Chapter 1 : Fuzzy Logic Tutorial

Fuzzy Logic Decision Making - Learn Fuzzy Logic in simple and easy steps starting from basic to advanced concepts with examples including Introduction, Classical Set Theory, Fuzzy Set Theory, Membership Function, Traditional Fuzzy Refresher, Approximate Reasoning, Fuzzy Inference System, Database and Queries, Quantification, Decision Making, Control System, Adaptive Fuzzy Controller, Fuzziness.

Get Free Tips Whitepaper Decision making theories for the curious With decisions touching everything we do, there is an overwhelming number of decision making theories and related research. Most of these theories have been developed during the twentieth century even though humans have been making judgments with uncertainty for millennia. Decision making models continue to evolve to address more complex situations, and cognitive psychologists are rapidly learning more on how we think. This should lead to decision making theories that could improve the decisions we make, and for the curious, you will find a number of interesting paradoxes and conclusions that reveal the difficulties we all face in trying to make good choices. Research on decision making theories comes from two key viewpoints If you are a person that enjoys models and mathematics, you will enjoy a large body of decision making theory research that comes from the view that we act to make optimal, or alternatively, rational decisions. Theories coming from this point of view generally assume an ideal decision maker that seeks to make the best decision by becoming fully informed and able to compute with perfect accuracy, with full alignment to a defined set of goals. This area of theories is focused on addressing the question of "What should we do? While in reality, no one is an ideal decision maker, those subscribing to this perspective attempt to move closer to the ideal by building on facts where available, and applying mathematics and computing to help address risk and uncertainty. The second area of research for decision theories explores the question "What do we do? Much of the research in this area comes from the study of problem solving by cognitive psychologists seeking to understand how we think. As you might imagine, there are a number of interesting decision making behaviors and paradoxes that have been exposed and characterized that are inconsistent with rational decision making thought processes. Of course, there are decision making theories that do go beyond these two viewpoints. These theories may challenge some generally accepted principles but are seeking to resolve some of the problems that are inadequately addressed with current theories. Some of these issues include: People may have uncertain aspirations that vary based on decision context. Decision complexity is such that it is too difficult to determine optimal behavior. Probability theory and rules may not be sufficiently robust to errors in assumptions. Resources for more on Decision Making Theories There are a vast number of decision making theory resources available that can address your specific interest. For those looking to address critical decision making problems, we would suggest starting with theories for rational decision making that you can find at Wikipedia. This article provides a good summary of a number of theories, along with references for further investigation. If you are more curious about topics related to "what we do" when making decisions, an excellent set of articles can be found at ChangingMinds. A number of specific decision making thinking behaviors are addressed, along with ways to use or defend against these behaviors. Supporting and additional resources are also provided. Another resource that can support a number of decision making activities associated with uncertainty is Econport. Teaching modules, experiments, software tools, and cataloged resources are provided. What can we learn from all this research? There is an overwhelming amount of research on making decisions coming from a number of viewpoints. These range from trying to help us with approaches that ideally move us toward our goals, personally and in organizations, to dealing with practical limitations of our knowledge and how we think. Our goal at Decision Innovation is to provide a decision making process and model that helps to capture and use knowledge in pursuit of better decision making. Our model enables us to adapt and incorporate the best learning from decision making theories in a way that supports application to our most valued decisions. It is ultimately about creating knowledge through a set of connected decisions that we can use to better realize our potential and reach our aspirations.

theory, might be useful to model decision making in social systems. Fuzzy set theory has been originated in by L.A. Zadeh as a mathematical theory of vagueness (Zadeh(I)).

Organisation of Decision Making 1. Stages of Decision Making: In an important sense, management is synonymous with decision making. About the stages in decision making, Simon identifies three criteria: Searching for problems, and identifying and defining problems that demand action. More briefly, what is the problem? Formulating alternative courses of action, and identifying their likely costs and consequences. More briefly, what are the alternatives? Selecting a particular course of action from the various alternatives. More briefly, what alternative is best? Thus, we need to understand the following three points: If organisations are viewed as a hierarchy of decision making and decision makers, it implies that, at different levels of the organisation, management will be concerned with different types of decision. An outline classification of decision making is given below for comprehension: The decision making process is very complex. There is no simple analytical model upon which basic strategic choices are made. The above diagram shows that a large number of disciplines influence and interact on strategic decision making in organisations. The readers must understand that there are no neat formulas to quantify and determine how much of each discipline will apply to a particular problem nor how much weight a decision maker should give to each of the disciplines. From company to company, and within the same company, the decision process is constantly changing. Furthermore, major strategic decisions tend to be, in most cases, unique to each organisation. Theories of Decision Making: The theories of decision making, in a broad classification, are of two types: Their characteristics and general theme are presented next. On the rationality approach to decision making, Simon observes: On the basis of this question, he has identified four types of rationality in decision making: It is interesting to note that Cyert and March also emphasise the on-going political process involved in the reconciliation of such goals. Thus organisational objectives are the end-product of a complex and continuous interaction between individuals and groups within and outside the organisation. Organisation of Decision Making: In the organisation of decision making, there are basically two crucial schemes: Possibly Henry Fayol was modern in this concept. Of them, three major factors are: The history of the enterprise and the philosophy of management are also other criteria. The positive features of decentralisation are: The negative features of decentralisation are: Centralisation and decentralisation are, thus, complex issues. Again certain departments may be centralised and others decentralised. And so, we find that many US companies which went multinational adopted divisional structure and attempted to combine centralised control with decentralised operations. This issue should be discussed along with the matrix structure of an organisation. There are many ways in which decision makers can be departmentalised. But the main approaches could be summarised in a diagram next: It combines the advantages and disadvantages of both functional and product organisations, and the optimum balance between them would yield results in the strategic choices and applications. Two basic points emerge therefrom: One important caution to a practising manager is that he should be a conflict-resolver and a joint delegator in his total task and should see to the practical realities of organisational decision making, without having a massive structural upheaval.

