Study on Fuzzy ELECTRE Method with Various Methodologies

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Abstract

The purpose of this thesis is to develop a MCDM system based on a deletion and selective translation reality (ELECTRE) Assessment information is expressed and manipulated by the Tempster-Schaefer Theory (DST). DST is the primary means for uncertainty modeling. In this paper, the weight of the criteria and the effectiveness of each alternative are expressed in terms of linguistic terms and belief levels, which are then converted into basic probability assignment (BPA) representations. In order to integrate the evaluations of different experts in the most rational and efficient manner, a discount system in DST is provided Based on the proposed concept of source reliability. In addition, as a family of MCDM models, the ELECTRE system is known for its superior relationships in ordering a set of alternatives. As an extension, artificial weight, including subjective and objective weights, is used to determine concepts of synchronization and variance. The proposed DS-ELECTRE approach directly reflects the advantage of DST and deals with uncertainty, but the ELECTRE method can also play a role in analyzing the relationships between alternatives. An illustrative number example is conducted to demonstrate the effectiveness of the DS-ELECTRE method. The final result matrix can be obtained based on the fusion results, which will then be used in ELECTRE mode. At this point, the transcendental relationships between all pair alternatives are structured in ELECTRE mode using concepts of synchronization and contrast, which are Represented by some corresponding matrix. A result chart will be drawn based on the resulting global matrix, and the ranking results will be analyzed to determine the appropriate provider. In short, a new ELECTRE-based system has been developed to address MCDM issues in DST contexts, which can be considered by decision makers. non-formal evaluation and apply incomplete or insufficient knowledge of data. Therefore, in this study, a comprehensive Weight including subjective weight and objective weight is defined in the process of ELECTRE method to make the synchronization and contrast metrics more reasonable. Subjective weight is obtained only on the basis of decision makers 'preferences or judgments, and objective weight is determined using the entropy weight method.

Introduction

Generally, multiple criteria follow six steps, including problem-solving, problem-solving, goal-setting, alternative-finding, criterion-making, and identification (Saber, Erkoyuncu, & Roy). Can be applied to Analysis (MCDA) refers to the making of optional decisions in alternative ways characterized by multiple attributes (e.g. evaluation and selection). Four Different Ways to Compare the Ideal Solution System using the Technique for Order Reference by an MCDA Multi-Scale Decision Making (MCDM) or Multi-Scale Analysis (MCDA) is a sub-discipline of operational research, both in decision making (in business and in medicine, in government and in business). Explicitly evaluates several conflicting criteria). This method, like other methods that support the provision of multiple criteria for alternatives, uses the custom model of the DM, characterized by a number of parameters that more or less follow directly from the priority information provided by the DM. In the ELECTRE TRI, the priority model is an ideal relationship and the parameters are different limits of weights and criteria. In order to support the selection process, we propose a systemically integrated ELECTRE TRI Assistant. It guesses the priority model parameters from the assignment examples provided by DM. when choosing from the alternatives in front of them. Making offers two benefits over individual decision making: synergy and information sharing. Sharing information between other advantages of the team decision-making process is team members. Team decisions take into account a wide range of information as each team member can provide personal make it easier to move towards a collective conclusion.

Multi-criteria decision making

A numerical example is provided to demonstrate the practice of overcoming alternatives in the value engineering environment using the ELECTRE III model. Alternatives. , In addition to the indifference (q) and priority (p) limits, depends are made by a number of criteria Allows strong decisions to be made on engineering issues [7]. From a personal assessment of the characteristic features of the product The computer is trying to find a collection of some interesting products. Multiple criterion decision models can be used effectively, because they have a limited number of features Or decision-making alternatives with criteria Provide a method for evaluation. Based on the requirements for this product (Including price, quality, appearance, running speed and customer service) When one buys a laptop, the recommendation system will suggest the most suitable type of laptop for the customer. Information provided by customers who have purchased similar products. In general, these different customers may give different ratings to a particular aspect of the

