Introduction To Decision Analysis

This book presents an introduction to MCDA followed by more detailed chapters about each of the leading methods used in this field. Comparison of methods and software is also featured to enable readers to choose the most appropriate method needed in their research. Worked examples as well as the software featured in the book are available on an accompanying website.

Decision Analysis for Management Judgment is unique in its breadth of coverage of decision analysis methods. It covers both the psychological problems that are associated with unaided managerial decision making and the decision analysis methods designed to overcome them. It is presented and explained in a clear, straightforward manner without using mathematical notation. This latest edition has been fully revised and updated and includes a number of changes to reflect the latest developments in the field.

The first part of the book explains the various analytical tools that simplify and accelerate decision making. Learn about tools that help you determine causes, evaluate choices, and forecast future events. For occasions when a group, rather than an individual, has to make a decision, you will also learn what tools can help you create group consensus. The second half of the book shows you how to apply analytical tools to different healthcare situations, including comparing clinician performance, determining the causes for medical errors, analyzing the costs of programs, and determining the market for new services. Many practical examples walk you step-by-step through common decision-making scenarios.

Written in a lecture format with solved problems at the end of each chapter, this book surveys quantitative modeling and decision analysis techniques. It serves to familiarize the reader with quantitative techniques utilized in planning and optimizing complex systems, as well as students experiencing the subject for the first time. It can be used by students of business and public administration without a background in calculus as well as engineers with significant scientific training. It allows the reader to comprehend the material through examples and problems and also demonstrates the value and shortcomings of many methods. Quantitative Analysis: An introduction developed out of the author's experience teaching the material to students at the University of California Los Angeles, California State University, Northridge, and the University of Southern California, Los Angeles.

For courses in Decision Making and Engineering. The Fundamentals of Analyzing and Making Decisions Foundations of Decision Analysis is a groundbreaking text that explores the art of decision making, both in life and in professional settings. By exploring themes such as dealing with uncertainty and understanding the distinction between a decision and its outcome, the First Edition teaches readers to achieve clarity of action in any situation. The book treats decision making as an evolutionary process from a scientific standpoint. Strategic decision-making analysis is presented as a tool to help students understand, discuss, and settle on important life choices. Through this text, readers will understand the specific thought process that occurs behind approaching any decision to make easier and better life choices for themselves.

Since the first edition of this book published, Bayesian networks have become even more important for applications in a vast array of fields. This second edition includes new material on influence diagrams, learning from data, value of information, cybersecurity, debunking bad statistics, and much more. Focusing on practical real-world problem-solving and model building, as opposed to algorithms and theory, it explains how to incorporate knowledge with data to develop and use (Bayesian) causal models of risk that provide more powerful insights and better decision making than is possible from purely data-driven solutions. Features Provides all tools necessary to build and run realistic Bayesian network models Supplies extensive example models based on real risk assessment problems in a wide range of

application domains provided; for example, finance, safety, systems reliability, law, forensics, cybersecurity and more Introduces all necessary mathematics, probability, and statistics as needed Establishes the basics of probability, risk, and building and using Bayesian network models, before going into the detailed applications A dedicated website contains exercises and worked solutions for all chapters along with numerous other resources. The AgenaRisk software contains a model library with executable versions of all of the models in the book. Lecture slides are freely available to accredited academic teachers adopting the book on their course.

A central problem of prescriptive decision making is the mismatch between the elegant formal models of decision theory and the less elegant, informal thinking of decision makers, especially when dealing with ill-structured situations. This problem has been a central concern of the authors and their colleagues over the past two decades. They have wisely (to my mind) realized that any viable solution must be informed by a deep understanding of both the structural properties of alternative formalisms and the cognitive demands that they impose on decision makers. Considering the two in parallel reduces the risk of forcing decision makers to say things and endorse models that they do not really understand. It opens the door for creative solutions, incorporating insights from both decision theory and cognitive psychology. It is this opportunity that the authors have so ably exploited in this important book. Under the pressures of an interview situation, people will often answer a question that is put to them. Thus, they may be willing to provide a decision consultant with probability and utility assessments for all manner of things. However, if they do not fully understand the implications of what they are saying and the use to which it will be put, then they cannot maintain cognitive mastery of the decision models intended to represent their beliefs and interests.

