

Modeling And Visualization Of Complex Systems And Enterprises Explorations Of Physical Human Economic And Social Phenomena Stevens Institute Series On Complex Systems And Enterprises

Summary: "These proceedings include the contributions to the 11th international Workshop Vision, Modeling, and Visualization 2006 held in Aachen, Germany. The papers cover the following topics: Image-based Reconstruction -- Textures and Rendering -- GPU-Programming -- Simulation and Visualization -- Image Processing -- Volume Visualization -- Geometry Processing and Rendering."--Publisher description.

This volume constitutes the proceedings of the 18th Asia Simulation Conference, AsiaSim 2018, held in Kyoto, Japan, in August 2018. The 45 revised full papers presented in this volume were carefully reviewed and selected from 90 submissions. The papers are organized in topical sections on modeling and simulation technology; soft computing and machine learning; high performance computing and cloud computing; simulation technology for industry; simulation technology for intelligent society; simulation of instrumentation and control application; computational mathematics and computational science; flow simulation; visualization and computer vision to support simulation.

Juval Portugali The notion of complex artificial environments (CAE) refers to theories of complexity and self-organization, as well as to artifacts in general, and to artificial environments, such as cities, in particular. The link between the two, however, is not trivial. For one thing, the theories of complexity and self-organization originated in the "hard" science and by reference to natural phenomena in physics and biology. The study of artifacts, per contra, has traditionally been the business of the "soft" disciplines in the humanities and social sciences. The notion of "complex artificial environments" thus implies the supposition that the theories of complexity and self-organization, together with the mathematical formalisms and methodologies developed for their study, apply beyond the domain of nature. Such a supposition raises a whole set of questions relating to the nature of 21 century cities and urbanism, to philosophical issues regarding the natural versus the artificial, to the methodological legitimacy of interdisciplinary transfer of theories and methodologies and to the implications that entail the use of sophisticated, state-of-the-art artifacts such as virtual reality (VR) cities and environments. The three-day workshop on the study of complex artificial environments that took place on the island of San Servolo, Venice, during April 1-3, 2004, was a gathering of scholars engaged in the study of the various aspects of CAE.

Suitable as a reference for industry practitioners and as a textbook for classroom use, Case Studies in System of Systems, Enterprise Systems, and Complex Systems Engineering provides a clear understanding of the principles and

practice of system of systems engineering (SoSE), enterprise systems engineering (ESE), and complex systems engineering (CSE). Multiple domain practitioners present and analyze case studies from a range of applications that demonstrate underlying principles and best practices of transdisciplinary systems engineering. A number of the case studies focus on addressing real human needs. Diverse approaches such as use of soft systems skills are illustrated, and other helpful techniques are also provided. The case studies describe, examine, analyze, and assess applications across a range of domains, including: Engineering management and systems engineering education Information technology business transformation and infrastructure engineering Cooperative framework for and cost management in the construction industry Supply chain modeling and decision analysis in distribution centers and logistics International development assistance in a foreign culture of education Value analysis in generating electrical energy through wind power Systemic risk and reliability assessment in banking Assessing emergencies and reducing errors in hospitals and health care systems Information fusion and operational resilience in disaster response systems Strategy and investment for capability developments in defense acquisition Layered, flexible, and decentralized enterprise architectures in military systems Enterprise transformation of the air traffic management and transport network Supplying you with a better understanding of SoSE, ESE, and CSE concepts and principles, the book highlights best practices and lessons learned as benchmarks that are applicable to other cases. If adopted correctly, the approaches outlined can facilitate significant progress in human affairs. The study of complex systems is still in its infancy, and it is likely to evolve for decades to come. While this book does not provide all the answers, it does establish a platform, through which analysis and knowledge application can take place and conclusions can be made in order to educate the next generation of systems engineers.

