Decision Making Under Uncertainty Models And Choices

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The Analytics of Uncertainty and Information Sushil Bikhchandani 2013-08-12 There has been explosive progress in the economic theory of uncertainty and information in the past few decades. This subject is now taught not only in departments of economics but also in professional schools and programs oriented toward business, government and administration, and public policy. This book attempts to unify the subject matter in a simple, accessible manner. Part I of the book focuses on the economics of uncertainty; Part II examines the economics of information. This revised and updated second edition places a greater focus on game theory. New topics include posted-price markets, mechanism design, common-value auctions, and the one-shot deviation principle for repeated games.

Handbook of the Economics of Risk and Uncertainty Mark Machina 2013-11-14 The need to understand the theories and applications of economic and finance risk has been clear to everyone since the financial crisis, and this collection of original essays proffers broad, high-level explanations of risk and uncertainty. The economics of risk and uncertainty is unlike most branches of economics in spanning from the individual decision-maker to the market (and indeed, social decisions), and ranging from purely theoretical analysis through individual experimentation, empirical analysis, and applied and policy decisions. It also has close and sometimes conflicting relationships with theoretical and applied statistics, and psychology. The aim of this volume is to provide an overview of diverse aspects of this field, ranging from classical and foundational work through current developments. Presents coherent summaries of risk and uncertainty that inform major areas in economics and finance Divides coverage between theoretical, empirical, and experimental findings Makes the economics of risk and uncertainty accessible to scholars in fields outside economics

Bounded Rationality in Decision Making Under Uncertainty: Towards Optimal Granularity Joe Lorkowski 2017-07-01 This book addresses an intriguing question: are our decisions rational? It explains seemingly irrational human decision-making behavior by taking into account our limited ability to process information. It also shows with several examples that optimization under granularity restriction leads to observed human decision-making. Drawing on the Nobel-prize-winning studies by Kahneman and Tversky, researchers have found many examples of seemingly irrational decisions: e.g., we overestimate the probability of rare events. Our explanation is that since human abilities to process information are limited, we operate not with the exact values of relevant quantities, but with “granules” that contain these values. We show that optimization under such granularity indeed leads to observed human behavior. In particular, for the first time, we explain the mysterious empirical dependence of betting odds on actual probabilities. This book can be recommended to all students interested in human decision-making, to researchers whose work involves human decisions, and to practitioners who design and employ systems involving human decision-making —so that they can better utilize our ability to make decisions under uncertainty.

Decision Making Under Uncertainty Mykel J. Kochenderfer 2015-07-17 An introduction to decision making under uncertainty from a computational perspective, covering both theory and applications ranging from speech recognition to airborne collision avoidance. Many important problems involve decision making under uncertainty—that is, choosing actions based on often imperfect observations, with unknown outcomes. Designers of automated decision support systems must take into account the various sources of uncertainty while balancing the multiple objectives of the system. This book provides an introduction to the challenges of decision making under uncertainty from a computational perspective. It presents both the theory behind decision making models and algorithms and a collection of example applications that range from speech recognition to aircraft collision avoidance. Focusing on two methods for designing decision agents, planning and reinforcement learning, the book covers probabilistic models, introducing Bayesian networks as a graphical model that captures probabilistic relationships between variables; utility theory as a framework for understanding optimal decision making under uncertainty; Markov decision processes as a method for modeling sequential problems; model uncertainty; state uncertainty; and cooperative decision making involving multiple interacting agents. A series of applications shows how the theoretical concepts can be applied to systems for attribute-based person search, speech applications, collision avoidance, and unmanned aircraft persistent surveillance. Decision Making Under Uncertainty unifies research from different communities using consistent notation, and is accessible to students and researchers across engineering disciplines who have some prior exposure to probability theory and calculus. It can be used as a text for advanced undergraduate and graduate students in fields including computer science, aerospace and electrical engineering, and management science. It will also be a valuable professional reference for researchers in a variety of disciplines.

