Computational Risk Management

Risks exist in every aspect of our lives and risk management has always been a vital topic. Most computational techniques and tools have been used for optimizing risk management and the risk management tools benefit from computational approaches. Computational intelligence models such as neural networks and support vector machines have been widely used for early warning of company bankruptcy and credit risk rating. Operational research approaches such as VaR (value at risk) optimization have been standardized in managing markets and credit risk, agent-based theories are employed in supply chain risk management and various simulation techniques are employed by researchers working on problems of environmental risk management and disaster risk management. Investigation of computational tools in risk management is beneficial to both practitioners and researchers. The Computational Risk Management series is a high-quality research book series with an emphasis on computational aspects of risk management and analysis. In this series, research monographs as well as conference proceedings are published.

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Descriptive Data Mining

Second Edition

Springer

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Preface

Knowledge management involves the application of human knowledge (epistemology) with the technological advances of our current society (computer systems) and big data, both in terms of collecting data and in analyzing it. We see three types of analytic tools. **Descriptive** analytics focus on the reports of what has happened. **Predictive** analytics extend statistical and/or artificial intelligence to provide forecasting capability. It also includes classification modeling. **Diagnostic** analytics can apply analysis to sensor input to direct control systems automatically. **Prescriptive** analytics applies quantitative models to optimize systems, or at least to identify improved systems. Data mining includes descriptive and predictive modeling. Operations research includes all the three. This book focuses on descriptive analytics.

Lincoln, USA — David L. Olson
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Book Concept

The book seeks to provide simple explanations and demonstration of some descriptive tools. This second edition provides more examples of big data impact, updates the content on visualization, clarifies some points, and expands coverage of association rules and cluster analysis. Chapter 1 gives an overview of the context of knowledge management. Chapter 2 discusses some basic software support to data visualization. Chapter 3 covers fundamentals of market basket analysis, and Chap. 4 provides a demonstration of RFM modeling, a basic marketing data mining tool. Chapter 5 demonstrates association rule mining. Chapter 6 has more in-depth coverage of cluster analysis. Chapter 7 discusses link analysis.

Models are demonstrated using business-related data. The style of the book is intended to be descriptive, seeking to explain how methods work, with some citations, but without deep scholarly references. The data sets and software are all selected for widespread availability and access by any reader with computer links.

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David L. Olson is the James & H.K. Stuart Chancellor's Distinguished Chair and Full Professor at the University of Nebraska. He has published research in over 150 refereed journal articles, primarily on the topic of multiple objective decision-making, information technology, supply chain risk management, and data mining. He teaches in the management information systems, management science, and operations management areas. He has authored over 20 books. He is Member of the Decision Sciences Institute, the Institute for Operations Research and Management Sciences, and the Multiple Criteria Decision Making Society. He was a Lowry Mays endowed Professor at Texas A&M University from 1999 to 2001. He was named the Raymond E. Miles Distinguished Scholar award for 2002, and was a James C. and Rhonda Seacrest Fellow from 2005 to 2006. He was named Best Enterprise Information Systems Educator by IFIP in 2006. He is a Fellow of the Decision Sciences Institute.

Georg Lauhoff is Technologist at Western Digital Corporation and carries out R&D in materials science and its application in data storage devices and uses the techniques described in this book for his work. He co-authored 38 refereed journal articles and over 30 conference presentations, primarily on the topic of materials science, data storage materials, and magnetic thin films. He was awarded scholarships and research grants in the UK and Japan. He was the Clerk Maxwell Scholar from 1995 to 1998 and is a Fellow of the Cambridge Philosophical Society. He studied physics at Aachen (Diplom) and Cambridge University (Master and Ph.D.) specializing in the field of materials science and magnetic thin films and sensors. After graduating, he moved to Japan and held a faculty position in Materials Science and Engineering at the Toyota Technological Institute and then carried out research in the sequencing of DNA using magnetic sensors at Cambridge University before moving in 2005 to the recording industry in the Bay area.