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A Study on Weighted Aggregated Sum Product Assessment (WASPAS) w.r.t Multiple Criteria Decision Making

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Abstract. Advantages of the WASPAS method Weight Total Model (WSM) and Weight Product Model (WPM) Uses. Combining WSM and WPM improves the ranking accuracy of WASPAS alternatives. That At the moment, WASPAS calculates an optimal registration parameter, which will be given in detail later. The Weight the Product Assessment (WASPAS) system is a unique combination of Weight Gross Model (WSM) and Weight Product Model (WPM). Its mathematical simplicity and ability to deliver more accurate results compared to WSM and WPM methods Due to this, it is now widely accepted as an effective decision maker. In this paper, (a) a flexible production system, (b) a machine in a flexible production cell, (c) an automated guide vehicle and (d) an automation study. Structure and (c) an industrial robot. For all these five problems, the WASPAS method provides the most acceptable results. The optimal 1 value is determined for each issue considered and the effects of different values on the ranking of candidate alternatives in the WASPAS system are also analyzed. In this study, the compatibility of the Weighted the Product Evaluation (WASPAS) method is being explored as an effective MCDM tool, while eight production Decision making issues are resolved. Condition, Mac inability of objects and electro-discharge Micro-machining process parameters. The system has the ability to accurately sequence alternatives across the entire Selection issues are considered. In the ranking performance of the WASPAS system the effect of the parameter is also explored.

Key words: Weighted Aggregated Sum Product Assessment (WASPAS), Multiple criteria decision making (MCDM), Interval Type-2 Fuzzy Sets, Fuzzy Sets.

Introduction

The first time, an extension of the Weight Product Assessment (WASPAS) system, provided in the vague environment of the image, is provided to solve the LMD mode selection problem. Introduced Picture Fuse Set (PFS) based Multi-Criteria Decision Making (MCDM) system is very useful for managers responsible for LMT because it is neutral / negative, accounting for information Taken; it effectively tackles a large number of mistakes. , Vague and uncertain information. Comparative analysis with existing sophisticated PFS-based MCDM methods recognized the high reliability of the proposed imageless WASPAS method. Its high strength and stability have also been confirmed.

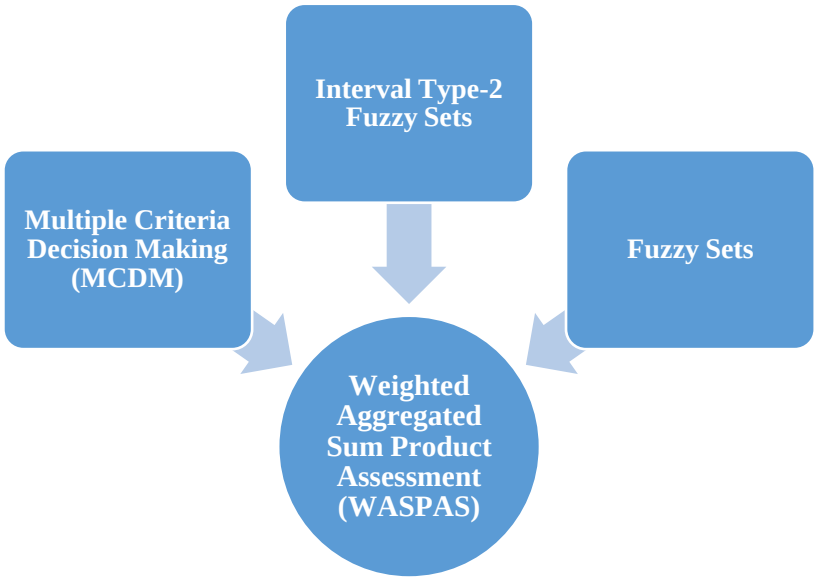

FIGURE 1. Shows the Weighted Aggregated Sum Product Assessment (WASPAS)