Modelling Under Risk and Uncertainty Etienne de Rocquigny 2012-04-12 Modelling has permeated virtually all areas of industrial, environmental, economic, bio-medical or civil engineering: yet the use of models for decision-making raises a number of issues to which this book is dedicated: How uncertain is my model ? Is it truly valuable to support decision-making ? What kind of decision can be truly supported and how can I handle residual uncertainty ? How much refined should the mathematical description be, given the true data limitations ? Could the uncertainty be reduced through more data, increased modeling investment or computational budget ? Should it be reduced now or later ? How robust is the analysis or the computational methods involved ? Should / could those methods be more robust ? Does it make sense to handle uncertainty, risk, lack of knowledge, variability or errors altogether ? How reasonable is the choice of probabilistic modeling for rare events ? How rare are the events to be considered ? How far does it make sense to handle extreme events and elaborate confidence figures ? Can I take advantage of expert / phenomenological knowledge to tighten the probabilistic figures ? Are there connex domains that could provide models or inspiration for my problem ? Written by a leader at the crossroads of industry, academia and engineering, and based on decades of multi-disciplinary field experience, Modelling Under Risk and Uncertainty gives a self-consistent introduction to the methods involved by any type of modeling development acknowledging the inevitable uncertainty and associated risks. It goes beyond the “black-box” view that some analysts, modelers, risk experts or statisticians develop on the underlying phenomenology of the environmental or

industrial processes, without valuing enough their physical properties and inner modelling potential nor challenging the practical plausibility of mathematical hypotheses; conversely it is also to attract environmental or engineering modellers to better handle model confidence issues through finer statistical and risk analysis material taking advantage of advanced scientific computing, to face new regulations departing from deterministic design or support robust decision-making. Modelling Under Risk and Uncertainty: Addresses a concern of growing interest for large industries, environmentalists or analysts: robust modeling for decision-making in complex systems. Gives new insights into the peculiar mathematical and computational challenges generated by recent industrial safety or environmental control analysis for rare events. Implements decision theory choices differentiating or aggregating the dimensions of risk/aleatory and epistemic uncertainty through a consistent multi-disciplinary set of statistical estimation, physical modelling, robust computation and risk analysis. Provides an original review of the advanced inverse probabilistic approaches for model identification, calibration or data assimilation, key to digest fast-growing multi-physical data acquisition. Illustrated with one favourite pedagogical example crossing natural risk, engineering and economics, developed throughout the book to facilitate the reading and understanding. Supports Master/PhD-level course as well as advanced tutorials for professional training Analysts and researchers in numerical modeling, applied statistics, scientific computing, reliability, advanced engineering, natural risk or environmental science will benefit from this book.

Decision making under uncertainty 1979

Decision Making under Uncertainty Kerstin Preuschoff 2015-06-16 Most decisions in life are based on incomplete information and have uncertain consequences. To successfully cope with real-life situations, the nervous system has to estimate, represent and eventually resolve uncertainty at various levels. A common tradeoff in such decisions involves those between the magnitude of the expected rewards and the uncertainty of obtaining the rewards. For instance, a decision maker may choose to forgo the high expected rewards of investing in the stock market and settle instead for the lower expected reward and much less uncertainty of a savings account. Little is known about how different forms of uncertainty, such as risk or ambiguity, are processed and learned about and how they are integrated with expected rewards and individual preferences throughout the decision making process. With this Research Topic we aim to provide a deeper and more detailed understanding of the processes behind decision making under uncertainty.

Highway Development Decision-making Under Uncertainty Mayar El-Khatib 2010 While decision-making under uncertainty is a major universal problem, its implications in the field of transportation systems are especially enormous; where the benefits of right decisions are tremendous, the consequences of wrong ones are potentially disastrous. In the realm of highway systems, decisions related to the highway configuration (number of lanes, right of way, etc.) need to incorporate both the traffic demand and land price uncertainties. In the literature, these uncertainties have generally been modeled using the Geometric Brownian Motion (GBM) process, which has been used extensively in modeling many other real life phenomena. But few scholars, including those who used the GBM in highway configuration decisions, have offered any rigorous justification for the use of this model. This thesis attempts to offer a detailed analysis of various aspects of transportation systems in relation to decision-making. It reveals some general insights as well as a new concept that extends the notion of opportunity cost to situations where wrong decisions could be made. Claiming deficiency of the GBM model, it also introduces a new formulation that utilizes a large and flexible parametric family of jump models (i.e., Lévy processes). To validate this claim, data related to traffic demand and land prices were collected and analyzed to reveal that their distributions, heavy-tailed and asymmetric, do not match well with the GBM model. As a remedy, this research used the Merton, Kou, and negative inverse Gaussian Lévy processes as possible alternatives. Though the results show indifference in relation to final decisions among the models, mathematically, they improve the precision of uncertainty models and the decision-making process. This furthers the quest for optimality in highway projects and beyond.

