SCSC2005 Tutorials
July 24-28, 2005
Hilton Philadelphia/Cherry Hill
Philadelphia, USA

SCSC2005_T1

Deterministic Analysis of Discrete Stochastic Models: Proxel-Based Simulation

Sanja Lazarova-Molnar, University of Magdeburg, Germany - sanja77@gmx.net

Abstract

The proxel-based method was recently developed for simulation of discrete stochastic models. The method approaches the problem in a very intuitive manner and it works by exploring all of the possible behaviours of the model. The proxel simulation can be also interpreted as solving a specific Markov chain, creating the probabilities for the state changes on-the-fly. We believe that besides the fact that the method can be competitive for certain classes of models, that it is especially useful for the purpose of learning how discrete stochastic models behave and the way the probability flows.

List of Topics

1. Introduction: Discrete stochastic models and the ways to describe them
2. Proxel-based simulation
3. Demonstrating the proxel simulation tool

The goal of this tutorial is to bring the method closer to the audience so that it could be put into practice and applied for solving different types of discrete stochastic models. Because of the intuitiveness of the method, it represents a good way of explaining what a discrete stochastic model is and what its simulation means.

The full tutorial is expected to be half a day long, while its target audience is people teaching simulation, researchers doing simulation in industry, simulation practitioners.

Instructor's biography

Sanja Lazarova-Molnar was born in Skopje, Macedonia and went to "Sts. Cyril and Methodius" University in Skopje where she obtained her degree in Computer Science. She continued her studies in Magdeburg from where she obtained her Masters degree in Computational Visualistics. At the moment she is a member of the Simulation and Modelling group at the university in Magdeburg working towards her PhD in the field of Simulation. She works as a teaching and research assistant and have conducted the exercises for the following courses: Introduction to Simulation and Advanced Discrete Modelling, where she conducted the lectures on the Proxel-Based Simulation (the topic of her PhD) two years in a row. She can be reached at sanja@isg.cs.uni-magdeburg.de

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SCSC2005_T2

Web Based Multi-Paradigm Simulation

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Abstract

This half day tutorial will provide a quick overview of discrete event, system dynamics, and agent based simulation techniques. The tutorial compares the three simulation paradigms and their relative strengths and weaknesses. We then provide an overview of emerging requirements of complex systems and architectures and the need for multi-paradigm simulations. The tutorial then provides an overview of multi-paradigm / hybrid modeling and simulation for complex systems. The tutorial then goes into development of an example multi-paradigm simulation, using AnyLogic, illustrating the concepts from different paradigms and benefits of using a hybrid approach. The tutorial ends by demonstrating how a web-based simulation is created from the hybrid model.

- List of Topics: Modeling and Simulation languages, system dynamics representation, web based architectures and implementation, agent directed simulation,
- Motivation (relevance to the conference themes) : The tutorial is very relevant to the simulation community.
- Target audience : M&S Developers, End Users

This tutorial is expected to be Half Day long.

Instructor's biography

Bipin Chadha is the founder of Coensys, Inc. that has been providing advanced collaborative modeling and simulation solutions to companies like Lockheed Martin and Northrop Grumman in areas ranging from wargaming and logistics to business process simulation and business intelligence. His current area of research is in Multi-Paradigm simulations and collaborative systems. Prior to Coensys, he worked as a Principal Member for Lockheed Martin where he was responsible for architecting simulation based acquisition solutions for programs such as DD-21 and FCS. He was also responsible for training team members on various simulation methodologies. He has been involved in the development of discrete event, system dynamics and agent-based simulations for various projects for ONR, MDA, and DARPA. Prior to Lockheed Martin he worked as a senior consultant for Intergraph. He received his Ph.D. from Georgia Institute of Technology, and his MS from Southern Illinois University-Carbondale. He has taught several courses at SIU-C and Georgia Tech where he received a teaching award for development of new course material and teaching at Georgia Tech.

SCSC2005 Tutorials

SCSC2005_T3

Design of Experiments for Simulation Projects

Edward Williams,PMCorp, USA, ewilliams@pmcorp.com

Enrico Bocca, Liophant Simulation, enrico.bocca@liophant.org

Abstract

This tutorial is devoted to using DOE (Design of Experiments) in Simulation projects for completing experimental analysis of results; the course include ANOVA analysis applied to Stochastic Discrete Event Simulation as well as Factorial and Composite Designed for Sensitivity Analysis and Meta-modeling. Critical Issues on DOE applied to simulation are highlighted and a detailed overview of techniques and real examples is provided to the attendees. The different approaches provided by the experts of DOE are proposed as well as considerations to be used with Industrial Simulators (i.e. Discrete Variables, Optimization Critical Issues and Performance Limits). The attendees are expected to have some basic background in statistics.