Chapter 3 : A new intuitionism: Meaning, memory, and development in Fuzzy-Trace Theory

The tenets of fuzzy trace theory are summarized with respect to their relevance to health and medical decision making. Illustrations are given for HIV prevention, cardiovascular disease, surgical risk, genetic risk, and cancer prevention and control. A core idea of fuzzy trace theory is that people.

Parallel storage[edit] The principle of parallel storage asserts that the encoding and storage of verbatim and gist information operate in parallel rather than in a serial fashion. For instance, suppose that a person is presented with the word "apple" in red color. On the one hand, according to the principle of parallel storage of verbatim and gist traces, verbatim features of the target item e. Conversely, if verbatim and gist traces are stored in a serial fashion, then gist features of the target item the word was a type of fruit would be derived from its verbatim features and, therefore, the formation of gist traces would depend on the encoding and storage of verbatim traces. The latter idea was often assumed by early memory models. Several studies have converged on the finding that the meaning of target items is encoded independently of, and even prior to, the encoding of the surface form of the same items. Dissociated retrieval[edit] Similar to the principle of parallel storage, retrieval of verbatim and gist traces also occur via dissociated pathways. According to the principle of dissociated retrieval, recollective and nonrecollective retrieval processes are independent of each other. Consequently, this principle allows verbatim and gist processes to be differentially influenced by factors such as the type of retrieval cues and the availability of each form of representation. Similarly, items that were not presented in the past but preserve the meaning of presented items are usually better cues for gist traces. Suppose, for example, that subjects of an experiment are presented with a word list containing several dog breeds, such as poodle, bulldog, greyhound, doberman, beagle, collie, boxer, mastif, husky, and terrier. During a recognition test, the words poodle, spaniel, and chair are presented. According to the principle of dissociated retrieval, retrieval of verbatim and gist traces does not depend on each other and, therefore, different types of test probes might serve as better cues to one type of trace than another. In this example, test probes such as poodle targets, or studied items will be better retrieval cues for verbatim traces than gist, whereas test probes such as spaniel related distractors, non-studied items but related to targets will be better retrieval cues for gist traces than verbatim. Chair, on the other hand, would neither be a better cue for verbatim traces nor for gist traces because it was not presented and is not related to dogs. If verbatim and gist processes were dependent, then factors that affect one process would also affect the other in the same direction. However, several experiments showing, for example, differential forgetting rates between memory for the surface details and memory for the bottom-line meaning of past events [30] [31] [32] [33] favor the notion of dissociated retrieval of verbatim and gist traces. Brainerd, Reyna, and Kneer, [35] for instance, found that delay drives true recognition rates supported by both verbatim and gist traces and false recognition rates supported by gist and suppressed by verbatim traces in opposite directions, namely true memory decays over time while false memory increases. Opponent processes in false memory[edit] The principle of opponent processes describes the interaction between verbatim and gist processes in creating true and false memories. Whereas true memory is supported by both verbatim and gist processes, false memory is supported by gist processes and suppressed by verbatim processes. In other words, verbatim and gist processes work in opposition to one another when it comes to false memories. During a recognition test, the items lemon target , orange related distractor , and fan unrelated distractor are shown. In this case, retrieval of a gist trace fruits supports acceptance of both test probes lemon true memory and orange false memory , whereas retrieval of a verbatim trace lemon only supports acceptance of the test probe lemon. In addition, retrieval of an exclusory verbatim trace "I saw only the words lemon, apple, pear, and citrus" suppresses acceptance of false but related items such as orange through an operation known as recollection rejection. The time of exposure of each word during study and the number of repetitions have been shown to produce such dissociations. Similarly, repetition is monotonically related to true memory true memory increases as a function of the number of repetitions and is non-monotonically related to false memory repetition produces an inverted-U relation with false memory. Retrieval phenomenology[edit] Retrieval phenomenologies are spontaneous mental experiences associated