Introduction to Statistical Decision Theory: Utility Theory and Causal Analysis provides the theoretical background to approach decision theory from a statistical perspective. It covers both traditional approaches, in terms of value theory and expected utility theory, and recent developments, in terms of causal inference. The book is specifically designed to appeal to students and researchers that intend to acquire a knowledge of statistical science based on decision theory. Features Covers approaches for making decisions under certainty, risk, and uncertainty Illustrates expected utility theory and its extensions Describes approaches to elicit the utility function Reviews classical and Bayesian approaches to statistical inference based on decision theory Discusses the role of causal analysis in statistical decision theory

The point of departure in the present book is that the decision makers, involved in the evaluation of alternatives under conflicting criteria, express their preferential judgement by estimating ratios of subjective values or differences of the corresponding logarithms, the so-called grades. Three MCDA methods are studied in detail: the Simple Multi-Attribute Rating Technique SMART, as well as the Additive and the Multiplicative AHP, both pairwise-comparison methods which do not suffer from the well-known shortcomings of the original Analytic Hierarchy Process. Context-related preference modelling on the basis of psycho-physical research in visual perception and motor skills is extensively discussed in the introductory chapters. Thereafter many extensions of the ideas are presented via case studies in university administration, health care, environmental assessment, budget allocation, and energy planning at the national and the European level. The issues under consideration are: group decision making with inhomogeneous power distributions, the search for a compromise solution, resource allocation and fair distributions, scenario analysis in long-term planning, conflict analysis via the pairwise comparison of concessions, and multi-objective optimization.

The final chapters are devoted to the fortunes of MCDA in the hands of its designers. The research started in the late seventies, when I got involved in three different problems: the nomination procedures in a university, the evaluation of alternative energy-research proposals, and the evaluation of non-linear programming software.
Public health and in health policy courses at the undergraduate and graduate level.
This book is the first in-depth guide to applying the philosophy, theory, and methods of decision analysis to creating and executing winning legal strategies. With explanations that progress from introductory to advanced and practice problems at the end of each chapter, this is a book the reader will want to use and refer to for years to come. Practicing decision analysts, operations research and management science students, attorneys and law students will find this book an invaluable addition to their knowledge and skills. John Celona has over three decades of experience in teaching and applying decision analysis. John lectures in the School of Engineering at Stanford University and is on faculty at The Stanford Center for Professional Development, the American Course on Drug Development and Regulatory Sciences, and the Academy of the American Society for Healthcare Risk Management.
This book is intended for the GIS Science and Decision Science communities. It is primarily targeted at postgraduate students and practitioners in GIS and urban, regional and environmental planning as well as applied decision analysis. It is also suitable for those studying and working with spatial decision support systems. The main objectives of this book are to effectivley integrate Multicriteria Decision Analysis (MCDA) into Geographic Information Science (GIScience), to provide a comprehensive account of theories, methods, technologies and tools for tackling spatial decision problems and to demonstrate how the GIS-MCDA approaches can be used in a wide range of planning and management situations.
This best-selling and up-to-date survey of decision analysis concepts and techniques is accessible to students with limited mathematical backgrounds. It is designed for advanced undergraduate and MBA-level courses in decision analysis and also for business courses in introductory quantitative methods. (Prerequisites: college algebra; introductory statistics.)
Written for safety and loss-control, environmental, and quality managers, this is the first comprehensive, integrated guide to developing a complete environmental risk analysis for regulated substances and processes. Unlike other books, Introduction to Risk Analysis looks at risk from a regulatory perspective, allowing both professionals in regulatory agencies concerned with risk including OSHA, EPA, USDA, DOT, FDA, and state environmental agencies and professionals in any agency-regulated industry to understand and implement the methods required for proper risk assessment. The authors examine risk and the structure of analysis. Emphasizing the predictive nature of risk, they discuss the quantitative nature of risk and explore quantitative-analysis topics, including data graphing, logarithmic thinking, risk estimating, and curve fitting. Chapters include discussions on functions, models, and uncertainties; the regulatory process; risk assessment; exposure; dosimetry; epidemiology; toxicology; risk characterization; comparative risk assessment; ecological risk assessment; risk management; and risk communication. Six in-depth case studies, an annotated bibliography, and more than 50 figures are also included."
Master today's important spreadsheet and business analytics skills with