Shows Figure 1. the Weighted Aggregated Sum Product Assessment (WASPAS) proposed method can be used to improve LMT in urban areas worldwide. Besides, it can be used to solve other MCDM problems developing in uncertain environment. MCDM or Multi-Scale Conclusion Analysis (MCDA) is a subdivision of functional research. In decision making (in everyday life and in business, such as government and medicine in companies) which explicitly evaluates a number of conflicting criteria.) Conflicting criteria are common in evaluating options: Price or price is usually one of the main criteria, and some criteria for quality generally easily conflict with another criterion price. When buying a car, price, convenience, safety and fuel economy may be some of the key criteria we consider - it is not uncommon for a cheap car to be very comfortable and safe. In portfolio management, managers reduce risks while generating revenue Are interested in maximizing; however, stocks with the potential to bring in higher returns generally carry the risk of losing money. In a service sector, customer satisfaction and the cost of providing a service are fundamentally conflicting criteria. We are introducing Type-2 ambiguous logic system (FLS) that can handle rule uncertainties. Implementing this type-2 FLS involves the functions of Fuzzification, inference and output processing. We focus on the "publishing process" that involves category reduction and ambiguity removal. Type-reduction methods extended versions of Type-1De-fasification methods. Except for the gap type-2 ambiguous packages that provide a simple type-reduction calculation process, it captures additional information about the uncertainty of the type-reduction rule, albeit computationally serious. We use Type-2 FLS for time-varying channel equations and demonstrate that it offers better performance than Type-1 FLS and neighboring class. Obscure set is a class of objects with a continuum of membership standards. Such a set is characterized by a member (attribute) function that assigns a member quality between each object and zero. Content, union, cross section, Concepts such as complement, relation, concentration are extended to such collections, and various properties of these concepts are established in the context of ambiguous collections. In particular, the separation theorem for compressed obscure packages has been demonstrated without the need for separating obscure packages. An ambiguous set defined in the universe of discourse is equal to the height (maximum membership value) (i.e., the normal ambiguous set), and is greater than or equal to the membership quality of the elements between the two. Spontaneous elements. Small membership quality of two arbitrary boundary elements the word "ambiguity" means "ambiguity (ambiguity)". Blurring occurs when the boundaries of information are not clear. Vague Collections - An extension of the 1965 Lotfi Jade Classical Code. Classical set theory allows members of elements in a set based on binary. The ambiguous set theory allows member activity to be evaluated at intervals [0, 1].

Weighted Aggregated Sum Product Assessment (WASPAS)