product [49]. Energy supply system options, planning, management and Rational decision making (DM) in economics is conducive to sustainable growth. However, the complex interactions shown in Figure 1 make DM very difficult. Provides a method of eliminating the difficulty of sustainable energy decision making using Multi-Scale Conclusion Analysis (MCDA), And it has long. MCDA is a form of integrated sustainability assessment. motives, Different types of data and information, Many interests and perspectives and complex and evolving biology And accounting for socio-economic systems Functional evaluation and decision support approach to solving complex problems. The traditional single-scale approach generally aims to identify the most cost-effective options [80]. Maintaining partnerships and using less but reliable suppliers. So, choosing the right suppliers, More than just scanning the price list line, Further choices depend on various factors including quantity and quality. Analytical hierarchical process (AHP), analytical network processing (ANP), Case Based Rationale (CBR), Data Envelope Analysis (DEA) And supplier such as ambiguous set theory Comprehensive multi-level decision-making approaches to the exam are proposed. Genetic Algorithm (GA), Mathematical Programming, Simple Multiple Writing Assessment to solve supplier evaluation and selection problem by several criteria. Individual and integrated approaches, their applications and rating criteria, are abbreviated in the back links.

Multiple Criteria

Multiple Criteria Decision Aid (MCDA) deals with three main types of decision making issues: ranking, sorting and selection. Ranking issues look at their ratings based on the criteria considered, ranging from the worst to the best in the rankings of all alternatives; Deployment issues include assigning each alternative to a pre-defined and pre-sorted class; Selection issues lie in selecting the subcommittee of alternatives that are considered the best (for a more detailed study, see [6,4]). To deal with these problems, one can use one of two different methods. Assign an utility value to each substitute, i.e. a real number, independent of the evaluation of the other substitutes, and compare the alternatives pair-wise to find out if one actual number represents the desirable quantity of the substitute considered. the Multiple Attribute Application often add-on several margin to alternate an application value by taking into account its values based on the criteria considered. There are criteria. Not all multi-criterion decision-making problems provide the same level of evaluation criteria, but there may be a hierarchical set of criteria. For developed by sub-criteria for evaluating alternatives [13]. The process leading controls over priority evaluated need to provide some optional information to develop a model that evaluates alternatives to this approach. Obtaining custom information from DMs and formalizing it by prioritizing parameters is an important step in the multi-criterion decision support [21]. Different decision-making problems require different approaches. We are interested in the context in which the objects (actions, alternatives,) of a decision must be sorted or assigned to a set of categories. To avoid any simplification, notice that the term "decision assistance" is used instead of "decision support", "decision making" or "decision analysis". The assignment of actions to categories is based on the evaluation of each action according to several criteria. In such decision-making ordering contexts, several hypotheses are relevant to the way decision-making assistance is considered [44]. Provides a multidimensional method of complex proportional evaluation of alternatives with gray relations for use and analysis of the gray relation system to define the use of alternatives. In this model, the parameters of the alternatives are determined by the relative quality of the gray and expressed in terms of spacing. Dembczyński et al. [3] The proposed dominant-based approach to dealing with multiple criteria (also known as regulatory classification with multiple criteria sorting or monotonicity restrictions), may be contrary to the principle of dominance. The given method preserves the well-known properties of approximations, i.e. approximate addition, fill, boundary identification and precipitation. Further, the rain is extended to the case where the object of the property is considered. Furthermore, they proposed a way to reduce decision-making tables and stimulate decision-making rules from approximate estimates [47]. The classical ELECTRE method uses pair-wise comparisons of alternatives to determine synchronous and conflicting sets. This method generates a variety of metrics using a combination of synchronization and contrast and uses threshold values to filter out the less favorable alternatives and select the best [32]. Watnois et al. [62] It was proposed to use the ELECTRE method in an interval type-2 ambiguous environment by means of interval weights and data. Vadnais and Had pour [61] developed the interval value ambiguous ELECTRE method to solve many scale decision problems with triangular interval value ambiguous numbers. We propose an ELECTRE-based outlining method for accurately analyzing IT2TrFN data and MCGDM issues, using a different approach from the ambiguous ELECTRE methods of gap value [61,62]. For practical applications, the proposed ELECTRE-based outrunning methods are more suitable for solving the multi-criterion evaluation problem compared to existing decision-making methods, in which the number of criteria significantly exceeds the number of variables. For example, note the comparison with the linear programming technique for Priority Multidimensional Analysis (LINMAP). LINMAP is a well-known method for solving multiple criterion analysis problems [57]. The taxonomy proposed in this paper provides a tool for evaluating MCDA methods depending on what type of problem they are suitable for. It empowers researchers to select the most appropriate MCDA method (s) for the decision-making problem. Users intended for this classification are decision makers responsible for evaluating a set of alternatives based on multiple criteria using MCDA methods and supporting DMs in the MCDA process. This work reflects the first phase of the contribution to the synchronization phase for the MCDA, which includes structured and comprehensive representation and the definition of components to be considered when making multi-criterion-based decisions. This classification is derived from a review of the available literature discussing the strengths and weaknesses of the MCDA system, or the selection of a subcommittee on the MCDA method, which provides guidelines and approaches for conducting the MCDA process [70].

