adjustable elements are tailored to allow peak performance. Systems engineering is applied to vast numbers of problems in industry and the military. An example of systems engineering at work is the control of the timing of thousands of city traffic lights to maximize traffic flow. The complex and intricate field of electronics and computers is perfectly suited for systems engineering analysis and in turn, advances in communications and computer technology have made more advanced systems engineering problems

solvable. Thus, the two areas feed off of one another. This book is a basic introduction to the use of models and methods in the engineering design of systems. It is aimed at students as well as practicing engineers. The concept of the "systems of systems" is discussed extensively, after a critical comparison of the different definitions and a range of various practical illustrations. It also provides key answers as to what a system of systems is and how its complexity can be mastered.

Discrete-event System Simulation -

Jerry Banks 2010

For junior- and senior-level simulation courses in engineering, business, or computer science. While most books on simulation focus on particular software tools, Discrete Event System Simulation examines the principles of modeling and analysis that translate to all such tools. This language-independent text

explains the basic aspects of the technology, including the proper collection and analysis of data, the use of analytic techniques, verification and validation of models, and designing simulation experiments.

Theory of Modeling and Simulation -
Bernard P. Zeigler 2000-01-10

The increased computational power and software tools available to engineers have increased the use and dependence on modeling and computer simulation throughout the design process. These tools have given engineers the capability of designing highly complex systems and computer architectures that were previously unthinkable. Every complex design project, from integrated circuits, to aerospace vehicles, to industrial manufacturing processes requires these new methods. This book fulfills the essential need of system and control engineers at all levels in understanding modeling and

simulation. This book, written as a true text/reference has become a standard sr./graduate level course in all EE departments worldwide and all professionals in this area are required to update their skills. The book provides a rigorous mathematical foundation for modeling and computer simulation. It provides a comprehensive framework for modeling and simulation integrating the various simulation approaches. It covers model formulation, simulation model execution, and the model building process with its key activities model abstraction and model simplification, as well as the organization of model libraries. Emphasis of the book is in particular in integrating discrete event and continuous modeling approaches as well as a new approach for discrete event simulation of continuous processes. The book also discusses simulation execution on parallel and distributed machines and concepts for

simulation model realization based on the High Level Architecture (HLA) standard of the Department of Defense. Presents a working foundation necessary for compliance with High Level Architecture (HLA) standards Provides a comprehensive framework for continuous and discrete event modeling and simulation Explores the mathematical foundation of simulation modeling Discusses system morphisms for model abstraction and simplification Presents a new approach to discrete event simulation of continuous processes Includes parallel and distributed simulation of discrete event models Presents a concept to achieve simulator interoperability in the form of the DEVS-Bus Simulation Modeling and Analysis - Averill M. Law 2007 Since the publication of the first edition in 1982, the goal of Simulation Modeling and Analysis has always been to provide a

comprehensive, state-of-the-art, and technically correct treatment of all important aspects of a simulation study. The book strives to make this material understandable by the use of intuition and numerous figures, examples, and problems. It is equally well suited for use in university courses, simulation practice, and self study. The book is widely regarded as the "bible" of simulation and now has more than 100,000 copies in print. The book can serve as the primary text for a variety of courses; for example: *A first course in simulation at the junior, senior, or beginning-graduate-student level in engineering, manufacturing, business, or computer science (Chaps. 1 through 4, and parts of Chaps. 5 through 9). At the end of such a course, the students will be prepared to carry out complete and effective simulation studies, and to take advanced simulation courses. *A second course in simulation for

graduate students in any of the above disciplines (most of Chaps. 5 through 12). After completing this course, the student should be familiar with the more advanced methodological issues involved in a simulation study, and should be prepared to understand and conduct simulation research. *An introduction to simulation as part of a general course in operations research or management science (part of Chaps. 1, 3, 5, 6, and 9).

Simulation Modeling Handbook -
Christopher A. Chung 2003-07-15
The use of simulation modeling and analysis is becoming increasingly more popular as a technique for improving or investigating process performance. This book is a practical, easy-to-follow reference that offers up-to-date information and step-by-step procedures for conducting simulation studies. It provides sample simulation project support materi