Prediction of behavior of the dynamical systems, analysis and modeling of its structure is vitally important problem in engineering, economy and science today. Examples of such systems can be seen in the world around us and of course in almost every scientific discipline including such "exotic" domains like the earth's atmosphere, turbulent fluids, economies (exchange rate and stock markets), population growth, physics (control of plasma), information flow in social networks and its dynamics, chemistry and complex networks. To understand such dynamics and to use it in research or industrial applications, it is important to create its models. For this purpose there is rich spectra of methods, from classical like ARMA models or Box Jenkins method to such modern ones like evolutionary computation, neural networks, fuzzy logic, fractal geometry, deterministic chaos and more. This proceeding book is a collection of the accepted papers to conference Nostradamus that has been held in Ostrava, Czech Republic. Proceeding also comprises of outstanding keynote speeches by distinguished guest speakers: Guanrong Chen (Hong Kong), Miguel A. F.

Sanjuan (Spain), Gennady Leonov and Nikolay Kuznetsov (Russia), Petr Škoda (Czech Republic). The main aim of the conference is to create periodical possibility for students, academics and researchers to exchange their ideas and novel methods. This conference will establish forum for presentation and discussion of recent trends in the area of applications of various predictive methods for researchers, students and academics.

An accessible primer on how to create effective graphics from data This book provides students and researchers a hands-on introduction to the principles and practice of data visualization. It explains what makes some graphs succeed while others fail, how to make high-quality figures from data using powerful and reproducible methods, and how to think about data visualization in an honest and effective way. Data Visualization builds the reader's expertise in ggplot2, a versatile visualization library for the R programming language. Through a series of worked examples, this accessible primer then demonstrates how to create plots piece by piece, beginning with summaries of single variables and moving on to more complex graphics. Topics include plotting continuous and categorical variables; layering information on graphics; producing effective "small multiple" plots; grouping, summarizing, and transforming data for plotting; creating maps; working with the output of statistical models; and refining plots to make them more comprehensible. Effective graphics are essential to communicating ideas and a great way to better understand data. This book provides the practical skills students and practitioners need to visualize quantitative data and get the most out of their research findings. Provides hands-on instruction using R and ggplot2 Shows how the "tidyverse" of data analysis tools makes working with R easier and more consistent Includes a library of data sets, code, and functions "This book is a comprehensive and in-depth reference to the most recent developments in the field covering theoretical developments, techniques, technologies, among others"--Provided by publisher.

The field of computer graphics combines display hardware, software, and interactive techniques in order to display and interact with data generated by applications. Visualization is concerned with exploring data and information graphically in such a way as to gain information from the data and determine significance. Visual analytics is the science of analytical reasoning facilitated by interactive visual interfaces. Expanding the Frontiers of Visual Analytics and Visualization provides a review of the state of the art in computer graphics, visualization, and visual analytics by researchers and developers who are closely involved in pioneering the latest advances in the field. It is a unique presentation of multi-disciplinary aspects in visualization and visual analytics, architecture and displays, augmented reality, the use of color, user interfaces and cognitive aspects, and technology transfer. It provides readers with insights into the latest developments in areas such as new displays and new display processors, new collaboration technologies, the role of visual, multimedia, and multimodal user interfaces, visual analysis at extreme scale, and adaptive visualization.

Today one of the hardest parts of computer aided design or analysis is first modeling the design, then recording and verifying it. For example, a typical vehicle such as a tank, automobile, ship or aircraft might be composed of tens of thousands of individual parts. Many of these parts are composed of cylinders, flats, and simple conic curves and surfaces such as are amenable to modeling using a constructive solid geometry (CSG) approach. However, especially with the increasing use of composite materials, many parts are designed using sculptured surfaces. A marriage of these two techniques is now critical to continued development of computer aided design and analysis. Further, the graphical user interfaces used in most modeling systems are at best barely adequate to the required task. Critical work on these interfaces is required to continue pushing back the frontiers. Similarly, once the design is modeled, how are the varied and diverse pieces stored, retrieved, and modified? How are physical interferences prevented or eliminated? Although considerable progress has been made, there are still more questions and frustrations than answers. One of the fundamental problems of the 1990s is and will continue to be modeling. The second problem is interpretation. With the ever increasing computational power available, our ability to generate data far exceeds our ability to interpret, understand, and utilize that data.