Decision Making und uncertainty: Models and choices 1979

Decision Making Under Uncertainty in Electricity Markets Antonio J. Conejo 2010-09-08 Decision Making Under Uncertainty in Electricity Markets provides models and procedures to be used by electricity market agents to make informed decisions under uncertainty. These procedures rely on well established stochastic programming models, which make them efficient and robust. Particularly, these techniques allow electricity producers to derive offering strategies for the pool and contracting decisions in the futures market. Retailers use these techniques to derive selling prices to clients and energy procurement strategies through the pool, the futures market and bilateral contracting. Using the proposed models, consumers can derive the best energy procurement strategies using the available trading floors. The market operator can use the techniques proposed in this book to clear simultaneously energy and reserve markets promoting efficiency and equity. The techniques described in this book are of interest for professionals working on energy markets, and for graduate students in power engineering, applied mathematics, applied economics, and operations research.

Advanced Models and Tools for Effective Decision Making Under Uncertainty and Risk Contexts González-Prida, Vicente 2020-09-04 Business industries depend on advanced models and tools that provide an optimal and objective decision-making process, ultimately guaranteeing improved competitiveness, reducing risk, and eliminating uncertainty. Thanks in part to the digital era of the modern world, reducing these conditions has become much more manageable. Advanced Models and Tools for Effective Decision Making Under Uncertainty and Risk Contexts provides research exploring the theoretical and practical aspects of effective decision making based not only on mathematical techniques, but also on those technological tools that are available nowadays in the Fourth Industrial Revolution. Featuring coverage on a broad range of topics such as industrial informatics, knowledge management, and production planning, this book is ideally designed for decision makers, researchers, engineers, academicians, and students.

Decision Theory with a Human Face Richard Bradley 2017-10-31 Explores how decision-makers can manage uncertainty that varies in both kind and severity by extending and supplementing Bayesian decision theory.

Decision Making under Uncertainty in Financial Markets Jonas Ekblom 2018-09-13 This thesis addresses the topic of decision making under uncertainty, with particular focus on financial markets. The aim of this research is to support improved decisions in practice, and related to this, to advance our understanding of financial markets. Stochastic optimization provides the tools to determine optimal decisions in uncertain environments, and the optimality conditions of these models produce insights into how financial markets work. To be more concrete, a great deal of financial theory is based on optimality conditions derived from stochastic optimization models. Therefore, an important part of the development of financial theory is to study stochastic optimization models that step-by-step better capture the essence of reality. This is the motivation behind the focus of this thesis, which is to study methods that in relation to prevailing models that underlie financial theory allow additional real-world complexities to be properly modeled. The overall purpose of this thesis is to develop and evaluate stochastic optimization models that support improved decisions under uncertainty on financial markets. The research into stochastic optimization in financial literature has traditionally focused on problem formulations that allow closed-form or `exact' numerical solutions; typically through the application of dynamic programming or optimal control. The focus in this thesis is on two other optimization methods, namely stochastic programming and approximate dynamic programming, which open up opportunities to study new classes of financial problems. More specifically, these optimization methods allow additional and important aspects of many real-world problems to be captured. This thesis contributes with several insights that are relevant for both financial and stochastic optimization literature. First, we show that the modeling of several real-world aspects traditionally not considered in the literature are important components in a model which supports corporate

hedging decisions. Specifically, we document the importance of modeling term premia, a rich asset universe and transaction costs. Secondly, we provide two methodological contributions to the stochastic programming literature by: (i) highlighting the challenges of realizing improved decisions through more stages in stochastic programming models; and (ii) developing an importance sampling method that can be used to produce high solution quality with few scenarios. Finally, we design an approximate dynamic programming model that gives close to optimal solutions to the classic, and thus far unsolved, portfolio choice problem with constant relative risk aversion preferences and transaction costs, given many risky assets and a large number of time periods.

Decisions Under Uncertainty Ian Jordaan 2005-04-07 Publisher Description

Risk, Choice, and Uncertainty George G. Szpiro 2020-01-07 At its core, economics is about making decisions. In the history of economic thought, great intellectual prowess has been exerted toward devising exquisite theories of optimal decision making in situations of constraint, risk, and scarcity. Yet not all of our choices are purely logical, and so there is a longstanding tension between those emphasizing the rational and irrational sides of human behavior. One strand develops formal models of rational utility maximizing while the other draws on what behavioral science has shown about our tendency to act irrationally. In Risk, Choice, and Uncertainty, George G. Szpiro offers a new narrative of the three-century history of the study of decision making, tracing how crucial ideas have evolved and telling the stories of the thinkers who shaped the field. Szpiro examines economics from the early days of theories spun from anecdotal evidence to the rise of a discipline built around elegant mathematics through the past half century’s interest in describing how people actually behave. Considering the work of Locke, Bentham, Jevons, Walras, Friedman, Tversky and Kahneman, Thaler, and a range of other thinkers, he sheds light on the vast scope of discovery since Bernoulli first proposed a solution to the St. Petersburg Paradox. Presenting fundamental mathematical theories in easy-to-understand language, Risk, Choice, and Uncertainty is a revelatory history for readers seeking to grasp the grand sweep of economic thought.