The Weighted Total Product Assessment (WASPAS) system is a unique combination of Weight Gross Model (WSM) and Weight Product Model (WPM). [1] The current review closely shows the process of upgrading WASPAS and SWARA and their applications in different fields from different angles. In total, 55 sheets are two MCDM Categorized according to approaches that determine applications; SWARA, WASPAS and a combination of the two approaches. The following sections discuss the literature and developments of these two techniques. WASPAS was first recommended in 2012 and is the strongest new MCDM application is one of the determining approaches. This approach is a combination of Weight Product Model (WPM) and Weight Integrated Model (WSM). This subdivision introduced the WASPAS method with a vague theory called WASPAS-F. In this mode an ambiguous approach is used to give comparative importance to attributes using ambiguous numbers. At this point, to provide a systematic review of WASPAS and SWARA's methods and applications, we have recommended some popular databases, including the Web of Science, Scopus Google Scholar. [2] Accordingly, an extension of the newly developed Weighted Gross Product Assessment (WASPAS) was proposed. WASPAS uses the recommended method to enhance the weighted integration functionality to achieve the highest accuracy of evaluation. It has been successfully applied to the eco-economic assessment of the modernization of many residential houses by selecting the appropriate location. Shows numerical examples of remodeling results of dilapidated buildings and ranking of investment alternatives using WASPAS-IVIF. Crisp WASPAS was used to select the best occupational safety solution during construction, in search of an increase in rating accuracy in a crisis situation. In current research, this method has been extended to intuitive value intuition with ambiguous numbers and is called WASPAS-IVIF. Combining the strengths of WASPAS and IVIFS makes the proposed method a useful tool for decision making on a number of criteria. [3] The SWARA-WASPAS method is used for decision making and future planning. SWARA and WASPAS are used to evaluate criteria and alternatives. Its purpose is to identify the priority nanotechnology applications to be explored. WASPAS is a recently introduced method and science is one of the new methods proposed by the community. The new system is based on the Weight Compound Model (WSM) and the Weight Product Model (WPM). In this section, numerical results of SWARA and WASPAS are presented. Of SWARA results Priority and criteria are given in the subsection, and priority and ranking alternatives are calculated in WASPAS mode. [4] Fuzzy is WASPAS weight Based on Product model (WPM) and weight combination model (WSM). In the ambiguous WASPAS approach, alternatives are preferred based on the integrated optimal criteria derived from WPS and WSM. Calculate the weight of Fuzzy SWARA criteria and evaluate the comparative significance of each criterion is used, and obscure WASPAS is used to sort the identified alternatives. In this section, after gaining weight of HSCMBs from ambiguous SWARA, ambiguous WASPAS to rank solutions for overcoming HSCMBs Used. The proposed hybrid is ambiguous SWARA-fuzzy WASPAS structure strong and capable of overriding HSCMBs priority the solution. [5] For the Multi-Response Optimization problem, the applicant engineer is used to assign the same importance to all measured responses, which will be valid WASPAS for the value of given when each response is upgraded. In this case, the method engineer must assign the maximum meaning of one to the requested response, increase / decrease it and assign the minimum significance of zero to subsequent answers. Then use the WASPAS technique to achieve the most

favorable parameter settings for the correct value of the Q. WASPAS method using the same variables, controls, and enabled border conditions. [6] This work has two primary goals, the first of which relates to the possibility of improving the mechanism of treatment for malpractice when the team enters the field of multi-dimensional decision making (MCDM) by creating new approximate weight accumulators Evaluation (WASPAS) approach. In the second section, a literature study demonstrating the applications of the WASPAS method and the applications of the approximate set theory in various areas is carried out. The third part of the novel provides a rigorous WASPAS approach with a detailed description of each step. Providing successful applications of the WASPAS method in different precision or uncertain decision situations, a concise literature study is conducted to demonstrate the approximate set theory application occurrence in MCDM problems. Rough WASPAS and Rough SAW have similar estimates, and the correlation coefficient is equal to 1.00, so the two approaches are rk = 0.829 compared to the Rough VIKOR approach. There is. The same correlation coefficient is Ruff Vigor with Ruff MULTIMOORA, while the values of 0.886 are Ruff Cha with Ruff WASPAS and Ruff MABAC and Ruff MULTIMOORA with Ruff EDAS. The coefficient of coefficient of 0.943 is Rough WASPAS and Rough MAIRCA Rough MABAC, Rough Cha and Rough EDAS, Rough MULTIMOORA with Rough MABAC and Rough MAIRCA

Multiple Criteria Decision Making (MCDM)