Computer Aided techniques, Applications, Systems and tools for Geometric Modeling are extremely useful in a number of academic and industrial settings. Specifically, Computer Aided Geometric Modeling (CAGM) plays a significant role in the construction of - signing and manufacturing of various objects. In addition to its cri- cal importance in the traditional fields of automobile and aircraft manufacturing, shipbuilding, and general product design, more - cently, the CAGM methods have also proven to be indispensable in a variety of modern industries, including computer vision, robotics, medical imaging, visualization, and even media. This book aims to provide a valuable source, which focuses on - terdisciplinary methods and affiliate research in the area. It aims to provide the user community with a variety of Geometric Modeling techniques, Applications, systems and tools necessary for various real life problems in the areas such as: Font Design Medical Visualization Scientific Data Visualization Archaeology Toon Rendering Virtual Reality Body Simulation It also aims to collect and disseminate information in various dis- plines including: Curve and Surface Fitting Geometric Algorithms Scientific Visualization Shape Abstraction and Modeling Intelligent CAD Systems Computational Geometry Solid Modeling v Shape Analysis and Description Industrial Applications The major goal of this book is to stimulate views and provide a source where researchers and practitioners can find the latest dev- opments in the field of Geometric Modeling.

This book deals with the recording, modelling and visualization of cultural heritage (anthropogenic objects and natural scenes) and related processes. The areas discussed include data acquisition, using a variety of sensors (mainly optical sensors and laser scanners); platforms and mobile systems; data

File Type PDF Modeling And Visualization Of Complex Systems And Enterprises Explorations Of Physical Human Economic And Social Phenomena Stevens Institute Series On Complex Systems And Enterprises management and Spatial Information Systems; 3D modeling; and reconstruction, visualization and animation; Virtual and Augmented Reality, including innovative software and hardware systems; applications and interdisciplinary projects. A central focus is the development of methods for automated data processing. The aim of the workshop was to survey recent developments, trends, and new approaches and to bring together the various heterogeneous groups active in cultural heritage (sponsors, archaeologists and architects, scientists in remote sensing, photogrammetry, computer vision and computer graphics etc.). The involvement of these groups, representing both producers and users of information, allowed a cross-fertilisation and a multidisciplinary treatment of the workshop topics. This book offers a comprehensive selection of high-quality contributions from leading international research institutions and other organisations active in cultural heritage, treating theoretical issues as well as projects and applications and representing the cutting edge of this key subject as presented at the workshop organised by the Swiss Federal Institute of Technology (ETH) Zurich at Monte Verità, Ascona, Switzerland on 22-27 May 2005.

The flood of information through various computer networks such as the Internet characterizes the world situation in which we live. Information worlds, often called virtual spaces and cyberspaces, have been formed on computer networks. The complexity of information worlds has been increasing almost exponentially through the exponential growth of computer networks. Such nonlinearity in growth and in scope characterizes information worlds. In other words, the characterization of nonlinearity is the key to understanding, utilizing and living with the flood of information. The characterization approach is by characteristic points such as peaks, pits, and passes, according to the Morse theory. Another approach is by singularity signs such as folds and cusps. Atoms and molecules are the other fundamental characterization approach. Topology and geometry, including differential topology, serve as the framework for the characterization. Topological Modeling for Visualization is a textbook for those interested in this characterization, to understand what it is and how to do it. Understanding is the key to utilizing information worlds and to living with the changes in the real world. Writing this textbook required careful preparation by the authors. There are complex mathematical concepts that require designing a writing style that facilitates understanding and appeals to the reader. To evolve a style, we set as a main goal of this book the establishment of a link between the theoretical aspects of modern geometry and topology, on the one hand, and experimental computer geometry, on the other.