Choice of Health Insurance and Models of Decision Making Under Uncertainty Jessica S. Banthin 1995

Decision Making under Deep Uncertainty Vincent A. W. J. Marchau 2019-04-04 This open access book focuses on both the theory and practice associated with the tools and approaches for decisionmaking in the face of deep uncertainty. It explores approaches and tools supporting the design of strategic plans under deep uncertainty, and their testing in the real world, including barriers and enablers for their use in practice. The book broadens traditional approaches and tools to include the analysis of actors and networks related to the problem at hand. It also shows how lessons learned in the application process can be used to improve the approaches and tools used in the design process. The book offers guidance in identifying and applying appropriate approaches and tools to design plans, as well as advice on implementing these plans in the real world. For decisionmakers and practitioners, the book includes realistic examples and practical guidelines that should help them understand what decisionmaking under deep uncertainty is and how it may be of assistance to them. Decision Making under Deep Uncertainty: From Theory to Practice is divided into four parts. Part I presents five approaches for designing strategic plans under deep uncertainty: Robust Decision Making, Dynamic Adaptive Planning, Dynamic Adaptive Policy Pathways, Info-Gap Decision Theory, and Engineering Options Analysis. Each approach is worked out in terms of its theoretical foundations, methodological steps to follow when using the approach, latest methodological insights, and challenges for improvement. In Part II, applications of each of these approaches are presented. Based on recent case studies, the practical implications of applying each approach are discussed in depth. Part III focuses on using the approaches and tools in real-world contexts, based on insights from real-world cases. Part IV contains conclusions and a synthesis of the lessons that can be drawn for designing, applying, and implementing strategic plans under deep uncertainty, as well as recommendations for future work. The publication of this book has been funded by the Radboud University, the RAND Corporation, Delft University of Technology, and Deltares.

Decision Modeling in Policy Management Giampiero Beroggi 2013-12-01 The last decade has experienced major societal challenges at the intersection of technological systems and policy making. Prevalent examples are the liberalization of energy and telecommunications markets, the public aversion towards nuclear power plants, the development of high-speed trains, the debates about global warming and sustainability, the development of intelligent vehicle systems, and the controversies concerning the location of waste depositories, airports, and energy systems. These challenges, coupled with the call from industry for a systems-engineering oriented approach to policy analysis, motivated Delft University of Technology to launch the first European School of Systems Engineering, Policy Analysis. and Management (SEPA). The purpose was to educate engineering oriented policy analysts in bridging the gap between engineering systems and policy decision making processes, both for the public and private sector. Up to now, more than 500 first-year students and 30 Ph.D. students have enrolled in the program. In 1993, I set up a class called Quantitative Methods for Problem Solving which had to address the most relevant issues in decision making for policy management, such as linear and non-linear optimization, multiattribute utility theory, multicriteria decision making, concepts from game theory, outranking relations, and probabilistic influence diagrams.

Completing the Forecast National Research Council 2006-10-09 Uncertainty is a fundamental characteristic of weather, seasonal climate, and hydrological prediction, and no forecast is complete without a description of its uncertainty. Effective communication of uncertainty helps people better understand the likelihood of a particular event and improves their ability to make decisions based on the forecast. Nonetheless, for decades, users of these forecasts have been conditioned to receive incomplete information about uncertainty. They have become used to single-valued (deterministic) forecasts (e.g., "the high temperature will be 70 degrees Farenheit 9 days from now") and applied their own experience in determining how much confidence to place in the forecast. Most forecast products from the public and private sectors, including those from the National Oceanographic and Atmospheric Administrationâ€™s National Weather Service, continue this deterministic legacy. Fortunately, the National Weather Service and others in the prediction community have recognized the need to view uncertainty as a fundamental part of forecasts. By partnering with other segments of the community to understand user needs, generate relevant and rich informational products, and utilize effective communication vehicles, the National Weather Service can take a leading role in the transition to widespread, effective incorporation of uncertainty information into predictions. "Completing the Forecast" makes recommendations to the National Weather Service and the broader prediction community on how to make this transition.