MCDM is the process of determining the best possible solution to problems that are established criteria and are common occurrences in daily life. [7] In this research, the WASPAS methodology used the panel decision-making process to deal with the MCDM problem with brake type-2 ambiguous packages (Extended WASPAS method) we propose a new integrated approach. Some MCDM methods in recent years in the context of IT2FS have been created. Each of these methods has different properties and steps from the other. In the present study, a new integration based on the vasospasm method (extended WASPAS method) we propose the approach, which is applicable to MCDM problems with break type-2 ambiguous packages. [8] In a small number of variations (alternatives) associated with IP ratings, a type of MCDM multiple attribute decision (MADM) methods may be used. In the paper, a new approach to IP evaluation was proposed. The approach builds an algorithm based on the MCDM method. If the rater believes in a downward trend towards this rating or at least in the current situation, the orientation of the OFN labeled "average" will be negative (without positive trends Say OFN). This approach is innovative from the other MCDM methods described so far. When evaluating projects. Multiple attribute decision making (MADM) methods can be used as a branch of MCDM, with a small number of variations (alternatives) related to project evaluation. Above Examples illustrate not only the possibilities of using OFNs in MCDM methods, but also their key advantages. [9] This weight is referred to as the 'objective weight'. CRITIC is a method for determining the objective weights of criteria in MCDM problems. As mentioned earlier, the rating of 3PL providers may consider an MCDM problem. In this evaluation process, DMs generally express their estimates with uncertainty. IT2FS is an efficient tool for capturing the uncertainty of information reported by DMs. Use the IT2FS rating of 3PL providers, theirs for calculations Arithmetic functions are required, so some basic definitions of IT2FS and arithmetic operators are provided in this section. [10] Accordingly, IFSs are more influential in solving uncertain MCDM problems than IFSs and PFSs Is the most effective way. Increasing complexity and comprehensive in the environment with the changes, FFSs have grown in critical regard from teachers. The MCDM method approaches the distance from the interface (CRITIC) and the mean solution (EDAS) in the FFS environment by the importance of the criteria. Nevertheless, no one paid attention to the location selection for HCW removal under the FFSs environment. Recently, several MCDM models have been proposed under various uncertainty systems. This method was proposed to solve MCDM problems by completely unrecognized criteria and decision maker weights (DMs). The WASPAS approach, like the application score model for MCDM, chooses an option with a higher score (or maximum usage), while previous approaches compromise graduate practices and prefer the closest option to the best solution. [11] MCDM issues typically consist of five components: goal, decision-making options, alternatives, criteria, and results, respectively. MCDM models are another broad classification technique. Designed models are in the view of the designer. This can be a direct approach or an indirect one. MCDM is always complex due to the involvement of factors including technical, organizational, standards, social, economic and stakeholders. It therefore covers both engineering and management level analysis. In general, we have three types of MCDM models, namely value measurement models, goal, desire and reference level models, and outreach models. AHP with other MCDM technologies such as Joel Used. Programming (GP) and ambiguous logic. As shown in previous sections, MCDM is indeed a popular tool has evolved and has wide application in many subject areas. But no MCDM model can be rated as good or bad. Nevertheless, MCDM captures not only the system, but all the effects and purposes of planning. MCDM is still missing at the local organizational level. [12]

MCDM methods such as VIKOR and TOPSIS are based on an aggregation function that represents proximity to reference points (s). Both of these MCDM methods use different types of default to eliminate units of scale operations: VIKOR method linear Uses default and the TOPSIS method uses vector default. These results illustrate the difference between the MCDM methods VIKOR and TOPSIS. Both of these MCDM methods are different types of removal units of size operations Use defaults, whereas the VIKOR method is linear Uses default and TOPSIS method uses vector default. [13] The Fuzzy MCDM was essentially developed in the same way, although many innovations have been made possible with the help of the ambiguous set theory. MCDM approaches are key areas of decision theory and analysis. Hwang and Yoon (1981) compiled MCDM methods based on available information. Most MCDM methods deal with individual alternatives, which are described by a set of criteria. Modern MCDM methods enable decision makers to handle all types of information mentioned above. A wide range of MCDM problem-solving techniques, with varying complexity and potential solutions, confuse potential users. [14] Recently, MCDM methods, Hundreds of publications have been published to provide