with the act of remembering. It was first systematically characterized by E. Strong in the early s. Whereas the former is characterized as retrieval associated with recollection of past experiences, the latter lacks such association. The two forms of experiences can be illustrated by everyday expressions such as "I remember that! In FTT, retrieval of verbatim traces often produces recollective phenomenology and thus is frequently referred to as recollective retrieval. Instead, FTT posits that retrieval of gist traces can also produce recollective phenomenology under some circumstances. When gist resemblance between a false item and memory is high and compelling, this gives rise to a phenomenon called phantom recollection, [41] [42] which is a vivid, but false, memory deemed to be true. Developmental variability in dual processes[edit] The principle of developmental variability in dual processes posits that verbatim and gist processes show variability across the lifespan. More specifically, verbatim and gist processes have been shown to improve between early childhood and young adulthood. For instance, source memory accuracy greatly increases between 4-year-olds and 6-year-olds, [45] and memory for nonsense words i. For example, semantic clustering in free recall increases from 8-year-olds to year-olds, [47] and meaning connection across words and sentences has been shown to improve between 6- and 9-year-olds. Experiments indicate that older adults perform worse on tasks that require retrieval of surface features from studied items relative to younger adults. The former is known as forgetting , while the latter is better known as false memories. False memories can be separated into spontaneous and implanted false memories. Spontaneous false memories result from endogenous internal processes, such as meaning processing, while implanted false memories are the result of exogenous external processes, such as the suggestion of false information by an outside source e. Research had first suggested that younger children are more susceptible to suggestion of false information than adults. Studies have shown that false memories are actually more persistent than true memories. Reasoning and decision-making[edit] FTT, as it applies to reasoning, is adapted from dual process models of human cognition. It differs from the traditional dual process model in that it makes a distinction between impulsivity and intuition â€"which are combined in System 1 according to traditional dual process theoriesâ€"and then makes the claim that expertise and advanced cognition relies on intuition. The mental representations described by FTT are categorized as either gist or verbatim representations: Gist representations are bottom-line understandings of the meaning of information or experience, and are used in intuitive gist processing. Verbatim representations are the precise and detailed representations of the exact information or experience, and are used in analytic verbatim processing. Generally, most adults display what is called a "fuzzy processing preference," [7] meaning that they rely on the least precise gist representations necessary to make a decision, despite parallel processing of both gist and verbatim representations. Both processes increase with age, though the verbatim process develops sooner than the gist, and is thus more heavily relied on in adolescence. In this regard, the theory expands on research that has illustrated the role of memory representations in reasoning processes, [58] the intersection of which has been previously underexplored. An example of this is research between the risky choice framing task and working memory , in which better working memory is not associated with a reduction in bias. The gist that is encoded is often a basic categorical distinction between no risk and some risk. However, in situations when both choices in the decision have a level of uncertainty or risk, then another level of precision would be required, e. Framing effect psychology Framing effects occur when linguistically different descriptions of equivalent options lead to inconsistent choices. A famous example of a risky choice framing task is the Asian Disease Problem. They have to choose among two programs to combat this disease. Subjects are presented with options that are framed as either gains lives saved or losses lives lost. The possible options, as well as the categorical gists that are posited to be encoded by FTT are displayed below.

Chapter 4 : CiteSeerX â€" Citation Query Fuzzy theories on decision-making

Decision Making A Critical Review PDF doc, you can first open the Fuzzy Theories On Decision Making A Critical Review PDF doc and click on on the black binoculars icon. This makes it possible for you to carry out.