Quantitative Analysis for System Applications - Daniel A. McGrath,

Ph.D. 2018-09-05

As data holdings get bigger and questions get harder, data scientists and analysts must focus on the systems, the tools and techniques, and the disciplined process to get the correct answer, quickly! Whether you work within industry or government, this book will provide you with a foundation to successfully and confidently process large amounts of quantitative data. Here are just a dozen of the many questions answered within these pages: What does quantitative analysis of a system really mean? What is a system? What are big data and analytics? How do you know your numbers are good? What will the future data science environment look like? How do you determine data provenance? How do you gather and process information, and then organize, store, and synthesize it? How does an organization

implement data analytics? Do you really need to think like a Chief Information Officer? What is the best way to protect data? What makes a good dashboard? What is the relationship between eating ice cream and getting attacked by a shark? The nine chapters in this book are arranged in three parts that address systems concepts in general, tools and techniques, and future trend topics. Systems concepts include contrasting open and closed systems, performing data mining and big data analysis, and gauging data quality. Tools and techniques include analyzing both continuous and discrete data, applying probability basics, and practicing quantitative analysis such as descriptive and inferential statistics. Future trends include leveraging the Internet of Everything, modeling Artificial Intelligence, and establishing a Data Analytics Support Office (DASO). Many examples are included that were

generated using common software, such as Excel, Minitab, Tableau, SAS, and Crystal Ball. While words are good, examples can sometimes be a better teaching tool. For each example included, data files can be found on the companion website. Many of the data sets are tied to the global economy because they use data from shipping ports, air freight hubs, largest cities, and soccer teams. The appendices contain more detailed analysis including the 10 T's for Data Mining, Million Row Data Audit (MRDA) Processes, Analysis of Rainfall, and Simulation Models for Evaluating Traffic Flow.

Eco-efficiency of Grinding Processes and Systems - Marius Winter

2015-12-21

This research monograph aims at presenting an integrated assessment approach to describe, model, evaluate and improve the eco-efficiency of existing and new grinding processes and systems. Various combinations of

grinding process parameters and system configurations can be evaluated based on the eco-efficiency. The book presents the novel concept of empirical and physical modeling of technological, economic and environmental impact indicators. This includes the integrated evaluation of different grinding process and system scenarios. The book is a valuable read for research experts and practitioners in the field of eco-efficiency of manufacturing processes but the book may also be beneficial for graduate students.

Modelling Event-Based Interactions in Component-Based Architectures for Quantitative System Evaluation - Christoph Rathfelder 2014-07-31

This dissertation thesis presents an approach enabling the modelling and quality-of-service prediction of event-based systems at the architecture-level. Applying a two-step model refinement transformation,

the approach integrates platform-specific performance influences of the underlying middleware while enabling the use of different existing analytical and simulation-based prediction techniques.

Risk Analysis - David Vose 2008-04-28
Risk Analysis concerns itself with the quantification of risk, the modeling of identified risks and how to make decisions from those models. Quantitative risk analysis (QRA) using Monte Carlo simulation offers a powerful and precise method for dealing with the uncertainty and variability of a problem. By providing the building blocks the author guides the reader through the necessary steps to produce an accurate risk analysis model and offers general and specific techniques to cope with most modeling problems. A wide range of solved problems is used to illustrate these techniques and how they can be used together to solve otherwise complex

problems.

Systems Engineering - Reinhard Haberfellner 2019-06-06

This translation brings a landmark systems engineering (SE) book to English-speaking audiences for the first time since its original publication in 1972. For decades the SE concept championed by this book has helped engineers solve a wide variety of issues by emphasizing a top-down approach. Moving from the general to the specific, this SE concept has situated itself as uniquely appealing to both highly trained experts and anybody managing a complex project. Until now, this SE concept has only been available to German speakers. By shedding the overtly technical approach adopted by many other SE methods, this book can be used as a problem-solving guide in a great variety of disciplines, engineering and otherwise. By segmenting the book into separate parts that build upon each other, the

SE concept's accessibility is reinforced. The basic principles of SE, problem solving, and systems design are helpfully introduced in the first three parts. Once the fundamentals are presented, specific case studies are covered in the fourth part to display potential applications. Then part five offers further suggestions on how to effectively practice SE principles; for example, it not only points out frequent stumbling blocks, but also the specific points at which they may appear. In the final part, a wealth of different methods and tools, such as optimization techniques, are given to help maximize the potential use of this SE concept. Engineers and engineering students from all disciplines will find this book extremely helpful in solving complex problems. Because of its practicable lessons in problem-solving, any professional facing a complex project will also find much to learn from

this volume.

Multivariate Statistical Modeling in Engineering and Management -

Jharieswar Maiti 2022-10-25

The book focuses on problem solving for practitioners and model building for academicians under multivariate situations. This book helps readers in understanding the issues, such as knowing variability, extracting patterns, building relationships, and making objective decisions. A large number of multivariate statistical models are covered in the book. The readers will learn how a practical problem can be converted to a statistical problem and how the statistical solution can be interpreted as a practical solution. Key features:

- Links data generation process with statistical distributions in multivariate domain
- Provides step by step procedure for estimating parameters of developed models
- Provides blueprint for data driven decision making
- Includes

practical examples and case studies relevant for intended audiences The book will help everyone involved in data driven problem solving, modeling and decision making.