SPREADSHEET MODELING AND DECISION ANALYSIS: A PRACTICAL INTRODUCTION TO BUSINESS ANALYTICS, 9E, written by respected business analytics innovator Cliff Ragsdale. This edition's clear presentation, realistic examples and fascinating topics help you become proficient in today's most widely used business analytics techniques using the latest version of Excel in Microsoft Office 365 or Office 2019. Become skilled in using the newest Excel functions and tools as well as Analytic Solver and Data Mining add-ins. This edition helps you develop both algebraic and spreadsheet modeling skills with step-by-step instructions and annotated, full-color screen images that make examples easy to follow. Special sections, such as World of Business Analytics, emphasize how to apply what you learn about descriptive, predictive and prescriptive analytics to today's real business situations. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Cloth edition, $47.50.

A ONE-OF-A-KIND GUIDE TO THE BEST PRACTICES IN DECISION ANALYSIS Decision analysis provides powerful tools for addressing complex decisions that involve uncertainty and multiple objectives, yet most training materials on the subject overlook the soft skills that are essential for success in the field. This unique resource fills this gap in the decision analysis literature and features both soft personal/interpersonal skills and the hard technical skills involving mathematics and modeling. Readers will learn how to identify and overcome the numerous challenges of decision making, choose the appropriate decision process, lead and manage teams, and create value for their organization. Performing modeling analysis, assessing risk, and implementing decisions are also addressed throughout. Additional features include: Key insights gleaned from decision analysis applications and behavioral decision analysis research Integrated coverage of the techniques of single- and multiple-objective decision analysis Multiple qualitative and quantitative techniques presented for each key decision analysis task Three substantive real-world case studies illustrating diverse strategies for dealing with the challenges of decision making Extensive references for mathematical proofs and advanced topics The Handbook of Decision Analysis is an essential reference for academics and practitioners in various fields including business, operations research, engineering, and science. The book also serves as a supplement for courses at the upper-undergraduate and graduate levels.

Everybody has to make decisions—they are unavoidable. Yet we receive little or no education or training on how to make decisions. Business decisions can be dif_ cult: which people to hire, which product lines or facilities to expand and which to sell or shut down, which bid or proposal to accept, which process to implement, how much R&D to invest in, which environmental projects should receive the highest priority, etc. This book gives you all the tools you need to... • clarify and reach alignment on goals and objectives and understand trade-offs in reaching those goals, • develop and examine alternatives, • systematically analyze the effects of risk and uncertainty, and • maximize the chances of achieving your goals and objectives. Success (getting what you want) depends on luck and good decision making. You can't control your luck, but you can maximize your odds by making the best possible decisions, and this book gets you there. Broadly speaking, this book organizes and presents otherwise formal decision-making tools in an intuitively understandable fashion. The presentation is

informal, but the concepts and tools are research-based and formally accepted. Valuable software, realistic examples, and fascinating topics . . . everything you need to master the most widely used management science techniques using Microsoft Excel is right here! Learning to make decisions in today's business world takes training and experience. Cliff Ragsdale--the respected innovator in the field of management science--is an outstanding guide to help you learn the skills you need, use Microsoft Excel for Windows to implement those skills, and gain the confidence to apply what you learn to real business situations. SPREADSHEET MODELING AND DECISION ANALYSIS gives you step-by-step instructions and annotated screen shots to make examples easy to follow. Plus, interesting sections called The World of Management Science show you how each topic has been applied in a real company.

This text teaches the fundamental ideas of decision analysis, without the burden of extensive mathematical skills. This new version incorporates and implements the powerful DecisionTools by Palisade Corporation, the world's leading toolkit for risk and decision analysis. At the end of each chapter, topics are illustrated with step-by-step instructions for DecisionTools . The Third Edition adds new material on valuing real options and organizational use of decision analysis and updates on behavioral decision theory. Twelve cases from the Darden School, University of Virginia, have been included.

Project management is the art of making the right decisions. To be effective as a project manager, you must know how to make rational choices in project management, what processes can help you to improve these choices, and what tools are available to help you through the decision-making process. Project Decisions: The Art and Science is an entertaining and easy-to-read guide to a structured project decision analysis process. This valuable text presents the basics of cognitive psychology and quantitative analysis methods to help project managers make better decisions. Examples that portray different projects, real-life stories, and popular culture will help readers acquire the essential knowledge and skills required for effective project decision-making. Readers will be able to: •Understand psychological pitfalls related to project management •Establish a creative business environment in their organization •Identify project risks and uncertainties •Develop estimates of project time and cost based on an understanding of human psychology •Perform basic quantitative and qualitative risk and decision analysis •Use event chain methodology in managing projects •Communicate the results of decision analysis to decision-makers •Review project decisions and perform adaptive project management •Establish a project decision analysis process in their organization PLUS — Test your own judgment through a quiz that examines your intuition!