Abstract Once an emergency event occurs, effective emergency measures should be taken. It is known that the emergency event possesses characteristics of limited time and information, harmfulness, and uncertainty, and the decision makers are often bounded rational under uncertainty and risk. This paper presents a novel approach to emergency decision making with hesitant fuzzy information, which takes regret aversion of the decision makers into account. Firstly, based on the idea of the water-filling theory in the field of wireless communications, a mathematical programming model that can convert the attribute values into a compatible scale and eliminate the influence of different physical dimensions is constructed to determine the attribute weights. Then, a group satisfaction degree function is introduced into the regret theory to depict the psychological behaviors of the decision makers, based on which the perceived utility value function of alternative is constructed. The total perceived utility values of alternatives can be computed, and the ranking order of alternatives is obtained. Finally, a case study on a fire and explosion accident is given to illustrate the application of the proposed method. Besides that, the comparisons show the feasibility and superiority of the proposed method. When an emergency event happens, the decision makers or department of emergency management should formulate plans or select an effective emergency alternative to prevent further deterioration of the situation. It is a subject for the field of emergent management to make quick and reasonable decisions. As an important part of emergency management, the emergency decision making has become an important job of many countries and a focus of research in academic circles. The behavioral experiments demonstrate that people are often bounded rational under uncertainty and risk [1 â€" 3]. Therefore, the psychological behaviors of people should be considered in the actual decision processes. It is known that a noteworthy feature of the emergency response is timeliness, and there also exists much unknown and uncertain information in emergency response. In this situation, people are usually bounded rational rather than complete rational when making decisions [4 , 5]. Therefore, it is necessary to develop decision methods considering human behaviors so as to provide effective ways for people in emergency response. Schmidt and Zank [7] characterized the conditions for risk aversion in cumulative prospect theory and presented an index for measuring the degree of loss aversion. However, there are some shortcomings when adopting the prospect theory or cumulative prospect theory to solve the decision making problems [9]. Nwogugu [9] stated that the prospect theory and cumulative prospect theory failed to explain many aspects of decision making and risk. According to neurobiology, Nwogugu [9] demonstrated that the natural mental process of human beings could lead to decision making patterns, which differ from those predicted by and implied in the prospect theory and cumulative prospect theory. In addition, Nagarajan and Shechter [10] pointed out that the consistent empirical findings could not be explained by the prospect theory. Hence, it is necessary to develop more realistic decision models. To portray intuitive judgments more simply and consistently, Bell [11] and Loomes and Sugden [12] proposed the regret theory independently, where rejoice and regret factors were introduced when computing the utility values. Considering that the original version of the regret theory was limited to pairwise choices, Quiggin [13] extended it to a more general form that the optimal alternative can be selected from multiple alternatives. Then, the regret theory is modified to accommodate the impact of outcome feedback on anticipated regret-aversion [14]. Until now, the regret theory has been applied to many areas, such as currency hedging decisions [16], portfolio selection [17], and the production decision of the competitive [18]. Moreover, some researchers have attempted to introduce the regret theory to the multiple-attribute decision making process. Yang and Wang [23] presented a decision making method based on the regret theory and stochastic multicriteria acceptability analysis within the context of discrete -number. It is known that uncertainty widely exists in the complex realities [24]. Meanwhile, due to the fuzziness of

human thought as well as the complexity of the external environment, it is difficult for the decision makers to give precise preferences. Thus, it is necessary to develop novel tools to model the uncertainty. As an extension of fuzzy set [25], hesitant fuzzy set HFS contains all the possible membership degrees in a set and is an effective tool in simulating the situation where people are irresolute and hesitant for one thing or another [26]. For example, when an emergency event happens, some effective measures should be taken to minimize the losses. The process of selecting the alternatives can be interpreted as emergency decision making, which requires multiple experts with different professional backgrounds to make judgments. Usually, views are divided and it is difficult to reach an agreement. At this point, hesitant fuzzy sets will be useful to deal with the situation. Because of its strong ability to depict fuzziness and reserve original information, hesitant fuzzy sets have drawn the attention of scholars [27 â€" 41]. Based on the above analysis, we can find that the hesitant fuzzy set theory and applications have obtained rapid advances. However, the existing research on HFS is mainly focused on the rational decision theory. Although the prospect theory has been employed to deal with the hesitant fuzzy emergency decision making problems [4 , 42], there exist some shortcomings as mentioned above. Besides, it needs the decision makers to specify reference points and the calculation functions contain more parameters [22], which would increase the uncertainty of the decision results. Note that the psychology of regret aversion is typically implied when making decisions. It is thus necessary to quantitatively express the regret aversion of the decision makers in a hesitant fuzzy environment. In addition, attribute weights play an important part in multiple-attribute decision making MADM. Therefore, it is one of the core issues to identify the attribute weights in the decision making process. Many researchers have focused on the determination of attribute weights. However, few efforts have been made to remove the impact of attribute magnitude and dimension when determining the attribute weights. Since the physical dimensions of attributes are different, it is necessary to develop a more reasonable and effective approach for determining the attribute weights. For these reasons, we will present in this paper a novel approach based on the regret theory to deal with the hesitant fuzzy emergency decision making problems. To do this, we must tackle the following three challenges: Due to lack of knowledge, complexity, and so on, it is common to assume that the attribute weights are sometimes unknown. Therefore, it is an important issue, which is worth discussing thoroughly, to know how to deal with the hesitant fuzzy emergency decision making problems with unknown weight information for considering the psychological behaviors of decision makers. To do this, the remainder of the paper is organized as follows. Section 2 reviews some basic concepts. In Section 3 , we describe the hesitant fuzzy emergency decision making problems and put forward a group satisfaction degree formula. With the aid of the water-filling theory, we present an approach to determine the attribute weights, and then an approach to hesitant fuzzy emergency decision making based on the regret theory is presented. In Section 4 , a real case on emergency decision making is provided to demonstrate the application of the proposed method, and the comparisons with other methods are also conducted. Conclusions are offered in Section 5. Hesitant Fuzzy Sets As a generalization of fuzzy set, HFS can be utilized to model the hesitancy effectively when people are irresolute all the way and cannot reach an agreement. In the following, some basic concepts related to HFS are given. Definition 1 see [26]. Assume that is a reference set. An HFS on is defined in terms of a function that when applied to returns a subset of [0, 1]. Xia and Xu [38] adopted the following mathematical symbol to express the HFS: Definition 2 see [38]. Let be three HFEs, then 1 2.

Chapter 5 : Decision Making Theories

2. Types of Decisions. If organisations are viewed as a hierarchy of decision making and decision makers, it implies that, at different levels of the organisation, management will be concerned with different types of decision.