Fuzzy ELECTRE

The ambiguous set theory is capable of dealing with uncertainty. ELECTRE is one of the decision making methods based on pair wise comparison. Advantages of Fuzzy ELECTRE System for Personnel Selection Problem, More research is needed in the context of studying more complex employee selection with multiple criteria, As well as other MCDMs exploring to find the optimal employee selection solution. In this study, based on the ambiguous set theory for selecting the most adequate person We tried to design a multi-criterion decision model. Unlike other decision-making methods, this method can be followed to find the right person for the job [22]. ELECTRE I is one of the earliest multicriteria evaluation methods developed with other advanced methods. The main purpose of this method is to select a desirable alternative that meets both the synchronization option over multiple evaluation criteria and the discrepancy option under any preferred criteria. ELECTRE I generally consists of three concepts, namely synchronous code, conflicting code and entry value. In this study, our sample vague ELECTRE will be used by a panel of decision makers with the opinion of decision makers [68]. Using the smooth ELECTRE approach, Supplier A was identified as the most suitable supplier. However, when the ambiguous ELECTRE approach was used, supplier C was identified as the most suitable supplier. This paradoxical finding is not particularly surprising, since most supplier selection decisions are made in complex contexts where ambiguous decision-making theory can be used significantly. Because of the inherent ambiguity and ambiguity in human judgment, the crisp numbers proposed in the crisp ELECTRE have failed to solve the problem of ambiguity. In this study, the ambiguous ELECTRE method was used as an alternative to the conventional ELECTRE approach. Second, drawing a real case, this study compared and distinguished between traditional crisp and fuzzy ELECTRE methods. Of the three alternative suppliers in our case, supplier C was found to be the most favorable supplier under the ambiguous ELECTRE approach, whereas supplier A was identified as the most suitable supplier when using the soft ELECTRE method. Supplier B, however, was found to be less favorable under both methods [77]. The Fuzzy AHP approach and the Fuzzy ELECTRE method suggest the same candidate 2 as the best choice. They come from different theoretical backgrounds and differ with many criteria decision making regimes. Since the data required for the Fuzzy AHP and Fuzzy ELECTRE method approaches are different, we do not have to expect the same result for the same employee selection problem. However, compared to the rankings obtained using the Fuzzy AHP method and the Fuzzy ELECTRE method, the best alternative (candidate 2), and the rankings of the alternative talents in each method are very close to each other. This implies that the ranking results are necessarily the same, when the decision maker agrees with him in independently determining the data for each method. In fact, the same results were confirmed and a second candidate was selected [78]. Since vague DSS is enabled, all alternatives to the problem are evaluated under different criteria. These assessment scores can be used in an ambiguous MCDM system to reach the final ranking of alternatives that will help the decision maker make his or her final choice. In the next section of this paper, we will discuss the ambiguous MCDM systematically ambiguous ELECTRE III for sequencing alternatives based on the estimates achieved by the ambiguous DSS. This paper describes a new method for designing an ambiguous expert DSS, which can be used to assist companies in facilitating vendor evaluation, and also includes the use of ambiguous ELECTRE III to rank vendors based on vendor DSS ratings. The designed system evaluates the degree of compatibility between the seller's offer and the customer's need. Performance evaluation is done in a case study using expert verification and prototype testing at a leading oil company (OIEC) in Iran [79].

