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| Autore                  | Yalaoui Alice                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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| Collana                 | Automation-control and industrial engineering series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Altri autori (Persone)  | YalaouiAlice                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Disciplina              | 511.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Soggetti                | Computer science - Mathematics<br>Logistics - Mathematical models                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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| Nota di contenuto       | Cover; Title Page; Copyright Page; Table of Contents; Introduction; Chapter 1. Modeling and Performance Evaluation; 1.1. Introduction; 1.2. Markovian processes; 1.2.1. Overview of stochastic processes; 1.2.2. Markov processes; 1.2.2.1. Basics; 1.2.2.2. Chapman-Kolmogorov equations; 1.2.2.3. Steady-state probabilities; 1.2.2.4. Graph associated with a Markov process; 1.2.2.5. Application to production systems; 1.2.3. Markov chains; 1.2.3.1. Basics; 1.2.3.2. State probability vectors; 1.2.3.3. Fundamental equation of a Markov chain; 1.2.3.4. Graph associated with a Markov chain 1.2.3.5. Steady states of ergodic Markov chains1.2.3.6. Application to production systems; 1.3. Petri nets; 1.3.1. Introduction to Petri nets; 1.3.1.1. Basic definitions; 1.3.1.2. Dynamics of Petri nets; 1.3.1.3. Specific structures; 1.3.1.4. Tools for Petri net analysis; 1.3.1.5. Properties of Petri nets; 1.3.2. Non-autonomous Petri nets; 1.3.3. Timed Petri nets; 1.3.4. Continuous Petri nets; 1.3.4.1. Fundamental |

equation and performance analysis; 1.3.4.2. Example; 1.3.5. Colored Petri nets; 1.3.6. Stochastic Petri nets; 1.3.6.1. Firing time; 1.3.6.2. Firing selection policy  
 1.3.6.3. Service policy; 1.3.6.4. Memory policy; 1.3.6.5. Petri net analysis; 1.3.6.6. Marking graph; 1.3.6.7. Generator of Markovian processes; 1.3.6.8. Fundamental equation; 1.3.6.9. Steady-state probabilities; 1.3.6.10. Performance indices (steady state); 1.4. Discrete-event simulation; 1.4.1. The role of simulation in logistics systems analysis; 1.4.2. Components and dynamic evolution of systems; 1.4.3. Representing chance and the Monte Carlo method; 1.4.3.1. Uniform distribution  $U[0, 1]$ ; 1.4.3.2. The Monte Carlo method; 1.4.4. Simulating probability distributions  
 1.4.4.1. Simulating random events; 1.4.4.2. Simulating discrete random variables; 1.4.4.3. Simulating continuous random variables; 1.4.5. Discrete-event systems; 1.4.5.1. Key aspects of simulation; 1.5. Decomposition method; 1.5.1. Presentation; 1.5.2. Details of the method; Chapter 2. Optimization; 2.1. Introduction; 2.2. Polynomial problems and NP-hard problems; 2.2.1. The complexity of an algorithm; 2.2.2. Example of calculating the complexity of an algorithm; 2.2.3. Some definitions; 2.2.3.1. Polynomial-time algorithms; 2.2.3.2. Pseudo-polynomial-time algorithms; 2.2.3.3. Exponential-time algorithms; 2.2.4. Complexity of a problem; 2.2.4.1. Polynomial-time problems; 2.2.4.2. NP-hard problems; 2.3. Exact methods; 2.3.1. Mathematical programming; 2.3.2. Dynamic programming; 2.3.3. Branch and bound algorithm; 2.4. Approximate methods; 2.4.1. Genetic algorithms; 2.4.1.1. General principles; 2.4.1.2. Encoding the solutions; 2.4.1.3. Crossover operators; 2.4.1.4. Mutation operators; 2.4.1.5. Constructing the population in the next generation; 2.4.1.6. Stopping condition; 2.4.2. Ant colonies; 2.4.2.1. General principle  
 2.4.2.2. Management of pheromones: example of the traveling salesman problem

## Sommario/riassunto

This book aims to help engineers, Masters students and young researchers to understand and gain a general knowledge of logistic systems optimization problems and techniques, such as system design, layout, stock management, quality management, lot-sizing or scheduling. It summarizes the evaluation and optimization methods used to solve the most frequent problems. In particular, the authors also emphasize some recent and interesting scientific developments, as well as presenting some industrial applications and some solved instances from real-life cases. Performance evaluation tools (Pet