Decision Making Under Uncertainty Charles A. Holloway 1979 Introduction and basic concepts; Models and probability; Choices and preferences; Preference assessment procedures; Behavioral assumptions and limitations of decision analysis; Risk sharing and incentives; Choices with multiple attributes.

Medical Decision Making Stefan Felder 2017-03-30 This textbook offers a comprehensive analysis of medical decision making under uncertainty by combining Test Information Theory with Expected Utility Theory. The book shows how the parameters of Bayes’ theorem can be combined with a value function of health states to arrive at informed test and treatment decisions. The authors distinguish between risk-neutral, risk-averse and prudent decision makers and demonstrate the effects of risk preferences on physicians’ decisions. They analyze individual tests, multiple tests and endogenous tests where the test outcome is chosen by the decision maker. Moreover, the topic is examined in the context of health economics by introducing a trade-off between enjoying health and consuming other goods, so that the extent of treatment and thus the potential improvement in the patient’s health becomes endogenous. Finally, non-expected utility models of choice under risk and uncertainty (i.e. ambiguity) are presented. While these

models can explain observed test and treatment decisions, they are not suitable for normative analyses aimed at providing guidance on medical decision making.

Decision Making Under Risk and Uncertainty J. Geweke 2012-12-06 As desired, the infonnation demand correspondence is single valued at equilibrium prices. Hence no planner is needed to assign infonnation allocations to individuals. Proposition 4. For any given infonnation price system p E . P (F *), almost every a E A demands a unique combined infonnation structure (although traders may be indifferent among partial infonnation sales from different information allocations, etc.). In particular, the aggregate excess demand correspondence for net combined infonnation trades is a continuous function. Proof Uniqueness fails only if an agent can obtain the same expected utility from two or more net combined infonnation allocations. If this happens, appropriate slight perturbations of personal probability vectors destroy the equality unless the utility functions and wealth allocations were independent across states. Yet, when utilities and wealths don't depend on states in S, no infonnation to distinguish the states is desired, so that the demand for such infonnation structures must equal zero. To show the second claim, recall that if the correspondence is single valued for almost every agent, then its integral is also single valued. Finally, note that an upper hemicontinuous (by Proposition 2) correspondence which is single valued everywhere is, in fact, a continuous function. [] REFERENCES Allen, Beth (1986a). "The Demand for (Differentiated) Infonnation"; Review of Economic Studies. 53. (311-323). Allen, Beth (1986b). "General Equilibrium with Infonnation Sales"; Theory and Decision. 21. (1-33). Allen, Beth (1990). "Infonnation as an Economic Commodity"; American Economic Review. 80. (268-273).

Individual and Small Group Decisions K.J. Radford 2013-03-09 ecision making is one of the most important activities in both our profes D sional and our private lives today. The literature on the subject has grown considerably over the last fifty years and it now covers many different approaches to the subject. These approaches range from that of creating a mathematical model of the decision situation under consideration, as in operations research and other forms of mathematical decision analysis, to those that are based on human and organizational behavior. Recently, those working in the field have begun to combine approaches to the study of decision situations that arise in organizations, in our personal lives and in the communities in which we live. This book is an attempt to assist those concerned with decision making to work with this combination of approaches. In the past, decision problems have been considered according to the condi tions under which they arise and to some extent in terms of the approaches available for their resolution. Writers on the subject who are mathematically oriented have devised a method of classifying decisions based on the type of mathematics that they suggest be used in the resolution of the problems. This approach leads to the division of decision situations into the categories of cer tainty, uncertainty, risk and competition. Deterministic models available in oper ations research have then been offered as the means of treating decision situations in the category of certainty.

Valuing Health Risks, Costs, and Benefits for Environmental Decision Making National Research Council 1990-02-01

Irreversible Decisions under Uncertainty Svetlana Boyarchenko 2007-08-26 Here, two highly experienced authors present an alternative approach to optimal stopping problems. The basic ideas and techniques of the approach can be explained much simpler than the standard methods in the literature on optimal stopping problems. The monograph will teach the reader to apply the technique to many problems in economics and finance, including new ones. From the technical point of view, the method can be characterized as option pricing via the Wiener-Hopf factorization.