Guide to Modeling and Simulation of Systems of Systems - Bernard Zeigler
2012-11-29

This guide demonstrates how virtual build and test can be supported by the Discrete Event Systems Specification (DEVS) simulation modeling formalism, and the System Entity Structure (SES) simulation model ontology. The book examines a wide variety of Systems of Systems (SoS) problems, ranging from cloud computing systems to biological systems in agricultural food crops. Features: includes numerous exercises, examples and case studies throughout the text; presents a step-by-step introduction to DEVS concepts, encouraging hands-on practice to building sophisticated SoS models; illustrates virtual build

and test for a variety of SoS applications using both commercial and open source DEVS simulation environments; introduces an approach based on activity concepts intrinsic to DEVS-based system design, that integrates both energy and information processing requirements; describes co-design modeling concepts and methods to capture separate and integrated software and hardware systems.

Simulation and the Monte Carlo Method
- Reuven Y. Rubinstein 2016-11-07

This accessible new edition explores the major topics in Monte Carlo simulation that have arisen over the past 30 years and presents a sound foundation for problem solving Simulation and the Monte Carlo Method, Third Edition reflects the latest developments in the field and presents a fully updated and comprehensive account of the state-of-the-art theory, methods and applications that have emerged in

Monte Carlo simulation since the publication of the classic First Edition over more than a quarter of a century ago. While maintaining its accessible and intuitive approach, this revised edition features a wealth of up-to-date information that facilitates a deeper understanding of problem solving across a wide array of subject areas, such as engineering, statistics, computer science, mathematics, and the physical and life sciences. The book begins with a modernized introduction that addresses the basic concepts of probability, Markov processes, and convex optimization. Subsequent chapters discuss the dramatic changes that have occurred in the field of the Monte Carlo method, with coverage of many modern topics including: Markov Chain Monte Carlo, variance reduction techniques such as importance (re-)sampling, and the transform likelihood ratio method, the score function method for

sensitivity analysis, the stochastic approximation method and the stochastic counter-part method for Monte Carlo optimization, the cross-entropy method for rare events estimation and combinatorial optimization, and application of Monte Carlo techniques for counting problems. An extensive range of exercises is provided at the end of each chapter, as well as a generous sampling of applied examples. The Third Edition features a new chapter on the highly versatile splitting method, with applications to rare-event estimation, counting, sampling, and optimization. A second new chapter introduces the stochastic enumeration method, which is a new fast sequential Monte Carlo method for tree search. In addition, the Third Edition features new material on: • Random number generation, including multiple-recursive generators and the Mersenne Twister • Simulation of Gaussian processes,

Brownian motion, and diffusion processes • Multilevel Monte Carlo method • New enhancements of the cross-entropy (CE) method, including the “improved” CE method, which uses sampling from the zero-variance distribution to find the optimal importance sampling parameters • Over 100 algorithms in modern pseudo code with flow control • Over 25 new exercises Simulation and the Monte Carlo Method, Third Edition is an excellent text for upper-undergraduate and beginning graduate courses in stochastic simulation and Monte Carlo techniques. The book also serves as a valuable reference for professionals who would like to achieve a more formal understanding of the Monte Carlo method. Reuven Y. Rubinstein, DSc, was Professor Emeritus in the Faculty of Industrial Engineering and Management at Technion-Israel Institute of Technology. He served as a consultant at numerous large-scale

organizations, such as IBM, Motorola, and NEC. The author of over 100 articles and six books, Dr. Rubinstein was also the inventor of the popular score-function method in simulation analysis and generic cross-entropy methods for combinatorial optimization and counting. Dirk P. Kroese, PhD, is a Professor of Mathematics and Statistics in the School of Mathematics and Physics of The University of Queensland, Australia. He has published over 100 articles and four books in a wide range of areas in applied probability and statistics, including Monte Carlo methods, cross-entropy, randomized algorithms, tele-traffic theory, reliability, computational statistics, applied probability, and stochastic modeling.

Handbook of Production Scheduling –

Jeffrey W. Herrmann 2006-08-18

This book concentrates on real-world production scheduling in factories

and industrial settings. It includes industry case studies that use innovative techniques as well as academic research results that can be used to improve production scheduling. Its purpose is to present scheduling principles, advanced tools, and examples of innovative scheduling systems to persons who could use this information to improve their own production scheduling.