information on their development and application in various fields. This article provides an overview of output, as well as an overview of MCDM methods. Several books have been published that contain detailed information on MCDM approaches. As a result of the development and growing use of MCDM methods, several specific subfields have emerged. [15] Unlike the traditional definition of a measurement based on compound property, the multidimensional problem depends on the non-included MCDM methods and the ambiguous measurement and ambiguous integration are used to evaluate. The proposed novel hybrid MCDM method should be an effective model for evaluating the e-learning program's performance. The hybrid MCDM model proposed in this paper has the following characteristics. The results are consistent with the proposed hybrid MCDM model compared to the traditional combination models. [16] One of the purposes of this monograph is therefore to describe the basic features of MCDM techniques and to develop theoretical methods. Explain how these techniques help developers and practitioners solve their specific planning problems. MCDM techniques do not play a minor or direct role in this phase of the planning process, although they can serve in any monitoring training. Combining the use of MCDM techniques with the cost of implementing alternatives in the evaluation process It is clear that can be improved by. Analysts who have used transformation functions as part of an MCDM technique find that it allows considerable flexibility and that the four standardization processes previously provided have a more intuitive appeal in obtaining more than one application value. Recognizes. [17] This paper introduces a unique hybrid LNN WASPAS MCDM model that provides objective expert evaluation of criteria in a subjective context. The current approach, however, is to find alternative solutions confusion in the decision-making process and the lack of quantitative information. (Consultants) Helps to evaluate. The multidisciplinary model represents the opportunity to evaluate the work of consultants through pre-defined criteria, presenting a new algorithm that minimizes risk in the transportation of hazardous materials, minimizes damage and minimizes the magnitude of any consequences in the event of an accident.

Interval Type-2 Fuzzy Sets

An Interval Type-2 FLS allows you to measure any or all of the following uncertainties: words used in the preposition and the consequence of rules - because words can mean different things to different people. [18] Buckley's ambiguous AHP system has not yet received any criticism. For this reason, Buckley's method has been chosen to use interval type-2 ambiguous packages. The proposed optimistic, optimistic, realistic and weighted mean codes, which determine the different perspectives for the type reduction of the gap type-2 ambiguous sets. [19] In this section, we propose a method for ranking gap type-2 ambiguous packages based on a-cuts of interval type-2 ambiguous packages. In this section, the proposed ranking of gap type-2 ambiguous packages we propose a new method for deciding many attributes that are ambiguous in terms of method. [20] In this section, we propose a new method for ranking trepsoidal spacing type-2 ambiguous packages. In this section, we propose a new method for group determination of ambiguous multiple attributes based on the proposed ranking system of interval type-2 ambiguous sets. Let X be the sum of the alternatives, X = {x1, x2, ..., xn}, and F be the sum of the attributes, F = {f1, f2, ..., fm}. [21] The uncertainty of observation ambiguous set e A 1 The area of the foot is smaller than that of the anterior interval type-2 obscure packages e A11 and e A21, and the uncertain footprint area of the observation is obscure, as shown in Figure 12. The anterior space type 2 obscure packages e A 2 are smaller than the e A12 and e A22 Is and the Sense Mode (2008), The uncertain foot axis area of the fuzzy interpolation rational conclusion of the proposed method is smaller than that of the consequent interval type-2 fuzzy packets B1 and e B2. [22] Throughout this area, i2 + = [0, oo]; X is the global set; T \ {X) is a class of -1 vague sets of all types of X \ Ti X. AC is the complement of A G T \ (X). When Type-2 fuzzy packets are Type 1 fuzzy packs in A and B X, Note that our proposed distance d (A, B) becomes the humming distance. To define the distances for two types of ambiguous sets A and B, we combine the distances of Hamming and Fuzzy Haustorf, in which Fuzzy Howstorf distance II Level is a member, used to define functions, and primary humming distance is used to define membership functions. It is easy to see that the defined distance measurement (10) meets the above properties (Dl ') and (D2'). [23] The literature on similarity measurements for Type-1 ambiguous sets is very extensive and some calculations are simple, Interval Type-2 has been released to date with five similarity scales for ambiguous packages. SEIT2FNN uses spacing type-2 ambiguous packages, and complex measurement calculations using existing methods are complicated.SEIT2FNN proposed a new and efficient ambiguous set reduction method for these problems, and then introduced.