Decision Making Under Uncertainty Claude Greengard 2012-12-06 In the ideal world, major decisions would be made based on complete and reliable information available to the decision maker. We live in a world of uncertainties, and decisions must be made from information which may be incomplete and may contain uncertainty. The key mathematical question addressed in this volume is "how to make decision in the presence of quantifiable uncertainty." The volume contains articles on model problems of decision making process in the energy and power industry when the available information is noisy and/or incomplete. The major tools used in studying these problems are mathematical modeling and optimization techniques; especially stochastic optimization. These articles are meant to provide an insight into this rapidly developing field, which lies in the intersection of applied statistics, probability, operations research, and economic theory. It is hoped that the present volume will provide entry to newcomers into the field, and stimulation for further research.

The Oxford Handbook of Computational and Mathematical Psychology Jerome R. Busemeyer 2015 This Oxford Handbook offers a comprehensive and authoritative review of important developments in computational and mathematical psychology. With chapters written by leading scientists across a variety of subdisciplines, it examines the field's influence on related research areas such as cognitive psychology, developmental psychology, clinical psychology, and neuroscience. The Handbook emphasizes examples and applications of the latest research, and will appeal to readers possessing various levels of modeling experience. The Oxford Handbook of Computational and mathematical Psychology covers the key developments in elementary cognitive mechanisms (signal detection, information processing, reinforcement learning), basic cognitive skills (perceptual judgment, categorization, episodic memory), higher-level cognition (Bayesian cognition, decision making, semantic memory, shape perception), modeling tools (Bayesian estimation and other new model comparison methods), and emerging new directions in computation and mathematical psychology (neurocognitive modeling, applications to clinical psychology, quantum cognition). The Handbook would make an ideal graduate-level textbook for courses in computational and mathematical psychology. Readers ranging from advanced undergraduates to experienced faculty members and researchers in virtually any area of psychology--including cognitive science and related social and behavioral sciences such as consumer behavior and communication--will find the text useful.

Radical Uncertainty Mervyn King 2020-03-05 'A brilliant new book' Daily Telegraph 'Well written . . . and often entertaining' The Times 'A sparkling analysis' Prospect When uncertainty is all around us, and the facts are not clear, how can we make good decisions? We do not know what the future will hold, particularly in the midst of a crisis, but we must make decisions anyway. We regularly crave certainties which cannot exist and invent knowledge we cannot have, forgetting that humans are successful because we have adapted to an environment that we understand only imperfectly. Throughout history we have developed a variety of ways of coping with the radical uncertainty that defines our lives. This incisive and eye-opening book draws on biography, history, mathematics, economics and philosophy to highlight the most successful - and most short-sighted - methods of dealing with an unknowable future. Ultimately, the authors argue, the prevalent method of our age falls short, giving us a false understanding of our power to make predictions, leading to many of the problems we experience today. Tightly argued, provocative and written with wit and flair, Radical Uncertainty is at once an exploration of the limits of numbers and a celebration of human instinct and wisdom.

Financial Decision Making Under Uncertainty ANDERSON WEBSTER 2014-06-28 Financial Dec Making under Uncertainty

Individual Choice Under Certainty and Uncertainty Kenneth Joseph Arrow 1984 The third volume of Arrow's Collected Papers concerns the basic concept of rationality as it applies to an economic decision maker. In particular, it addresses the problem of choice faced by consumers in a multicommodity world and presents specific models of choice useful in economic analysis. It also discusses choice models under uncertainty.

Info-Gap Decision Theory Yakov Ben-Haim 2006-10-11 Everyone makes decisions, but not everyone is a decision analyst. A decision analyst uses quantitative models and computational methods to formulate decision algorithms, assess decision performance, identify and evaluate options, determine trade-offs and risks, evaluate strategies for investigation, and so on. Info-Gap Decision Theory is written for decision analysts. The term "decision analyst" covers an extremely

broad range of practitioners. Virtually all engineers involved in design (of buildings, machines, processes, etc.) or analysis (of safety, reliability, feasibility, etc.) are decision analysts, usually without calling themselves by this name. In addition to engineers, decision analysts work in planning offices for public agencies, in project management consultancies, they are engaged in manufacturing process planning and control, in financial planning and economic analysis, in decision support for medical or technological diagnosis, and so on and on. Decision analysts provide quantitative support for the decision-making process in all areas where systematic decisions are made. This second edition entails changes of several sorts. First, info-gap theory has found application in several new areas - especially biological conservation, economic policy formulation, preparedness against terrorism, and medical decision-making. Pertinent new examples have been included. Second, the combination of info-gap analysis with probabilistic decision algorithms has found wide application. Consequently "hybrid" models of uncertainty, which were treated exclusively in a separate chapter in the previous edition, now appear throughout the book as well as in a separate chapter. Finally, info-gap explanations of robust-satisficing behavior, and especially the Ellsberg and Allais "paradoxes", are discussed in a new chapter together with a theorem indicating when robust-satisficing will have greater probability of success than direct optimizing with uncertain models. New theory developed systematically Many examples from diverse disciplines Realistic representation of severe uncertainty Multi-faceted approach to risk Quantitative model-based decision theory