Mensch und Computer 2015 – Workshopband – Anette Weisbecker
2015-09-14

The Workshop Volume from the Humans and Computers Conference documents the advanced tutorials that were presented to deepen the understanding gained from the conference lectures. It presents case studies along with accompanying exercises.

Discrete-event System Simulation – Jerry Banks 1996

Offers comprehensive coverage of discrete-event simulation, emphasizing and describing the

procedures used in operations research – methodology, generation and testing of random numbers, collection and analysis of input data, verification of simulation models and analysis of output data.

Simulation with Arena – W. David Kelton 2004

The first edition of this book was the first text to be written on the Arena software, which is a very popular simulation modeling software. What makes this text the authoritative source on Arena is that it was written by the creators of Arena themselves. The new third edition follows in the tradition of the successful first and second editions in its tutorial style (via a sequence of carefully crafted examples) and an accessible writing style. The updates include thorough coverage of the new version of the Arena software (Arena 7.01), enhanced support for Excel and Access, and updated examples to reflect the new

version of software. The CD-ROM that accompanies the book contains the Academic version of the Arena software. The software features new capabilities such as model documentation, enhanced plots, file reading and writing, printing and animation symbols.

Modeling and Simulation - Hans-Joachim Bungartz 2013-10-24
Die Autoren führen auf anschauliche und systematische Weise in die mathematische und informatische Modellierung sowie in die Simulation als universelle Methodik ein. Es geht um Klassen von Modellen und um die Vielfalt an Beschreibungsarten. Aber es geht immer auch darum, wie aus Modellen konkrete Simulationsergebnisse gewonnen werden können. Nach einem kompakten Repetitorium zum benötigten mathematischen Apparat wird das Konzept anhand von Szenarien u. a. aus den Bereichen „Spielen - entscheiden - planen“ und „Physik im

Rechner“ umgesetzt.

Simulation Modeling and Arena - Manuel D. Rossetti 2015-06-22
Emphasizes a hands-on approach to learning statistical analysis and model building through the use of comprehensive examples, problems sets, and software applications With a unique blend of theory and applications, Simulation Modeling and Arena®, Second Edition integrates coverage of statistical analysis and model building to emphasize the importance of both topics in simulation. Featuring introductory coverage on how simulation works and why it matters, the Second Edition expands coverage on static simulation and the applications of spreadsheets to perform simulation. The new edition also introduces the use of the open source statistical package, R, for both performing statistical testing and fitting distributions. In addition, the models are presented in a clear and precise pseudo-code form,

which aids in understanding and model communication. Simulation Modeling and Arena, Second Edition also features: Updated coverage of necessary statistical modeling concepts such as confidence interval construction, hypothesis testing, and parameter estimation Additional examples of the simulation clock within discrete event simulation modeling involving the mechanics of time advancement by hand simulation A guide to the Arena Run Controller, which features a debugging scenario New homework problems that cover a wider range of engineering applications in transportation, logistics, healthcare, and computer science A related website with an Instructor's Solutions Manual, PowerPoint® slides, test bank questions, and data sets for each chapter Simulation Modeling and Arena, Second Edition is an ideal textbook for upper-undergraduate and graduate courses in modeling and

simulation within statistics, mathematics, industrial and civil engineering, construction management, business, computer science, and other departments where simulation is practiced. The book is also an excellent reference for professionals interested in mathematical modeling, simulation, and Arena.

Integrated Supply Chain Planning in Chemical Industry - Thomas Kirschstein 2015-01-07

Thomas Kirschstein provides an overview on methods and approaches for planning and optimizing large-scale chemical production networks. The focus is on an integrated modelling of chemical production processes, logistical processes as well as environmental effects. Therefore, a hybrid simulation framework is designed taking into account time series models for modelling chemical production processes, linear optimization models for describing logistical processes

as well as stochastic processes for modelling environmental effects.
Discrete Event Simulation of Bus Terminals - Therese Lindberg
2019-05-06

Public transport is important to society as it provides spatial accessibility and reduces congestion and pollution in comparison to other motorized modes. To assure a high-quality service, all parts of the system need to be well-functioning and properly planned. One important aspect for the system's bus terminals is their capacity. This needs to be high enough to avoid congestion and queues and the delays these may lead to. During planning processes, various suggested designs and solutions for a terminal need to be evaluated. Estimating capacity and how well the suggestions will function is a challenging problem, however. It requires analysis of complex interactions and behaviour of the vehicles. This sort of analyses