Bayesian decision analysis supports principled decision making in complex domains. This textbook takes the reader from a formal analysis of simple decision problems to a careful analysis of the sometimes very complex and data rich structures confronted by practitioners. The book contains basic material on subjective probability theory and multi-attribute utility theory, event and decision trees, Bayesian networks, influence diagrams and causal Bayesian networks. The author demonstrates when and how the theory can be successfully applied to a given decision problem, how data can be sampled and expert judgements elicited to support this analysis, and when and how an effective Bayesian decision analysis can be implemented. Evolving from a third-year

undergraduate course taught by the author over many years, all of the material in this book will be accessible to a student who has completed introductory courses in probability and mathematical statistics.

From selecting sites for new hospitals, schools, and factories, to managing forests and rivers, to creating and maintaining highways and bridges, public and private organizations are often called on to make decisions on geographic questions that involve a multitude of alternatives and often conflicting evaluation criteria. This book presents a formal mechanism for dealing with these situations, capturing the information in a Geographic Information System and processing it to derive optimal recommendations for confronting these complex questions.

A synthesis of the theory of decision making and its practical applications is intended for students as well as specialists and as a handbook for those needing to apply decision analysis in practice.

The field of multiple criteria decision analysis (MCDA), also termed multiple criteria decision aid, or multiple criteria decision making (MCDM), has developed rapidly over the past quarter century and in the process a number of divergent schools of thought have emerged. This can make it difficult for a new entrant into the field to develop a comprehensive appreciation of the range of tools and approaches which are available to assist decision makers in dealing with the ever-present difficulties of seeking compromise or consensus between conflicting inter ests and goals, i.e. the "multiple criteria". The diversity of philosophies and models makes it equally difficult for potential users of MCDA, i.e. management scientists and/or decision makers facing problems involving conflicting goals, to gain a clear understanding of which methodologies are appropriate to their particular context. Our intention in writing this book has been to provide a compre hensive yet widely accessible overview of the main streams of thought within MCDA. We aim to provide readers with sufficient awareness of the underlying philosophies and theories, understanding of the practi cal details of the methods, and insight into practice to enable them to implement any of the approaches in an informed manner. As the title of the book indicates, our emphasis is on developing an integrated view of MCDA, which we perceive to incorporate both integration of differ ent schools of thought within MCDA, and integration of MCDA with broader management theory, science and practice.

Whether managing strategy, operations or products, knowing how to make the best decision in a complex, uncertain business environment is difficult. You might be faced with multiple, competing objectives, which means making trade-offs. To complicate matters, any uncertainty makes it hard to explicitly understand how different objectives will impact potential outcomes. This book will help you face these problems. It provides a decision analysis framework implemented as a simple spreadsheet tool. This multi-objective decision analysis framework helps you to measure trade-offs among objectives and incorporate uncertainties and risk preferences. With this book, you will be able to identify what information is needed to make a decision, define how that information should be combined, and, finally, provide quantifiable evidence to clearly communicate and justify the decision. The process involves minimal overhead and is perfect for busy professionals who need a simple, structured process for making, tracking, and communicating decisions. This process makes decision making more efficient by focusing only on information and factors that are well-defined, measureable,

and relevant to the decision at hand. The framework requires clear characterization of a decision, ensuring that it can be traced and is consistent with the intended objectives and organizational values. Using this structured decision-making framework, anyone can consistently make better decisions to gain competitive and strategic advantage.