It is easier to detect the nondominated points corresponding to efficient solutions in the decision space in the criterion space. The north-east region of the feasible space constitutes the set of nondominated points for maximization problems. Generating nondominated solutions[edit] There are several ways to generate nondominated solutions. We will discuss two of these. The first approach can generate a special class of nondominated solutions whereas the second approach can generate any nondominated solution. These special efficient solutions appear at corner points of the set of available solutions. Efficient solutions that are not at corner points have special characteristics and this method is not capable of finding such points. Mathematically, we can represent this situation as max wT. Achievement scalarizing function Wierzbicki, [17] Figure 3. Projecting points onto the nondominated set with an Achievement Scalarizing Function Achievement scalarizing functions also combine multiple criteria into a single criterion by weighting them in a very special way. They create rectangular contours going away from a reference point towards the available efficient solutions. This special structure empower achievement scalarizing functions to reach any efficient solution. This is a powerful property that makes these functions very useful for MCDM problems. Any point supported or not can be reached. The second term in the objective function is required to avoid generating inefficient solutions. Figure 3 demonstrates how a feasible point, g_1, and an infeasible point, g_2, are projected onto the nondominated points, q_1 and q_2, respectively, along the direction w using an achievement scalarizing function. The dashed and solid contours correspond to the objective function contours with and without the second term of the objective function, respectively. For a bibliometric study showing their development over time, see Bragge, Korhonen, H. The purpose of vector maximization is to approximate the nondominated set; originally developed for Multiple Objective Linear Programming problems Evans and Steuer, ; [19] Yu and Zeleny, [20]. Phases of computation alternate with phases of decision-making Benayoun et al. The purpose is to set apriori target values for goals, and to minimize weighted deviations from these goals. Both importance weights as well as lexicographic pre-emptive weights have been used Charnes and Cooper, [25]. Fuzzy-set theorists Fuzzy sets were introduced by Zadeh [26] as an extension of the classical notion of sets. This idea is used in many MCDM algorithms to model and solve fuzzy problems. Multi-attribute utility theorists Multi-attribute utility or value functions are elicited and used to identify the most preferred alternative or to rank order the alternatives. Elaborate interview techniques, which exist for eliciting linear additive utility functions and multiplicative nonlinear utility functions, are used Keeney and Raiffa, [27]. The method was first proposed by Bernard Roy Roy, [28]. Evolutionary multiobjective optimization school EMO EMO algorithms start with an initial population, and update it by using processes designed to mimic natural survival-of-the-fittest principles and genetic variation operators to improve the average population from one generation to the next. The goal is to converge to a population of solutions which represent the nondominated set Schaffer, ; [29] Srinivas and Deb, [30]. Then the decision-maker evaluates the relative importance of its various elements by pairwise comparisons. The AHP converts these evaluations to numerical values weights or priorities , which are used to calculate a score for each alternative Saaty, [32]. A consistency index measures the extent to which the decision-maker has been consistent in her responses. AHP is one of the more controversial techniques listed here, with some researchers in the MCDA community believing it to be flawed. The underlying mathematics is also more complicated, though it has gained some popularity as a result of commercially available software.

Chapter 6 : Multiple-criteria decision analysis - Wikipedia

In this paper, the modified S-curve membership function methodology is used in a real life industrial problem of mix product selection. This problem occurs in production planning management where by a decision maker plays an important role in making decision in a fuzzy environment.

Herrera-viedma - and Systems , " The aim of this paper is to study the integration of multiplicative preference relation as a preference representation structure in fuzzy multipurpose decision making problems. Assuming fuzzy multipurpose decision making problems under different preference representation structures ordering, utilit Assuming fuzzy multipurpose decision making problems under different preference representation structures ordering, utilities and fuzzy preference relations and using the fuzzy preference relations as uniform representation element, the multiplicative preference relations are incorporated in the decision problem by means of a transformation function between multiplicative and fuzzy preference relations. A consistency study of this transformation function, which demonstrates that it does not change the informative content of multiplicative preference relation, is shown. As a consequence, a selection process based on fuzzy majority for multipurpose decision making problems under multiplicative preference relations is presented. To design it, an aggregation operator of information, called ordered weighted geometr Several choice processes of alternatives for non-homogeneous group decision making problems, assuming linguistic preference relations for expressing the opinions of individuals and linguistic values for expressing their respective power or importance degrees, are presented. These processes are desig These processes are designed using two choice degrees of alternatives based on the concept of fuzzy majority: In order to deal with non-weighted linguistic information, the linguistic ordered weighted averaging LOWA operator is applied. To deal with weighted linguistic information, three operators of linguistic weighted information aggregation are used: Herrera-viedma - European Journal of Operational Research , " A multiperson decision making problem, where the information about the alternatives provided by the experts can be presented by means of different preference representation structures preference orderings, utility functions and multiplicative preference relations is studied. Assuming the multiplicative preference relation as the uniform element of the preference representation, a multiplicative decision model based on fuzzy majority is presented to choose the best alternatives. In this decision model, several transformation functions are obtained to relate preference orderings and utility functions with multiplicative preference relations. The decision model uses the ordered weighted geometric operator to aggregate information and two choice degrees to rank the alternatives: The consistency of the model is analysed to prove that it acts coherently. Multiperson decision making, preference orderin In a fuzzy multi-person decision making problem, where each expert provides information about the alternatives in different ways, several techniques to make the information representation uniform are given. Assuming that the experts may provide their opinions by means of preference orderings, or uti Assuming that the experts may provide their opinions by means of preference orderings, or utility functions or preference relations, the fuzzy preference relations are chosen as usual representation element and then, from them any election process may be developed. In particular, in decision making problems where human judgments including preferences often vague. Some issues about this topic are presented in [3, 8, 9, 10, 11]. The application of Fuzzy Set Theory in real world decision making problems has given very good results.