Instructor's biography

Edward J. Williams holds bachelor's and master's degrees in mathematics. He joined Ford Motor Co. in 1972, where he worked until retirement in Dec.2001. After retirement from Ford, he joined Production Modeling Corporation, Dearborn, Michigan (www.pmcorp.com), as a senior simulation analyst. Also, since 1980, he has taught simulation evening classes at the Univ. of Michigan. He serves on the editorial board of the International Journal of Industrial Engineering - Applications and Practice. During the last several years, he has given invited plenary addresses on simulation and statistics at conferences in México; Turkey; Italy; and Latvia.

Enrico Bocca achieved the Logistics and Production Engineering degree in 1999 and completed during 2003 the thesis on "Innovative Technology Management in Retail Sector". During 2003 June-July he participated to IEPAL experience coordinating an International Team of Engineering and MBA Students. He worked as consultant on different initiatives: BRB Studio, Business Plans related to R&D Projects; Logistics and Project Management for CFLI, currently he works as researcher in Simulation Team of DIP with special attention to Logistics in Retail Business.

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SCSC2005_T4

Simulation for Time Series Analysis and Forecasts

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Enrico Briano, Liophant Simulation, enrico.briano@liophant.org

Abstract

This Tutorial focuses an providing an overview about benefits of using the Simulation for Time Series Analysis and forecasts.

The tutorial include an overview about the methodologies to model these phenomena and for analyzing data; the tutorial includes applicative introduction to both Time Series Analysis, Moving Average and Exponential Smoothing, ARMA and ARIMA; the tutorial proceeds in presenting simulation as support for estimating effectiveness of different techniques in forecasting considering stochastic nature of processes to be investigated, cluster analysis and constraints influence.

Indeed the tutorial discusses fundamentals about the common use forecast models and time series analysis in different applications: demand analysis, logistics, planning, etc.

The tutorial includes examples and exercises for demonstrating the techniques; some background in engineering or statistics could be useful, however all the fundamental elements will be transferred during the course.

Instructor's biography

Roberto Mosca is Full Professor at the University of Genoa. He has worked in the simulation sector since 1969 using discrete and stochastic industrial simulators for off_line and on_ line applications. He was Director of ITIM (Institute for Technology, Industrial Engineering and Manufacturing), DIP (Department of Industrial Production) and DIPEM (Department of Industrial Production, Engineering and Mathematical Modelling). Currently he is Director of DIPTEM (Department of Industrial Production, Technology, Engineering and Modelling), Dipartimento di Ingegneria della Produzione, Termotecnica e Modelli Matematici) in University of Genoa.

Enrico Briano completed his engineering studies in Management Engineering with 109/110. Since 1996 he is Liophant Founder member where he was youngest fellow (www.liophant.org). In 2002 he attended to a special industrial module of IEPAL project devoted to define the requirements for a new supply chain solution for Venice Area. He completed his Thesis defense in 2004 on Re-Engineering of a Aerospace Industry involved in Executive plane production.

SCSC2005_T5

Ethics in Simulation (SimEthics)

Tuncer Ören, MISS - Ottawa Center, ON Canada - oren@site.uottawa.ca

Description

The importance and the scope of application areas of modelling and simulation are growing. This obliges us, i.e., simulation professionals, to re-examine our field and reflect upon whether or not those who are involved in any aspect of it have any responsibility. Professional ethics consists of the rules or standards governing the conduct of a person or the members of a profession. SCS (Society for Modeling and Simulation International) has adopted, effective January 1, 2004, a Code of Professional Ethics for Simulationists. The code is already adopted by other organizations affecting 100s of individuals and this number is increasing.

In the tutorial, the following issues will be covered:

- Importance of M&S: What can go wrong if M&S is not done properly?
- Why ethics is needed in M&S activities?
- Stakeholders in M&S and their responsibilities to whom
- Sources of ethical behavior
- Codes of professional ethics
- Elements of Code of Ethics for Simulationists
- Organizations which adopted Code of Ethics for Simulationists
- Where to go from here?

Instructor's biography

Tuncer Ören is a professor emeritus of computer science at the School of Information Technology and Engineering of the University of Ottawa (Canada). He has extensively contributed to: (1) the advancement of the state-of-the art in simulation methodology, (2) the synergy of simulation, system theories, cybernetics, artificial intelligence, and software engineering, (3) the reliability issues in modeling and simulation, and (4) ethics in simulation. Has over 340 *publications*. Contributions in about 300 *conferences* and *seminars* held in nearly 30 countries. He is a member of the Board of Directors, AVP on Ethics, Chair of the Ethics Committee, and Director of the M&SNet (McLeod Network of Modeling and Simulation) of the Society for Modeling and Simulation International. http://www.site.uottawa.ca/~oren/