ELECTRE Tri

These situations are mainly related to the behavior of the wart method. We have "strong dominance" and wart. Displacement function used by Almeida-Diaz et al. (2010) to justify the proposition of two elements of the system using the central profiles they suggest to use together. In particular, as Roy (2002) first noted, the two versions of the original system were incompatible with the application of this transfer function: the pseudo-intermediate version (also known as the "trust") was not derived from the pseudo. Swap function and vice versa combined version (also known as "distrust"). Most of the elicitation techniques proposed so far deal with the pseudo-link version (Zheng, 2012; Zheng et al., 2014, with exceptions) and why the print analysis conducted at Bouyssou and Merchant (2007a, b) is only for the pseudo-link version. This will lead to the proposal using profiles defining the new variant of ELECTRE TRI. Step-by-step ELECTRE Tri-B method for real world decision making. In 2000, the Transport Infrastructure Regional Survey (TIRS) was conducted in the context of the Stability Agreement under the European Investment Bank (EIB) and the European Union (EU) to assess the feasibility of implementing Survey for more details on TIRS). The extension of the SRF method can be used with a hierarchical set of criteria compiled in a way that does not cover all types of decision-making issues (selection, ranking and sorting issues). The proposed method is illustrated by an artificial example that uses decision-making problem [15]. The ELECTRE TRI-C is made up of two joint rules, the descent rule and the ascent rule. Each of these rules selects only one category for the possible assignment of an action. They are used together to highlight the higher category and the lower category, which may seem appropriate to obtain an action. These two extreme categories may be identical. When they differ, the assignment of such action may not be determined within the range of possible types, considering the way in which the set types of characteristic actions are defined. ELECTRE TRI-C is the ELECTRE TRI-B in case of mismatched deployment situations where it is difficult to define boundary functions according to assumption 4 (see Section 1). Defining boundary actions is often a very difficult task. This is especially true when the decision maker has a vague idea of the boundary between the two successive categories. Alternative selection functions may also be suggested to replace what is

proposed in this paper. In order to preserve the characteristic functions and fundamental properties of the ELECTRE TRI-C system, particularly the role of the monotonicity property [38], such alternative selective functions must meet two desired characteristics. This database includes actual alternatives; Its use in analysis provides some indication of the ability of the proposed method to infer accurate ELECTRE TRI models from real data, whose properties are generally difficult to reproduce in a simulated environment. The alternatives in each package are grouped using the ELECTRE TRI method. In the analysis both belief and disbelief practices are implemented. [43]. The linear dry algorithm was provided in Lorenzo & Costa (2001b) and was used to solve the surgical planning decision using the software tool built to support it (see Lorenzo and Costa, 2001a). It is now possible to identify / confirm certain algorithm limitations. For example, the simplifications introduced in the weight-based coefficient hypothesis scheme may override some assignment examples (alternative / classification), however, according to the current optional framework, they will receive exactly is that it does not use any dominant solutions as type reference profiles. This does not conform to the ELECTRE TRI method and further complicates the weight assumption process. Not only did this not fully comply with the ELECTRE TRI, but it also seemed to complicate the weight assumption process. [60]. Conflicts arise cannot be expressed by the preferred random information from the expressed options, i.e., very different or conflicting allocation examples. As a result, a fundamental test issue is about the ability of the tool to detect inconsistencies in the DM's statements: detecting inconsistencies will enable the DM to correct explicit assertions to match his / her preferred model. We observe the capability of the guessed weights to correctly assign the entire is capable of using guessed weights to accurately reassemble all alternatives, increasing the size of the set from which the weights are obtained. However, the number of allocation examples expressed by the DM should not exceed [71].

