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Titolo	Introductory Statistics and Random Phenomena : Uncertainty, Complexity and Chaotic Behavior in Engineering and Science / / by Manfred Denker, Wojbor Woyczynski
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Descrizione fisica	1 online resource (XXVI, 509 p. 10 illus.)
Collana	Modern Birkhäuser Classics, , 2197-1811
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Soggetti	Mathematics - Data processing Statistics Computational Science and Engineering Statistics in Engineering, Physics, Computer Science, Chemistry and Earth Sciences
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Nota di contenuto	Preface -- Introduction -- Notation and Abbreviations -- Part I: Descriptive Statistics - Compressing Data -- Why One Needs to Analyze Data -- Data Representation and Compression -- Analytics Representation of Random Experimental Data -- Part II: Modeling Uncertainty -- Algorithmic Complexity and Random Strings -- Statistical Independence and Kolmogorov's Probability Theory -- Chaos in Dynamical Systems: How Uncertainty Arises in Scientific and Engineering Phenomena -- Part III: Model Specification Design of Experiments -- General Principles of Statistical Analysis -- Statistical Inference for Normal Populations -- Analysis of Variance -- Appendix A: Uncertainty Principle in Signal Processing and Quantum Mechanics -- Appendix B: Fuzzy Systems and Logic -- Appendix C: A Critique of Pure Reason -- Appendix D: The Remarkable Bernoulli Family -- Uncertain Virtual Worlds Mathematica Packages -- Appendix F: Tables -- Index.
Sommario/riassunto	Introductory Statistics and Random Phenomena integrates traditional statistical data analysis with new computational experimentation capabilities and concepts of algorithmic complexity and chaotic

behavior in nonlinear dynamic systems. This was the first advanced text/reference to bring together such a comprehensive variety of tools for the study of random phenomena occurring in engineering and the natural, life, and social sciences. The crucial computer experiments are conducted using the readily available computer program Mathematica® Uncertain Virtual Worlds™ software packages which optimize and facilitate the simulation environment. Brief tutorials are included that explain how to use theMathematica® programs for effective simulation and computer experiments. Large and original real-life data sets are introduced and analyzed as a model for independent study. This is an excellent classroom tool and self-study guide. The material is presented in a clear and accessible style providing numerous exercises and bibliographical notes suggesting further reading. Topics and Features Comprehensive and integrated treatment of uncertainty arising in engineering and scientific phenomena – algorithmic complexity, statistical independence, and nonlinear chaotic behavior Extensive exercise sets, examples, and Mathematica® computer experiments that reinforce concepts and algorithmic methods Thorough presentation of methods of data compression and representation Algorithmic approach to model selection and design of experiments Large data sets and 13 Mathematica®-based Uncertain Virtual Worlds™ programs and code This text is an excellent resource for all applied statisticians, engineers, and scientists who need to use modern statistical analysis methods to investigate and model their data. The present, softcover reprint is designed to make this classic textbook available to a wider audience. Reviews Highly data-oriented, with an unusually large collection of real-life examples taken from industry and various scientific disciplines… The book departs from the standard fare, by [also] including detailed coverage of such contemporary topics as chaotic dynamical systems, the nature of randomness, computability and Kolmogorov complexity, encryption, ergodicity, entropy, and even fractals. —Short Book Reviews, International Statistical Institute I find [this book] to be an excellent textbook, and I strongly recommend it as an introductory technical statistics course to engineering and science students who have had a basic programming course in computer science. I expect it to become a classic. <—Mathematical Reviews.