Society is approaching and advancing nano- and microtechnology from various angles of science and engineering. The need for further fundamental, applied, and experimental research is matched by the demand for quality references that capture the multidisciplinary and multifaceted nature of the science. Presenting cutting-edge information that is applicable to many fields, Nano- and Micro-

Electromechanical Systems: Fundamentals of Nano and Microengineering, Second Edition builds the theoretical foundation for understanding, modeling, controlling, simulating, and designing nano- and microsystems. The book focuses on the fundamentals of nano- and microengineering and nano- and microtechnology. It emphasizes the multidisciplinary principles of NEMS and MEMS and practical applications of the basic theory in engineering practice and technology development. Significantly revised to reflect both fundamental and technological aspects, this second edition introduces the concepts, methods, techniques, and technologies needed to solve a wide variety of problems related to high-performance nano- and microsystems. The book is written in a textbook style and now includes homework problems, examples, and reference lists in every chapter, as well as a separate solutions manual. It is designed to satisfy the growing demands of undergraduate and graduate students, researchers, and professionals in the fields of nano- and microengineering, and to enable them to contribute to the nanotechnology revolution.

Modeling and Visualization of Complex Systems and Enterprises Explorations of Physical, Human, Economic, and Social Phenomena John Wiley & Sons
Geometric Modeling and Scientific Visualization are both established disciplines, each with their own series of workshops, conferences and journals. But clearly both disciplines overlap; this observation led to the idea of composing a book on Geometric Modeling for Scientific Visualization.

Supplemented with outstanding graphic charts and helpful analogies, the book features succinct sections and an engaging, easy-to-follow style to help accelerate comprehension. Its quick-access structure makes it a handy reference for established project managers and a wise long-term investment for students and trainees.

This proceedings volume covers the broad interdisciplinary spectrum of scientific computing and presents recent advances in theory, development of methods, and applications in practice. From the reviews: "Bishop and Schroder (both, Univ. of Nebraska at Omaha) have brought together an impressive group of practitioners in the relatively new application of geographic information science to mountain geomorphology. In doing so, they have produced valuable, first, overall coverage of a high-tech approach to mountain, three-dimensional research. More than 40 contributing authors discuss a wide range of related aspects.... The book is well bound and well produced; each chapter provides an extensive source of references. The numerous line drawings are clearly reproduced, although the mediocre quality of photographic reproduction limits the value of air photographs and satellite images. As is characteristic of many edited collections, there is some variation in chapter quality. Some of the writing is so dense that it requires minute concentration--one chapter, for instance, has 14 pages of references from a total of 43 pages. Nevertheless, this is a vital compendium for a rapidly expanding field of research. Summing Up: Recommended. Upper-division undergraduates through professionals." (J. D. Ives, Choice, March 2005)

Virtual Manufacturing presents a novel concept of combining human computer interfaces with virtual reality for discrete and continuous manufacturing systems. The authors address the relevant concepts of manufacturing engineering, virtual reality, and computer science and engineering, before embarking on a description of the methodology for building augmented reality for manufacturing processes and manufacturing systems. Virtual Manufacturing is

centered on the description of the development of augmented reality models for a range of processes based on CNC, PLC, SCADA, mechatronics and on embedded systems. Further discussions address the use of augmented reality for developing augmented reality models to control contemporary manufacturing systems and to acquire micro- and macro-level decision parameters for managers to boost profitability of their manufacturing systems. Guiding readers through the building of their own virtual factory software, Virtual Manufacturing comes with access to online files and software that will enable readers to create a virtual factory, operate it and experiment with it. This is a valuable source of information with a useful toolkit for anyone interested in virtual manufacturing, including advanced undergraduate students, postgraduate students and researchers.

"This book presents high quality research on the design and implementation of information systems in the fields of agronomics, mathematics, economics, computer science, and the environment, offering holistic approaches to the design, development, and implementation of complex agricultural and environmental information systems"--Provided by publisher.