Outranking Method

First-aid method using the concept of a previous relationship. The idea of modifying the reliability of advanced insertion was introduced in ELECTRE II (see Roy and Bertier, 1973) in which two model options are taken into account: the first is relatively poor but strongly justified and the second is rich but less insecure. Built-in outreach relationships [2]. This section presents the unique making situations. These are the four preferred scenarios handled by ELECTRE methods, priority modeling by transcendental relationships, ideas of synchronization and contradiction, planning of decision-making method, major strengths and weaknesses of ELECTRE methods. All outranking-based methods rely on the notion of synchronization and contradiction, which, in a certain sense, represent causes against and against the transcendental situation. Incomplete knowledge of the data and the creation of some arbitrary out ranking as well as against. Rank shows that reversal can occur and, as a result, the property of liberty related to inappropriate actions may be violated when dealing with unrelated relationships. [3]. ELECTRE-GD is a natural extension of the ELECTRE III approach to collective group decision-making, using a genetic algorithm with good properties for utilizing ambiguous hypersensitivity to ELECTRE concepts that are synchronous, contradictory, veto and incomparable. The presence members are a key feature of our proposal. ELECTRE-GD is actually a way to model the options of SDMs [8]. The classical ELECTRE method uses a pair of alternating comparisons to determine the sets of synchronization and contrast. This method generates a variety of metrics using a combination of synchronization and contrast and uses threshold values to filter out the less favorable alternatives and select the best [32]. Wahdani et al. [62] It was proposed to use the ELECTRE method in an interval type-2 ambiguous environment by means of interval weights and data. Wahdani and Hadipur [61] developed the Interval Value ELECTRE method to solve many scale decision problems with triangular interval value ambiguous numbers. We propose an ELECTRE-based outlining method for accurately analyzing IT2TrFN data and MCGDM issues, using a different approach from the ambiguous value obscure ELECTRE methods [61, 62]. Seven-point linguistic assessment measurements were used in this example. Sen et al. [26] and Hatami-Marbini and Tanana [38] convert linguistic estimates into trapezoidal ambiguous numbers to form a decision-making team and determine the ambiguous weight of each criterion. However, the proposed ELECTRE based outranking methods are used to solve MCGDM problems in the IT2TrFN environment [74]. Key approaches to decision making include multiple attribute application theory and transcendental methods. The basic premise of the application theory is that the decision maker chooses the alternative that maximizes the expected application value. The difficulty, however, is that in many cases it is not possible for the decision maker's application function to obtain a mathematical representation of U, so many aggregation functions are introduced instead of the global application function [75]. The departure of transcendental practices advancing techniques do not predict the existence of a better alternative to be sought. The solution of algorithms that transcend the notion of a more acceptable compromise with respect to the optional structure of the DM (Brans and Marshal, 2005; Guidonia and Martel, 1998). The dominant concept is further structured on the basis of the principle of dominant and dominant alternatives. Therefore, surplus models go on to compare pairs of alternatives related to their performance on each single scale [76].

Group Decision

The proposed method is designed to select the problem instead of the ranking of actions. The hybrid ambiguous Electro I approach considers ambiguity in decision-making method allows a group of DMs to form their own opinion independently of the linguistic rules and uses ambiguous decision team and criterion weights to integrate their ideas. We determine the synchronization team and the contrast team for each action. As a result, two different ambiguous estimates for each process are obtained and integrated. Based on the total matrix, we draw a conclusion graph to determine which action is desirable, incomparable, or negligible. Sheet 374 A. Hatami-Marbini, M. Tanana / *Omega* 39 (2011) 373–386 is organized as