Fuzzy Sets

In mathematics, ambiguous packages (a.k.a. uncertain packages) are packages containing elements of element size. In 1965, as an extension of the classical concept of the set, Lotfi a. vague collections were introduced by Jade and Dieter Clava. In ambiguous set theory, classical bipolar packages are commonly referred to as crisp packages. [24] Although the validity of this hypothesis has not been proven at this time, on the one hand, there seems to be a very close agreement between the basic functions such as the union of the ambiguous sets and the cross section. Deviations and connections of propositions of the form "X is F" in dealing with potential distributions. It is convenient to use a type of code representation commonly used in ambiguous packages. In particular, for simplicity, let us assume that U1,… Un are finite sets, and ri k (ri ,, ..., Rk) represents the n-tuple of values derived from U ,, U ,,. [25] The embedding of probabilities in optimistic theory clarifies the relationship between ambiguous packages and probabilities: ambiguous packages correspond to accurate observations, while probability variables correspond to factual evidence. Obscure packages and random packages agree projection functions from multiple dimensional dimensions. Obscure compilation theory first adopted the logical view, formulating a measurement-theoretical approach through the algebraic and probabilistic measures of obscure compilations then came.

Packages generated by random packages and ambiguous packages (as well as top-down probabilities). In the case of ambiguous sets of union rules, the actions of inaccuracies play a role similar to one of the measurements of entropy for probability measures. By converting triangular rules into triangular parallelograms, we can read obscure sets as well as cross-sections. For ambiguous sets, the same views can be accepted and existing results from frequent or racing probabilities and measurement theory can be very useful. Before proceeding further, it would be useful to discuss the ideas captured by the ambiguous packages and especially the concept of feasibility. [26] The proposed test is a human controller that, in practice, He should provide valuable information on how he defines ambiguous packages the context and time for a given operator and how the boundaries of these packages vary with the set of operators. New situations this kind of study should also shed light on how a man can modify his command mechanism to cope. In the field of artificial intelligence such information is especially useful for those who work and are more interested in the field of natural intelligence. [27] In the above definition of normal ambiguous sets, the grades take the values at unit intervals [0, 1]. However, in reality, the quality is "high" and "low" Like the claim of "about 0.8," "medium", "not high", we often encounter situations where quality itself is often misinterpreted. Or "very low". [28] He proposes a more complex ambiguous model in which "if x is y" can express the rules by a special category — hence the important problem is the correct translation of the true-merits of natural language. As sufficiently ambiguous sets of unit spacing. Truth-eligibility rules: When A and B are ambiguous sets, "x is A if y is B" is actually "x is A, and y = f (x) B". Strangely enough obscure collections and works on quality rationality are very rare, although linguistic controllers Montani and followers can be seen as quality control. [29] To comprehend vague sets, it is helpful to initially think about a portion of the nuts and bolts of old style set hypothesis. Specifically, think about the two fundamental laws of Boolean variable based math - the prohibited center and the law of inconsistency. It is simply important to show $A \cap A$ for somewhere around one $x \in X$ to show that the perplexing principle is additionally abused for vague sets. This further brings up the issue of what specific structure the capacity will take. . This part sums up the key methodologies used to appoint enrollment norms when involving uncertain bundles for GIS-related issues.