can preferably be carried out using microsimulation. Furthermore, a discrete event simulation approach can make use of the fact that the path of a vehicle through a terminal can readily be described by a sequence of events (such as arriving, starting to drive to a stop etc.). The overall aim of this thesis is to investigate how discrete event simulation can be used to evaluate bus terminal design and traffic control policies. The main contribution is the development of a method for bus terminal simulation. As a first step, a discrete event simulation model of a combined bus and tram stop is formulated. The model is tested on a real system where the current design is compared to an alternative one. The test shows that a model developed with a discrete event approach can be used to evaluate the situation at a stop and compare design alternatives. In the next step, a general discrete

event simulation model of bus terminals is formulated. A modular approach is introduced, where a terminal can be constructed from a set of module building blocks. Another important contribution of the model is its spatial resolution that allows for queues and blockages to occur throughout the terminal. By applying the simulation model in a case study, it is shown that the model can be used to evaluate and compare various scenarios related to the layout, number of passengers and the outside traffic situation. Lastly, the bus terminal simulation model is used in a second case study in order to compare model output with empirical data. This study identified a number of factors that may have had an influence on differences between observations and simulation results and that is of interest to look further into. This includes the actual adherence to terminal rules and the effects of model parameters.

Handbook of Research on Discrete Event Simulation Environments: Technologies and Applications - Abu-Taieh, Evon M. O. 2009-10-31

"This book provides a comprehensive overview of theory and practice in simulation systems focusing on major breakthroughs within the technological arena, with particular concentration on the accelerating principles, concepts and applications"--Provided by publisher.

Network Modeling and Simulation - Mohsen Guizani 2010-01-26

Network Modeling and Simulation is a practical guide to using modeling and simulation to solve real-life problems. The authors give a comprehensive exposition of the core concepts in modeling and simulation, and then systematically address the many practical considerations faced by developers in modeling complex large-scale systems. The authors provide examples from computer and telecommunication networks and use

these to illustrate the process of mapping generic simulation concepts to domain-specific problems in different industries and disciplines. Key features: Provides the tools and strategies needed to build simulation models from the ground up rather than providing solutions to specific problems. Includes a new simulation tool, CASiNO built by the authors. Examines the core concepts of systems simulation and modeling. Presents code examples to illustrate the implementation process of commonly encountered simulation tasks. Offers examples of industry-standard modeling methodology that can be applied in steps to tackle any modeling problem in practice.

AnyLogic 7 in Three Days - Ilya Grigoryev 2015-03-20

The first practical textbook on AnyLogic 7 from AnyLogic developers. AnyLogic is the unique simulation software that supports three simulation modeling methods: system

dynamics, discrete event, and agent based modeling and allows you to create multi-method models. The book is structured around four examples: a model of a consumer market, an epidemic model, a job shop model and an airport model. We also give some theory on different modeling methods. You can consider this book as your first guide in studying AnyLogic 7. *Conceptual Modeling for Discrete-Event Simulation* - Stewart Robinson 2010-08-02

Bringing together an international group of researchers involved in military, business, and health modeling and simulation, *Conceptual Modeling for Discrete-Event Simulation* presents a comprehensive view of the current state of the art in the field. The book addresses a host of issues, including: What is a conceptual model? How is conceptual modeling performed in general and in specific modeling domains? What is the role of established approaches in

conceptual modeling? Each of the book's six parts focuses on a different aspect of conceptual modeling for simulation. The first section discusses the purpose and requirements of a conceptual model. The next set of chapters provides frameworks and tools for conceptual modeling. The book then describes the use of soft systems methodology for model structuring as well as the application of software engineering methods and tools for model specification. After illustrating how conceptual modeling is adopted in the military and semiconductor manufacturing, the book concludes with a discussion on future research directions. This volume offers a broad, multifaceted account of the field by presenting diverse perspectives on what conceptual modeling entails. It also provides a basis upon which these perspectives can be compared.

Discrete Event Simulations - Aitor

Goti 2010-08-18

Considered by many authors as a technique for modelling stochastic, dynamic and discretely evolving systems, this technique has gained widespread acceptance among the practitioners who want to represent and improve complex systems. Since DES is a technique applied in incredibly different areas, this book reflects many different points of view about DES, thus, all authors describe how it is understood and applied within their context of work, providing an extensive understanding of what DES is. It can be said that the name of the book itself reflects the plurality that these points of view represent. The book embraces a number of topics covering theory, methods and applications to a wide range of sectors and problem areas that have been categorised into five groups. As well as the previously explained variety of points of view concerning DES, there is one

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additional thing to remark about this book: its richness when talking about actual data or actual data based analysis. When most academic areas are lacking application cases, roughly the half part of the chapters

included in this book deal with actual problems or at least are based on actual data. Thus, the editor firmly believes that this book will be interesting for both beginners and practitioners in the area of DES.