Chapter 7 : Decision Making: Process and Theories | Management

The utility of Fuzzy set Theory in decision-making was first demonstrated by Bellman and Zadeh in The inventory of successful application of Fuzzy Set Theory has been growing steadily, particularly in the s.

This paper explores the ethical implications of the existence of personal relationships in business exchanges. Firstly, this paper introduces personal relationship in business exchanges. Secondly, three normative theories of business ethics that are related to the issue of personal relationship are Secondly, three normative theories of business ethics that are related to the issue of personal relationship are presented. Finally, this paper explores the ethical implications on personal relationships according to the three theories. In this paper we give an overview of existing approaches for capturing HCD Human-Centred Design process and design knowledge. We present an alternative approach that aims at fostering the integration of UE Usability Engineering activities and artifacts into existing software developmen We present an alternative approach that aims at fostering the integration of UE Usability Engineering activities and artifacts into existing software development processes. The approach is based on six claims that are derived from an analysis of existing UE process models and requirements of software developers. Our approach is embeddable in existing process improvement frameworks such as the UMM Usability Maturity Model and is supported by a web-based tool. An explorative study that we have conducted with software developers from various software development organizations confirms the potential of our approach. However the study indicates that our approach is more strongly preferred by developers with experience in user interface design. In the upper right corner, the project context situation is represented. It is used to describe important constraints for the sel The investment return, tariff regime and concession period are the most important items that influence the success of a concession-based Public-Private Partnership PPP project. However, a seemingly favorable deal may turn out to be the least value-for-money option should it cause unnecessary social upheaval, such as excessive tariff increases or complaints. A scheme which is truly value-for-money is one which balances the interests of the public partner, investor and end-users. In this paper, a simulation model is proposed to assist a public partner to identify the concession period based on the expected investment and tariff regime. The needs for establishing different scenarios to represent the risks and uncertainties involved are presented, and a fuzzy multi-objective decision model is All rights of reproduction in any form reserved. This study reviews the problem of the individual investor and applies to it a methodology based on fuzzy sets and the theory of possibility. The investment decision is characterized by uncertainty, imprecision and complexity, which lessen the effectiveness of conventional calculus andprobability too The investment decision is characterized by uncertainty, imprecision and complexity, which lessen the effectiveness of conventional calculus andprobability tools. In contrast, fuzzy set theory and its modeling language provide objects of analysis and algebra that are well suited to this problem. Show Context Citation Context What is gained in the application of fuzzy sets to the individual investor problem? In brief, fuzzy sets provide the algebraic tools and operations to permit the asset allocat This Open access is brought to you for free and open access by the Electronic Theses and Dissertations at Scholarly Repository. It has been accepted for inclusion in Open Access Dissertations by an authorized administrator of Scholarly Repository. For more information, please contact For more information, please contact Powered by:

Chapter 8 : Fuzzy-trace theory - Wikipedia

Fuzzy-trace theory (FTT) predicts reversals by proposing two types of mental representation (gist and verbatim), and that risk takers rely more on verbatim processing when making decisions. In this article, we describe the main tenets of FTT and explain how it can account for risky decision making.