follows: In Section 2, we review vague packages and some basic definitions of the Electra I method. In Section 3, we introduce our method and methods. In Section 4, we present a numerical example to illustrate the details of the proposed method and illustrate our results in Section 5. In Section 6 we present our findings and future research directions [14]. Hung and Chen used intuitive ambiguous sets for the new ambiguous tipsy decision model, and used entropy weights to deal with decision-making problems on multiple criteria in an intuitive ambiguous environment. Created different configurations intuitive ambiguous packages intuitive vague topsides in the project decision-making model for project selection. Proposed some IVIF integration operators and examined their application for panel decision making under the IVIF environment. Proposed a new multicriteria decision-making system under the IVIF context [48]. The purpose of this article is to extend the ELECTRE method to the decision-making environment of IT2TrFNs for solving MCGDM problems. Decision makers generally use the linguistic evaluation method. Because uncertainty is essential in real-world decision-making situations, it is increasingly important to model the uncertainty of human subjective management in solving MCGDM problems. IT2TrFNs can be useful for managing uncertainty and inaccuracies arising from mental events in a team decision-making environment. Therefore, IT2TrFNs can accurately specify linguistic values to directly calculate uncertainties in complex or miss-defined situations. Considering the IT2TrFN context, this paper also provides a hybrid averaging approach with signed distances to add IT2TrFN information to create a collaborative decision-making environment. Next, this paper develops an ELECTRE-based outranking system for accurately interpreting IT2TrFN data to add MCGDM issues. Using the signed remote approach, we identify synchronization and conflict packages to determine synchronous and conflicting codes for each pair of alternatives, respectively [57]. This paper is an attempt to explore further applications of MADM approaches for simultaneous ranking consistency Final notes are given in the section. The next two subcategories, selected classical weighing and optimization methods are reviewed first, where uncertainty in weighing is not considered. In Section 2.3, these tools are used to make a panel decision under uncertain weight for multiple criteria material selection [59]. The purpose of this study is to provide a basis for groups to study decision support systems. Provides a conceptual overview of GDSS, their scope, components and expected implications. Our perspective is based on the decision-making information exchange vision and the effects of GDSS on changes in the form of personal communication brought about by technology. In particular, the use of GDSS changes the nature of participation within the group, which affects the quality of the decision and other consequences of the meeting. Three levels of GDSS systems are described, each representing an increasing technology and the most dramatic intervention in the process of group transfer. After understanding the effectiveness of less sophisticated designs, we propose that research should proceed gradually through these three level systems, considering the more complex systems. Shifting the individual exchange that occurs as a team through a transform. The magnitude of the change in the communications introduced by technology has a very dramatic impact on the indirectly, the decision-making effect [72].

Conclusion

The system tries to find a collection of some interesting products from a personal assessment of the many features that characterize the product. Many the recommendation systems will recommend the most suitable laptop for the customer based on the rating based on his requirements for this product purchased can ratings particular aspect. Different decision-making problems require different approaches. We are interested in the context in which the objects (actions, alternatives ...) of a decision must be sorted or assigned to a set of categories. To avoid any simplification, notice that the term "decision assistance" is used instead of "decision support", "decision making" or "decision analysis". The assignment of actions to categories is based on the evaluation of each action according to several criteria. In such decision-making ordering contexts, many assumptions are relevant as to how decision-making assistance should be considered. ELECTRE I am one of the earliest multicriteria evaluation methods developed with other advanced methods. The main purpose of this method is to select a desirable alternative that meets both the synchronization option over multiple evaluation criteria and the discrepancy option under any preferred criteria. ELECTRE I generally consists of three concepts, namely synchronous code, conflicting code and entry value. In this study, our sample vague ELECTRE will be used by a panel of decision makers with the opinion of decision makers. The ELECTRE TRI-C is made up of two joint rules, the descent rule and the ascent rule. Each of these rules selects only one category for the possible assignment of an action. They are used together to highlight the higher category and the lower category, which may seem appropriate to obtain an action. These two extreme categories may be identical. If they differ, the assignment of such action will not be determined within the range of possible types, considering the way in which the set types of characteristic actions are defined. Hung and Chen used intuitive ambiguous sets for the new ambiguous Tipsy decision model, and used entropy weights to deal with decision-making problems on multiple criteria in an intuitive ambiguous environment.

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