Decision Making Under Uncertainty David E. Bell 1995 These authors draw on nearly 50 years of combined teaching and consulting experience to give readers a straightforward yet systematic approach for making estimates about the likelihood and consequences of future events -- and then using those assessments to arrive at sound decisions. The book's real-world cases, supplemented with expository text and spreadsheets, help readers master such techniques as decision trees and simulation, such concepts as probability, the value of information, and strategic gaming; and such applications as inventory stocking problems, bidding situations, and negotiating.

Preferences and Decisions Salvatore Greco 2010-10-05 Decision making is an omnipresent, most crucial activity of the human being, and also of virtually all artificial broadly perceived “intelligent” systems that try to mimic human behavior, reasoning and choice processes. It is quite obvious that such a relevance of decision making had triggered vast research effort on its very essence, and attempts to develop tools and techniques which would make it possible to somehow mimic human decision making related acts, even to automate decision making processes that had been so far reserved for the human beings. The roots of those attempts at a scientific analysis can be traced to the ancient times but – clearly – they have gained momentum in the recent 50 or 100 years following a general boom in science. Depending on the field of science, decision making can be viewed in different ways. The most general view can be that decision making boils down to some cognitive, mental process(es) that lead to the selection of an option or a course of action among several alternatives. Then, looking in a deeper way, from a psychological perspective this process proceeds in the context of a set of needs, preferences, rational choice of an individual, a group of individuals, or even an organization. From a cognitive perspective, the decision making process proceeds in the context of various interactions with the environment.

Judgment Under Uncertainty Daniel Kahneman 1982-04-30 Thirty-five chapters describe various judgmental heuristics and the biases they produce, not only in laboratory experiments, but in important social, medical, and political situations as well. Most review multiple studies or entire subareas rather than describing single experimental studies.

Decision Making Under Uncertainty Charles A. Holloway 1979 Introduction and basic concepts; Models and probability; Choices and preferences; Preference assessment procedures; Behavioral assumptions and limitations of decision analysis; Risk sharing and incentives; Choices with multiple attributes.

Judgment and Decision Making Under Uncertainty: Descriptive, Normative, and Prescriptive Perspectives David R. Mandel 2019-09-26

What Every Engineer Should Know About Decision Making Under Uncertainty John X. Wang 2002-07-01 Covering the prediction of outcomes for engineering decisions through regression analysis, this succinct and practical reference presents statistical reasoning and interpretational techniques to aid in the decision making process when faced with engineering problems. The author emphasizes the use of spreadsheet simulations and decision trees as imp

Theory of Decision under Uncertainty Itzhak Gilboa 2009-03-16 This book describes the classical axiomatic theories of decision under uncertainty, as well as critiques thereof and alternative theories. It focuses on the meaning of probability, discussing some definitions and surveying their scope of applicability. The behavioral definition of subjective probability serves as a way to present the classical theories, culminating in Savage's theorem. The limitations of this result as a definition of probability lead to two directions - first, similar behavioral definitions of more general theories, such as non-additive probabilities and multiple priors, and second, cognitive derivations based on case-based techniques.