Larger framing effect Figure 5 shows effects of selectively focusing attention on parts of the gamble; two variations on selective attention effects are displayed. These experiments address the question of whether supposedly key numbers are sufficient to observe framing effects. These numbers are supposed to provide everything needed to show framing effects. The zero complement of the gamble literally multiplies out to equal zero. Thus, focusing attention on these numbers should produce identical framing effects compared to full-complement, traditional versions of the problem , according to psychophysical theories. Framing problems with variations in gamblesâ€"focusing on nonzero complement shown at the left, both complements traditional presentation shown in the middle, or zero complements shown at the right. Labels are shown for the Asian disease problem, but the data are from multiple problems each of which shows the effect. As you can see in Figure 5, there is little or no framing effect when attention is focused on the supposedly critical numbers, an effect that has been replicated in different languages and cultures e. What happens if the opposite truncation of the gamble is performed, another selective attention manipulation Table 2? According to fuzzy trace theory, this variation highlights the some-none contrast: Therefore, an increase in the framing effect should be observed, and, in fact, this is what the studies showed Figure 5. When the expected values of the options are equal or close to it , however, focusing attention on categorical contrasts between options produces sharp preferences, in spite of the equivalence in expected value. This series of experiments on selective attention effects pits predictions characterizing decision making in terms of psychophysical transformations of probabilities and outcomes, which trade off, against predictions that decision making boils down to essential meaning: The effects shown in Figures 4 and 5â€"making framing effects disappear and making these effects largerâ€"fall out of the assumptions of fuzzy-trace theory. It is possible to explain some of these findings with prospect theory or cumulative prospect theory by going beyond its psychophysical mechanisms, but it is not obvious how all of the effects in Figures 4 and 5 can be accommodated by that approach. Prospect theory seems to capture what people do when they process numbers, but more often than not, people make decisions based on crude qualitative contrasts some-none or low-high rather than on numerical details Reyna, How people mentally represent quantities in judgments and decisions, along with the social and moral values that they retrieve and apply to their representations, determine behaviors, such as choices. Moreover, the level of representation is not arbitrary, but, rather, begins at the lowest or simplest level of gist the nominal, or categorical, level and proceeds up the hierarchy of gist increasing in precision until a choice can be made e. The fuzzy-processing principle stipulates that the lowest level of gist, the categorical or some-none distinction, is attempted first because it is the simplest gist e. That is, if one thinks of any kind of numerical quantity, the simplest distinction that can be made is at the nominal some vs. Thus, the gist of the Asian disease problem boils down to a choice between saving some people versus saving some people or saving none, favoring the selection of the sure option in the gain frame; the same simple dichotomization favors selection of the gamble option in the loss frame Reyna, Other decisions cue other values, such as valuing money or health, which are then applied to representations of the decision options in order to generate a preference. Retrieving and applying a value for human life e. If decision makers had this some-none representation, but did not have this human-life value, they would not necessarily have a preference, even though the representation was simple. It is this value, retrieved in the context of choice, that allows someone to decide between the sure option versus the gamble option. Therefore, in the gain frame, because saving some people is better than saving none, one prefers the sure option. In the loss frame, the mental processes are analogous to those in the gain frame, but the resulting preference is exactly the opposite. If some people die for sure, and none dying is preferred over some dying, now one chooses the gamble option. Algorithmically applying the same representation and retrieval processes e. Additional variations include that framing effects increase, rather than disappear, with repeated

choices presented within subjects e. These effects, as well as the nonnumerical and selective attention effects discussed earlier, are predicted by the representational and retrieval assumptions of fuzzy-trace theory. This result mirrored other emerging developmental results for similar reasons. Reyna and Ellis argued that the representativeness heuristic and other biases increased with age, too, because of an increased reliance on gist-based intuition e. Young children were found to be loss averse, as adults are Reyna, a , but they roughly calculated and responded similarly to gain and loss frames in true framing as opposed to reflection problems: Rather than show gist-based framing effects, young children appear to roughly calculate expected value, and they modulate their choices based on the magnitudes of risks and rewards e. However, fuzzy-trace theory does not assume that verbatim-based analysis e. Instead, fuzzy-trace theory incorporates a duality: Therefore, cuing and context elicited mathematically astute judgments early in development e. Furthermore, mathematical performance improved during the same period in which heuristics and biases emerged for seemingly mathematical tasks, such as probability judgment and decision making i. If one considers theories of the development of reasoning from childhood to adulthood, there are many reasons to expect that reasoning should only get better in the traditional sense of being more quantitatively sophisticated and less biased. Working memory capacity increases, inhibition and cognitive control improve, and metacognition develops during that age period e. A person becomes a better computer all the way around, from childhood, to adolescence, to adulthood. In all standard developmental and dual process theories â€" if an age difference is observed â€" it should generally reflect improvement in reasoning and judgment-and-decision-making performance. Increases in biases or distortions are called developmental reversals because they reverse the usual expectation of developmental progress e. Developmental reversals were predicted by fuzzy-trace theory, but they have been found serendipitously, too. According to the theory, these increases are predicted because they reflect gist-based meaning biases. Shown in false memory as well as in reasoning, meaning-based processing increases with age from childhood to adulthood. A study conducted by Markovits and Dumas is instructive for understanding increases in reasoning biases. They presented transitive inference problems to young children transitive inference questions are on IQ testsâ€"A is bigger than B, B is bigger than C, therefore A is bigger than C. As children get older, systematic errors go up in the friendship version of the problems. Older children are more likely to conclude erroneously that Paul is a friend of Sam. That erroneous inference increases with pragmatic knowledge, social knowledge, and so on, because knowledge supports the processing of meaning e. However, as the emergence of framing effects shows, knowledge differences are not essential to observing increases in gist-based intuition. Older theories acknowledge the possibility of meaning-based distortions, but they claim either that reasoning is inherently biased or that such biases are artifacts e. Both verbatim analysis e. The interplay of these two kinds of processing has been used most recently to explain adult biases in conjunction and disjunction judgments e. To summarize, during childhood, despite increasing skill in calculation, including in calculating probabilities and expected value, the tendency to use the bottom-line meaning in many situations goes up faster than the tendency to rely on computational ability. Mathematical models are useful in testing such predictions involving opposing processes, in this instance, verbatim-based analysis versus gist-based intuition e. Models incorporating simple assumptions from fuzzy-trace theory have been tested for goodness-of-fit to real data and evaluated against alternative models e. The heart of a mathematical model of a psychological process, such as decision making, is not the mathematics, but, rather, the interpretation of the mathematics in terms of core constructs. The core constructs in fuzzy-trace theory are verbatim and gist representations that are encoded and processed in parallel, and which support analysis versus intuition, respectively. Verbatim and gist representations compete against each other for control of task performance; the winner depends on which memory is more accessible and the constraints of the task see Figure 1. In general, gist is more accessible and more useful than verbatim representationsâ€"especially when gist is informed by age and experience. False memory, occurring when people remember things that never happened as though they did happen, typically derives from unconscious meaning-based inferences e. Popular myths, such as that adolescents underestimate risks, have been studied extensively and ruled out by multiple investigators. Therefore, underestimation of risk, changes in beliefs, and other conventional wisdom do not account for the effects I now discuss. Applying the lesson that laboratory