Modeling and Simulation: Theory and Practice provides a comprehensive review of both methodologies and applications of simulation and modeling. The methodology section includes such topics as the philosophy of simulation, inverse problems in simulation, simulation model compilers, treatment of ill-defined systems, and a survey of simulation languages. The application section covers a wide range of topics, including applications to environmental management, biology and medicine, neural networks, collaborative visualization and intelligent interfaces. The book consists of 13 invited chapters written by former colleagues and students of Professor Karplus. Also included are several short 'reminiscences' describing Professor Karplus' impact on the professional careers of former colleagues and students who worked closely with him over the years.

This volume constitutes the refereed post-workshop proceedings of two IFIP WG 13.7 workshops on Human-Computer Interaction and Visualization: the 7th HCIV Workshop on Non-formal Modelling for Interaction Design, held at the 29th European Conference on Cognitive Ergonomics, ECCE 2011, in Rostock, Germany, in August 2011 and the 8th HCIV Workshop on HCI and Visualization, held at the 13th IFIP TC 13 Conference on Human-Computer Interaction, INTERACT 2011, in Lisbon, Portugal, in September 2011. The 15 revised papers presented were carefully reviewed and selected for inclusion in this volume. They cover a wide range of topics in the fields of non-formal modeling, visualization and HCI and provide visions from researchers working at or across the borders between these domains that may help develop a holistic cross-discipline.

Explains multi-level models of enterprise systems and covers modeling methodology This book addresses the essential phenomena underlying the overall behaviors of complex systems and enterprises. Understanding these phenomena can enable improving these systems. These phenomena range from physical, behavioral, and organizational, to economic and social, all of which involve significant human components. Specific phenomena of interest and how they are represented depend on the questions of interest and the relevant domains or contexts.

Modeling and Visualization of Complex Systems and Enterprises examines visualization of phenomena and how understanding the relationships among phenomena can provide the basis for understanding where deeper exploration is warranted. The author also reviews mathematical and computational models, defined very broadly across disciplines, which can enable deeper understanding. Presents a 10 step methodology for addressing questions associated with the design or operation of complex systems and enterprises Examines six archetypal enterprise problems including two from healthcare, two from urban systems, and one each from financial systems and defense systems Provides an introduction to the nature of complex systems, historical perspectives on complexity and complex adaptive systems, and the evolution of systems practice Modeling and Visualization of Complex Systems and

Enterprises is written for graduate students studying systems science and engineering and professionals involved in systems science and engineering, those involved in complex systems such as healthcare delivery, urban systems, sustainable energy, financial systems, and national security.

Fragmentation: Toward Accurate Calculations on Complex Molecular Systems introduces the reader to the broad array of fragmentation and embedding methods that are currently available or under development to facilitate accurate calculations on large, complex systems such as proteins, polymers, liquids and nanoparticles. These methods work by subdividing a system into subunits, called fragments or subsystems or domains. Calculations are performed on each fragment and then the results are combined to predict properties for the whole system. Topics covered include: Fragmentation methods Embedding methods Explicitly correlated local electron correlation methods Fragment molecular orbital method Methods for treating large molecules This book is aimed at academic researchers who are interested in computational chemistry, computational biology, computational materials science and related fields, as well as graduate students in these fields.

Information visualization is not only about creating graphical displays of complex and latent information structures. It also contributes to a broader range of cognitive, social, and collaborative activities. This is the first book to examine information visualization from this perspective. This 2nd edition continues the unique and ambitious quest for setting information visualization and virtual environments in a unifying framework. It pays special attention to the advances made over the last 5 years and potentially fruitful directions to pursue. It is particularly updated to meet the need for practitioners. The book is a valuable source for researchers and graduate students.