In two volumes, this new edition presents the state of the art in Multiple Criteria Decision Analysis (MCDA). Reflecting the explosive growth in the field seen during the last several years, the editors not only present surveys of the foundations of MCDA, but look as well at many new areas and new applications. Individual chapter authors are among the most prestigious names in MCDA research, and combined their chapters bring the field completely up to date. Part I of the book considers the history and current state of MCDA, with surveys that cover the early history of MCDA and an overview that discusses the “pre-theoretical” assumptions of MCDA. Part II then presents the foundations of MCDA, with individual chapters that provide a very exhaustive review of preference modeling, along with a chapter devoted to the axiomatic basis of the different models that multiple criteria preferences. Part III looks at outranking methods, with three chapters that consider the ELECTRE methods, PROMETHEE methods, and a look at the rich literature of other outranking methods. Part IV, on Multiattribute Utility and Value Theories (MAUT), presents chapters on the fundamentals of this approach, the very well known UTA methods, the Analytic Hierarchy Process (AHP) and its more recent extension, the Analytic Network Process (ANP), as well as a chapter on MACBETH (Measuring Attractiveness by a Categorical Based Evaluation Technique). Part V looks at Non-Classical MCDA Approaches, with chapters on risk and uncertainty in MCDA, the decision rule approach to MCDA, the fuzzy integral approach, the verbal decision methods, and a tentative assessment of the role of fuzzy sets in decision analysis. Part VI, on Multiobjective Optimization, contains chapters on recent developments of vector and set optimization, the state of the art in continuous multiobjective programming, multiobjective combinatorial optimization, fuzzy multicriteria optimization, a review of the field of goal programming, interactive methods for solving multiobjective optimization problems, and relationships between MCDA and evolutionary multiobjective optimization (EMO). Part VII, on Applications, selects some of the most significant areas, including contributions of MCDA in finance, energy planning problems, telecommunication network planning and design, sustainable development, and portfolio analysis. Finally, Part VIII, on MCDM software, presents well known MCDA software packages.

Representing the first collection on the topic, this book builds from foundations to case studies, to future prospects, providing the reader with a rich and comprehensive understanding of the use of multi-criteria decision analysis (MCDA) in healthcare. The first section of the collection presents the foundations of MCDA as it is applied to healthcare decisions, providing guidance on the ethical and theoretical underpinnings of MCDA and how to select MCDA methods appropriate to different decision settings. Section two comprises a collection of case studies spanning the decision continuum, including portfolio development, benefit–risk assessment, health technology assessment, priority setting, resource optimisation, clinical practice and shared decision making. Section three explores future directions in the application of MCDA to healthcare and identifies opportunities for further research to support these.

Contains teaching notes and complete solutions to all the problems in the text.

This well-respected introduction to statistics and statistical theory covers data processing, probability and random variables, utility and descriptive statistics, computation of Bayes strategies, models, testing hypotheses, and much more. 1959 edition.

Smith, Jennifer A. Szymanski, Terry Walshe, Nicolas Zuël

Decision analysis has become widely recognized as an important process for translating science into management actions. With climate change and other systemic threats as driving forces in creating environmental and engineering problems, there is a great need for understanding decision making frameworks through a case-study based approach. Management of environmental and engineering projects is often complicated and multidisciplinary in scope and nature, thus issues that arise can be difficult to solve analytically. Multi-Criteria Decision Analysis: Case Studies in Engineering and the Environment provides detailed description of MCDA methods and tools and illustrates their applications through case studies focused on sustainability and system engineering applications. New in the Second Edition: Addresses current and emerging environmental and engineering problems Includes seven new case studies to illustrate different management situations applicable at the international level Builds on real case studies from recent and relevant environmental and engineering management experience Describes advanced MCDA techniques and extensions used by practitioners Provides corresponding decision models implemented using the DECERNS software package Gives a more holistic approach to teaching MCDA methodology with a focus on sustainable solutions and adoption of new technologies, including nanotechnology and synthetic biology Given the novelty and inherent applicability of this decision-making framework to the environmental and engineering fields, a greater number of teaching tools for this topic need to be made available. This book provides those teaching tools, covering the breadth of the applications of MCDA methodologies with clear explanations of the MCDA process. The case studies are implemented in the DECERNS software package, allowing readers to experiment and explore and to understand the full process by which environmental managers assess these problems. This book is a great resource for professionals and students seeking to learn decision analysis techniques and apply similar frameworks to environmental and engineering projects

Provides an introduction to decision analysis. This book is based upon a number of papers and articles taken from the Operational Research Society's journal and other publications. However, the book is not simply a 'collection of reprints': Professor French has provided extensive notes and commentary to weave the extracts into a coherent whole. Although techniques are presented, the main thrust is to convey the purpose of decision analysis and the interpretation that should be placed upon its output: vital topics, but ones seldom discussed in introductory texts. The writing is aimed at the non-technical reader.