findings bear on real life to the problem of risk taking, I have more recently examined risky decision making of adolescents, portrayed in the literature as paradigmatic examples of irrational decision makers Reyna, et al. Extrapolating decision-making mechanisms from laboratory to life, is it possible to explain adolescent risk taking? Tasks that add the experience of actual outcomesâ€"children experience wins and lossesâ€"cloud assessment of risk preferences per se: As noted earlier, around preschool age, there is no consistent difference between risk preferences for gains e. The biasing effect of context, that net gains were achieved as a result of losses, emerges in childhood Galvan, Although risk preferences for gains versus gains framed as losses are similar in preschoolers, such preferences begin to diverge for elementary schoolers. Reverse framing is the opposite of standard framing: It is a preference for the gamble option in the gain frame, but the sure option in the loss frame. Recall that, when expected value is equal, risk and reward trade off in these problems. Thus, in reverse framing, second graders choose the gamble more in the gain frame; they go for the larger rewards i. Apparently, second graders compare numerical outcomes in the loss frame, too; they go for the smaller losses in the sure thing, relative to the losses in the gamble focusing on probabilities would have produced opposite preferences. So, unlike younger children who process both risk and rewardâ€"two dimensionsâ€"older children mainly focus on the one dimension of reward outcomes. In early adolescence, the emergence of standard framing can be detected e. Standard framing is evidence for qualitative processing because that hypothesis accounts for all of the effects reviewed earlier, as opposed to alternative hypotheses that do not account for all of the effects. Consistent with this hypothesis, younger adolescents who are just beginning to exhibit standard framing, are more likely to assimilate outcomes when the outcomes are similar to one another than when they differ: Therefore, it makes sense that standard framing emerges first for smaller outcomes e. In other words, the difference in outcomes is greater for larger e. High school students also show reverse framing for larger outcomes e. Thus, children and adolescents are sensitive to quantitative differences between outcomes, manifest in a reverse framing pattern, whereas adults rarely exhibit reverse framing e. Intriguingly, deviation from consistency across frames grows with age until the adult pattern of standard framing is evident. By traditional yardsticks e. How can the risk preferences of lab and life be reconciled? For gains, the downward trend across age in preference for risk, as measured objectively in the laboratory, is fairly stable. However, as illustrated by reverse framing, adolescents also differ cognitively and motivationally from adults e. Youth are more likely to compare reward magnitudes, and to take risks to achieve more positive outcomes. According to fuzzy-trace theory, their greater reliance on verbatim-based analysis e. The cognitive shift from greater reliance on verbatim-based analysis e. In , based on a review of the literature in many domains of adolescent risk taking, Reyna and Farley concluded that precise, hair-splitting calculation of risks and rewards promotes risk taking among adolescents, whereas simple, all-or-none gist protects against unhealthy risk takingâ€"the opposite of most theories of risk taking e. This prediction was also borne out in subsequent studies e. Moreover, cognitive measures of verbatim-based analysis versus gist-based intuition i. Reverse framing, in particular, loaded with other measures of verbatim-based analysis in principal component analyses, and these verbatim measures predicted greater vulnerability to real-life risk taking. In contrast, gist-based intuition was consistently associated with lower levels of unhealthy risk taking. Most theories of adolescent risk taking recognize that something like inhibition or cognitive control which includes the ability to regulate emotions also develops during this period.

Chapter 9 : CiteSeerX â€" Citation Query Fuzzy Theories on Decision Making (Nijhoff

"Classical theories of choice in organisations emphasise decision making as the making of rational choices on the basis of expectations about the consequences of action for prior objectives, and organisational forms as instruments for making those choices" [14].