Effective Decision-Making Edoardo Binda Zane 2016-04-28 The aim of this book is to quickly empower you to make better decisions by giving you step-by-step explanations of the best techniques. We always make decisions under uncertainty and pressure, especially in business. We need faster and better decisions to cope, but we don''t have the time to learn how to make them well. That is where I come in. I wrote this book to allow you to make better decisions without spending weeks studying theory and practice. THE INTRODUCTION gives you a snapshot of two decision-making biases, of the worst mistake you can do when making decision, and a lesson taken straight from philosophy. - Decision Biases (why your brain isn''t always your friend in decisions) - The Worst Mistake in Decision-Making - A Lesson From Another Time THE FIRST CHAPTER looks at frameworks of reference, meaning how you can apply decision-making to achieve your goals, for example how and why some decisions are able to automatically give you a competitive advantage. - The OODA Loop - The Recognition-Primed Decision Model - GROW or the John Whitmore Model - The PDSA Cycle CHAPTERS 2 TO 5 look at separate phases of decision-making: understanding your context, understanding the problem, generating solutions and selecting one option out of many. 2 - CONTEXT Contexts can be very different - and there is no one size fits all approach, which is why this book provides you with five. - SWOT and PEST - TELOS - Porter''s Five Forces - Causal Loops Diagrams 3 - PROBLEM ASSESSMENT Before making decisions, then, you need to work on finding out exactly what you are trying to solve. This chapter gives you 5 tools to do so: - Root Cause Analysis: Ishikawa''s Diagramand the 5 Whys Technique - Pareto Analysis - Kipling Method (5W1H) - CATWOE 4 - GENERATING IDEAS In "pure" decision-making, little attention is given to this phase, as it belongs to a different field: creativity. This book includes two tools: - Zwicky''s Box - SCAMPER 5 - WEIGHING ALTERNATIVES This book gives you six tools for this, each one with its specificities: - Weights and Factors: the Grid Analysis and the KT Matrix - The Paired Comparison Analysis - The Quantitative Strategic Planning Matrix - The Analytic Hierarchy Process - The Eisenhower Matrix CHAPTER 6 AND 7 look at group decisions, meaning whether it''s a good idea to make decisions in a group and, if it is, how that group should make decisions. 6 - DO YOU NEED YOUR TEAM? You can either involve your team in decisions or exclude them. Often, managers are torn between these two options - you have three tools to help you though: - The Vroom-Yetton-Jago Model - The Hoy-Tarter Model - The Hersey-Blanchard Model 7 - GROUP TECHNIQUES To be used when making decisions in a group is necessary. - The Nominal Group Technique - The Delphi Method - Hartnett''s Consensus-Oriented Decision-Making Model - The Stepladder Technique - DeBono''s Six Thinking Hats - The Charette Procedure - RAPID CHAPTERS 8 AND 9 look at decisions in corporate strategy and analyse a decision''s consequence 8 - CORPORATE STRATEGY These decision tools have all been developed for corporations, but they still hold value for smaller businesses. - The BCG Matrix - The Advantage Matrix - The GE Matrix - Blind Spot Analysis 9 - CONSEQUENCES In other words: "how can I make sure that the

decision I made is the best one and will work in my specific situation?" Unfortunately nobody can answer this. Any decision method can only skew the odds of having made the right decision in your favour. That said, there are a few techniques you can apply. - Impact Assessment - Plus-Minus-Interesting - Decision Trees - Cost-Benefit Analysis - Futures Wheel

Decision Making Under Uncertainty Marianna Carmen Blackburn 2012 Why is it difficult to save for a pension or maintain a healthy diet? Choosing between options that have future or delayed consequences presents a challenge for a decision maker. When faced with such intertemporal choices the tendency to favour choices with immediate or short term outcomes, otherwise known as delay discounting, can lead to suboptimal consequences in the long-term. However, the mechanisms underlying the devaluation of future outcomes are poorly understood. This is due to the lack of a consistent framework for the representation of delays and delayed outcomes. One perspective is to represent delays as uncertainty. However, current conceptions of uncertainty are limited, by and large, to the dimension of probability, and are therefore inadequate. This thesis adopts a delay discounting model and emphasises different types of uncertainties within choice. Unifying these components, a framework that considers intertemporal choice as decision making under uncertainty is proposed. A series of behavioural and electrophysiological studies is presented to demonstrate that: it is the perceived uncertainty about 'if' and 'when' outcomes occur that contributes to behavioural discounting (chapters 2 and 3); the perception and evaluation of 'what' is delayed is underlined by emotional processes (chapter 4); and that generally, uncertainties about 'if' and 'what' outcomes differentially characterise risky and impulsive choices (chapter 5), and can be distinguished in terms of their informational qualities (chapter 6). Collectively, these findings present a deconstruction of uncertainty into components of 'if', 'what' and 'when', that could be mapped to delayed outcomes. I discuss them within the context of judgement and decision making, individual differences, and neural aspects of reward processing. These results allow me to argue that 1) all decision making is a process of information availability; 2) behaviour is motivated to reduce uncertainty; 3) choice is the manifestation of acquired information gathered from a decision-maker's internal and/or external environment. In conclusion, this thesis demonstrates that decision making under uncertainty can be qualified beyond a single dimension of probability; and that uncertainty can be characterised as a state of incomplete information about 'if' 'what' and 'when' outcomes will occur. Accordingly, intertemporal and risky choices can be accommodated within a single framework, subject to the same cognitive and neural processes. Consequently, this framework allows for the design of behavioural interventions that specifically target reducing uncertainties of 'if', 'what' or 'when'.