An insightful presentation of the key concepts, paradigms, and applications of modeling and simulation Modeling and simulation has become an integral part of research and development across many fields of study, having evolved from a tool to a discipline in less than two decades. Modeling and Simulation Fundamentals offers a comprehensive and authoritative treatment of the topic and includes definitions, paradigms, and applications to equip readers with the skills needed to work successfully as developers and users of modeling and simulation. Featuring contributions written by leading experts in the field, the book's fluid presentation builds from topic to topic and provides the foundation and theoretical underpinnings of modeling and simulation. First, an introduction to the topic is presented, including related terminology, examples of model development, and various domains of modeling and simulation. Subsequent chapters develop the necessary mathematical background needed to understand modeling and simulation topics, model types, and the importance of visualization. In addition, Monte Carlo simulation, continuous simulation, and discrete event simulation are thoroughly discussed, all of which are significant to a complete understanding of modeling and simulation. The book also features chapters that outline sophisticated methodologies, verification and validation, and the importance of interoperability. A related FTP site features color representations of the book's numerous figures. Modeling and Simulation Fundamentals encompasses a comprehensive study of the discipline and is an excellent book for modeling and simulation courses at the upper-undergraduate and graduate levels. It is also a valuable reference for researchers and practitioners in the fields of computational statistics, engineering, and computer science who use statistical modeling techniques.

This volume constitutes the proceedings of the 19th Asia Simulation Conference,

AsiaSim 2019, held in Singapore, Singapore, in October 2019. The 19 revised full papers and 5 short papers presented in this volume were carefully reviewed and selected from 36 submissions. The papers are organized in topical sections on simulation and modeling methodology; numerical and Monte Carlo simulation; simulation applications: blockchain, deep learning and cloud; simulation and visualization; simulation applications; short papers.

This volume describes frontiers in social-behavioral modeling for contexts as diverse as national security, health, and on-line social gaming. Recent scientific and technological advances have created exciting opportunities for such improvements. However, the book also identifies crucial scientific, ethical, and cultural challenges to be met if social-behavioral modeling is to achieve its potential. Doing so will require new methods, data sources, and technology. The volume discusses these, including those needed to achieve and maintain high standards of ethics and privacy. The result should be a new generation of modeling that will advance science and, separately, aid decision-making on major social and security-related subjects despite the myriad uncertainties and complexities of social phenomena. Intended to be relatively comprehensive in scope, the volume balances theory-driven, data-driven, and hybrid approaches. The latter may be rapidly iterative, as when artificial-intelligence methods are coupled with theory-driven insights to build models that are sound, comprehensible and usable in new situations. With the intent of being a milestone document that sketches a research agenda for the next decade, the volume draws on the wisdom, ideas and suggestions of many noted researchers who draw in turn from anthropology, communications, complexity science, computer science, defense planning, economics, engineering, health systems, medicine, neuroscience, physics, political science, psychology, public policy and sociology. In brief, the volume discusses: Cutting-edge challenges and opportunities in modeling for social and behavioral science Special requirements for achieving high standards of privacy and ethics New approaches for developing theory while exploiting both empirical and computational data Issues of reproducibility, communication, explanation, and validation Special requirements for models intended to inform decision making about complex social systems

THE PROJECT MANAGEMENT CLASSIC-REVISED AND EXPANDED Now Includes Downloadable Forms and Worksheets Projects are becoming the heart of business. This comprehensive revision of the bestselling guide to project management explains the processes, practices, and management techniques you need to implement a successful project culture within your team and enterprise. Visualizing Project Management simplifies the challenge of managing complex projects with powerful, visual models that have been adopted by more than 100 leading government and private organizations. In this new Third Edition, the authors-leading thinkers and practitioners in the field-keep you on the cutting edge with a sophisticated approach that integrates project management, systems engineering, and process improvement. This advanced content can help take your career and your organization well beyond the fundamentals. New, downloadable forms, templates, and worksheets make it easy to implement powerful project techniques and tools. Includes references to the Project Management Institute Body of Knowledge and the INCOSE Handbook to help you pass: The Project Management Professional Certification Exam The INCOSE Systems Engineer Certification Exam (CSEP) "I recommend this book to all those who aspire to

project management [and] those who must supervise it." —Norman R. Augustine, former chairman and CEO Lockheed Martin Corporation "The importance of this excellent book, able to encompass these two key disciplines [systems engineering and project management], cannot be overemphasized." —Heinz Stoewer, President, INCOSE Boundaries of Rock Mechanics. Recent Advances and Challenges for the 21st Century contains 180 papers from the International Young Scholars Symposium on Rock Mechanics 2008 (Beijing, China, 28 April-2 May 2008). The symposium was organized by the ISRM Commission on Education, and sponsored by the International Society for Rock Mechanics (ISRM) and