This methodology regularly makes an interpretation of complex information into dark bundles characterized as a questionable C-Means calculation Connecting. This part presents ambiguous bundles and fundamental ideas of rationale pointed toward acquainting the peruser with certain issues and activities that are not generally viewed as in the GIS writing. Also, those thoughts that are broadly utilized in GIS are referenced, providing the peruser with an outline of what is being utilized in GIS as far as giving uncertain bundles. To begin with, a few fundamental ideas will be characterized, trailed by a conversation of capacities in uncertain sets. It is not difficult to see dubious cross-areas and associations qualifying as co-appointment measures in vague bundles. The Montani induction strategy creates uncertain bundles as contributions for the dispersion interaction. Their results plainly showed the predominance of the uncertain set methodology over the conventional fresh (Boolean) approach. [30] It depicts a few sorts of non-old style assortments that have normal highlights, in any case, are dark assortments. Consequently equivocal sets lead to a continuous hypothesis of vulnerability, which varies in its extension from the habitually happening probabilities. Inside this framework, yet without summing up to it, an uncertain assemblage hypothesis was created, just as the hypothesis of surmised aggregations (Pavlock, 1982, 1991). Of Lesniewski Mathematics Proposes something else altogether to the rudiments, yet one that is disconnected to questionable bundles. Accentuation is set here on the different portrayals of the vague set, which can be instrumental in stretching out proper thoughts from set to questionable set. Issue contrasting equivocal bundles Discussed and investigated techniques for producing similar codes. This part at last alludes to the properties of dark sets set off by the primary properties of the reference like distance between the concentric and dark bundles. There is presently an inclination to distinguish the hypothesis of uncertain sets with the hypothesis of summed up trademark capacities. Full individuals and full individuals Regular bundles can be considered unique instances of equivocal bundles that are just permitted by non-clients. Unit separating to demonstrate enrollment principles for questionable arrangements of genuine numbers Natural. Obviously equivocal bundles can give a characteristic point of interaction between etymological portrayals and mathematical portrayals. In that sense, the remainder of the vagueness ambiguous bundles doesn't have similar worry as approaches. The primary interest of level-cut portrayal is that it is a lot simpler when stretching out set-hypothetical ideas to vague sets. Frequently, the best way to get such an arrangement expansion is to control f unique capacities and f exceptional dark bundles. Portrayal dependent on the concentric organization of the sets gives a deliberate method for extending the set-capacities into quantitative assessments of questionable sets. Thus, a few properties of Boolean polynomial math should be taken out for equivocal sets. Qualities of the main conversation of assortments. The normal capacities for connecting dark bundles are on the whole capacities among least and most extreme. The idea of commensurability as far as levels of fulfillment regarding different questionable bundles makes it conceivable to consolidate equivocal bundles definitively.

Conclusion

Fuzzy Based on the WASPAS Weight Product Model (WPM) and Weight Combined Model (WSM). In ambiguous WASPAS approach, WPS and WSM Alternatives are preferred based on the integrated optimal criteria derived from. Calculate the weight of the Fuzzy SWARA criteria, each it is also used to estimate the relative importance of the criteria, and obscure WASPAS is used to rank the identified alternatives. In this research, we propose a new integrated approach based on the VASPOS method (extended WASPOS method), which addresses the MCDM problem with break type-2 ambiguous packages. The panel uses the decision-making process. Some MCDM systems have been developed in the context of IT2FS in recent years. Each of these methods has different properties and steps from the other. In the present study, we propose a new integrated approach based on the WASPOS method (extended WASPOS method), which is applicable to MCDM problems with gap type-2 ambiguous packages. The literature on similarity measurements for Type-1 ambiguous sets is

somewhat more comprehensive and simplified in to date only five similarity levels have appeared for the gap type-2 ambiguous sets. SEIT2FNN uses spacing type-2 ambiguous packages, and complex measurement calculations using existing methods are complicated. SEIT2 FNN is a new and efficient ambiguous package reduction method for these problems Proposed, then introduced. It describes some types of non-classical collections that have common features, albeit distinct, obscure collections. Regular packages can be viewed as special instances of ambiguous packages that are only allowed for full members and non-full members. Unit spacing it is natural to model membership standards of obscure sets of real numbers. Obscure Packages are naturalization between linguistic representations and numerical representations it is clear that the interface can provide.

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