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Nota di contenuto	Contents; Preface; Acknowledgments; Introduction; 1.1 Overview of the Remaining Chapters; 1.2 Summary of Key Concepts and Ideas; 1.3 Symbols and Notation; 1 System Analysis; 1.1 Uncertainty; 1.2 The Art of Modelling: Linkage; 1.3 Dynamic Systems; 1.4 Example: Coupled Tanks Model; 2 Uncertainty Techniques; 2.1 The Least-Squares Criterion; 2.1.1 Example: Regression Line; 2.1.2 Example: Fourier Series; 2.2 Maximum Likelihood Estimation; 2.2.1 Example: ML- Estimates; 2.2.2 The EM Algorithm; 2.3 Stochastic Processes; 2.3.1 Example: Kalman-Bucy Filtering; 3 Learning from Data: System Identification 3.1 The Probabilistic Perspective3.2 Kernel Density Estimation; 3.3 Basis Function Approximation; 3.4 Example: EM Algorithm; 3.5 Discussion: Modelling and Identification; 4 Propositions as Subsets of the Data Space; 4.1 Hard-c-Means Clustering; 4.2 Least-Squares Functional: Fuzzy Clustering; 4.3 Example: Hard vs. Fuzzy Clustering;

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	<ul> <li>4.4 Orthogonal Transformation; 4.5 Example: Classification; 4.6 Similarity-Based Reasoning; 4.7 The Quotient Induced by Similarity Relations; 5 Fuzzy Systems and Identification; 5.1 Fuzzy Systems Model Structures; 5.2 Identification of Antecedent Fuzzy Sets</li> <li>5.3 Parameter Identification in the Takagi-Sugeno Model5.4 Example: TS-Modelling and Identification; 5.5 Example: Prediction of a Chaotic Time-Series; 5.6 Discussion; 5.7 Regression Models and Fuzzy Clustering; 5.8 Example: pH Neutralization Process; 6 Random-Set Modelling and Identification; 6.1 Random Variables, Point-Valued Maps; 6.2 Random-Sets, Multi-Valued Maps; 6.3 A Random-Set Approach to System Identification; 6.4 Example 1: Nonlinear AR Process; 6.5 Example 2: Box- Jenkins Gas-Furnace Data; 7 Certain Uncertainty; 7.1 Uncertainty in Systems Analysis 7.2 A Fuzzy Prepositional Calculus7.2.1 Probabilistic Logic; 7.2.2 Classical Two-Valued Logic; 7.2.3 Approximate Reasoning; 8 Fuzzy Inference Engines; 8.1 Composition-Based Inference; 8.2 Individual- Rule-Based Inference; 8.3 Fuzzy Systems as Nonlinear Mappings; 8.4 Example: Comparison of Inference Engines; 9 Fuzzy Classification; 9.1 Equivalence of Fuzzy and Statistical Classifier; 9.2 Fuzzy Rule-Based Classifier Design; 10 Fuzzy Control; 10.1 PI-Control vs. Fuzzy PI- Control; 10.2 Example 1: First-Order System with Dead-Time; 10.3 Example 2: Coupled Tanks; 11 Fuzzy Mathematics 11.1 The Algebra of Fuzzy Sets11.2 The Extension Principle; 11.3 Fuzzy Rules and Fuzzy Graphs; 11.4 Fuzzy Logic; 11.5 A Bijective Probability - Possibility Transformation; 11.6 Example: Maintenance Decision Making; 11.7 Example: Evaluating Student Performances; 12 Summary; 12.1 System Representations; 12.2 More Philosophical Ideas; 12.2.1 Data Engineering; 13 Appendices; 13.1 Sets, Relations, Mappings; 13.2 Measuring Forecast Accuracy; 13.3 (Hierarchical) Clustering; 13.4 Measure Spaces and Integrals; 13.5 Unbiasedness of Estimators; 13.6 Statistical Reasoning; 13.7 Frequency Analysis; Index A</li> </ul>
Sommario/riassunto	Although data engineering is a multi-disciplinary field with applications in control, decision theory, and the emerging hot area of bioinformatics, there are no books on the market that make the subject accessible to non-experts. This book fills the gap in the field, offering a clear, user-friendly introduction to the main theoretical and practical tools for analyzing complex systems. An ftp site features the corresponding MATLAB and Mathematical tools and simulations.Market: Researchers in data management, electrical engineering, computer science, and life sciences.