This book contains papers presented at the Workshop on the Analysis of Large-scale, High-Dimensional, and Multi-Variate Data Using Topology and Statistics, held in Le Barp, France, June 2013. It features the work of some of the most prominent and recognized leaders in the field who examine challenges as well as detail solutions to the analysis of extreme scale data. The book presents new methods that leverage the mutual strengths of both topological and statistical techniques to support the management, analysis, and visualization of complex data. It covers both theory and application and provides readers with an overview of important key concepts and the latest research trends. Coverage in the book includes multi-variate and/or high-dimensional analysis techniques, feature-based statistical methods, combinatorial algorithms, scalable statistics algorithms, scalar and vector field topology, and multi-scale representations. In addition, the book details algorithms that are broadly applicable and can be used by application scientists to glean insight from a wide range of complex data sets.

Explains multi-level models of enterprise systems and covers modeling methodology This book addresses the essential phenomena underlying the overall behaviors of complex systems and enterprises. Understanding these phenomena can enable improving these systems. These phenomena range from physical, behavioral, and organizational, to economic and social, all of which involves significant human components. Specific phenomena of interest and how they are represented depend on the questions of interest and the relevant domains or contexts. Modeling and Visualization of Complex Systems and Enterprises examines visualization of phenomena and how understanding the relationships among phenomena can provide the basis for understanding where deeper exploration is warranted. The author also reviews mathematical and computational models, defined very broadly across disciplines, which can enable deeper understanding. Presents a 10 step methodology for addressing questions associated with the design or operation of complex systems and enterprises Examines six archetypal enterprise problems including two from healthcare, two from urban systems, and one each from financial systems and defense systems Provides an introduction to the nature of complex systems, historical perspectives on complexity and complex adaptive systems, and the evolution of systems practice Modeling and Visualization of Complex Systems and Enterprises is written for graduate students studying system science and engineering and professionals involved in system science and engineering, those involved in complex systems such as healthcare delivery, urban systems, sustainable energy, financial systems, and national security.

Fuzzy cognitive maps (FCMs) have gained popularity in the scientific community

due to their capabilities in modeling and decision making for complex problems. This book presents a novel algorithm called glassoFCM to enable automatic learning of FCM models from data. Specifically, glassoFCM is a combination of two methods, glasso (a technique originated from machine learning) for data modeling and FCM simulation for decision making. The book outlines that glassoFCM elaborates simple, accurate, and more stable models that are easy to interpret and offer meaningful decisions. The research results presented are based on an investigation related to a real-world business intelligence problem to evaluate characteristics that influence employee work readiness. Finally, this book provides readers with a step-by-step guide of the 'fcm' package to execute and visualize their policies and decisions through the FCM simulation process.

A comprehensive text that reviews the methods and technologies that explore emergent behavior in complex systems engineering in multidisciplinary fields In Emergent Behavior in Complex Systems Engineering, the authors present the theoretical considerations and the tools required to enable the study of emergent behaviors in manmade systems. Information Technology is key to today's modern world. Scientific theories introduced in the last five decades can now be realized with the latest computational infrastructure. Modeling and simulation, along with Big Data technologies are at the forefront of such exploration and investigation. The text offers a number of simulation-based methods, technologies, and approaches that are designed to encourage the reader to incorporate simulation technologies to further their understanding of emergent behavior in complex systems. The authors present a resource for those designing, developing, managing, operating, and maintaining systems, including system of systems. The guide is designed to help better detect, analyse, understand, and manage the emergent behaviour inherent in complex systems engineering in order to reap the benefits of innovations and avoid the dangers of unforeseen consequences. This vital resource: Presents coverage of a wide range of simulation technologies Explores the subject of emergence through the lens of Modeling and Simulation (M&S) Offers contributions from authors at the forefront of various related disciplines such as philosophy, science, engineering, sociology, and economics Contains information on the next generation of complex systems engineering Written for researchers, lecturers, and students, Emergent Behavior in Complex Systems Engineering provides an overview of the current discussions on complexity and emergence, and shows how systems engineering methods in general and simulation methods in particular can help in gaining new insights in complex systems engineering.

This book constitutes the refereed proceedings of the 16th International Conference on Principles and Practice of Multi-Agent Systems, PRIMA 2013, held in Dunedin, New Zealand, in December 2013. The conference was co-located with the 26th Australasian Artificial International Conference, AI 2013. The 24 revised full papers presented together with 18 short papers and 2 invited

papers were carefully reviewed and selected from 81 submissions. The papers are organized in topical sections on foundations of agents and multi-agent systems; agent and multi-agent system architectures; agent-oriented software engineering; agent-based modelling and simulation; cooperation/collaboration, coordination/communication; hybrid technologies, application domains; and applications.

Energy exchange is a major foundation of the dynamics of physical systems, and, hence, in the study of complex multi-domain systems, methodologies that explicitly describe the topology of energy exchanges are instrumental in structuring the modeling and the computation of the system's dynamics and its control. This book is the outcome of the European Project "Geoplex" (FP5 IST-2001-34166) that studied and extended such system modeling and control methodologies. This unique book starts from the basic concept of port-based modeling, and extends it to port-Hamiltonian systems. This generic paradigm is applied to various physical domains, showing its power and unifying flexibility for real multi-domain systems.

This four-volume set (CCIS 643, 644, 645, 646) constitutes the refereed proceedings of the 16th Asia Simulation Conference and the First Autumn Simulation Multi-Conference, AsiaSim / SCS AutumnSim 2016, held in Beijing, China, in October 2016. The 265 revised full papers presented were carefully reviewed and selected from 651 submissions. The papers in this third volume of the set are organized in topical sections on Cloud technologies in simulation applications; fractional calculus with applications and simulations; modeling and simulation for energy, environment and climate; SBA virtual prototyping engineering technology; simulation and Big Data.

This book emerged out of international conferences organized as part of the AAI Fall Symposia series, and the Swarmfest 2017 conference. It brings together researchers from diverse fields studying these complex systems using CAS and agent-based modeling tools and techniques. In the past, the knowledge gained in each domain has largely remained exclusive to that domain. By bringing together scholars who study these phenomena, the book takes knowledge from one domain to provide insight into others. Most interesting phenomena in natural and social systems include constant transitions and oscillations among their various phases – wars, companies, societies, markets, and humans rarely stay in a stable, predictable state for long. Randomness, power laws, and human behavior ensure that the future is both unknown and challenging. How do events unfold? When do they take hold? Why do some initial events cause an avalanche while others do not? What characterizes these events? What are the thresholds that differentiate a sea change from a non-event? Complex adaptive systems (CAS) have proven to be a powerful tool for exploring these and other related phenomena. The authors characterize a general CAS model as having a large number of self-similar agents that: 1) utilize one or more levels of feedback; 2) exhibit emergent properties and self-

File Type PDF Modeling And Visualization Of Complex Systems And Enterprises Explorations Of Physical Human Economic And Social Phenomena Stevens Institute Series On Complex Systems And Enterprises organization; and 3) produce non-linear dynamic behavior. Advances in modeling and computing technology have led not only to a deeper understanding of complex systems in many areas, but they have also raised the possibility that similar fundamental principles may be at work across these systems, even though the underlying principles may manifest themselves differently.

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