



# A Review on Promethee and Analytic Hierarchy Process with Its Application

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**Abstract.** In recent decades, transportation Results support in the planning field the system is constantly evolving. PROMETHEE (for enrichment assessment) Priority ranking system Method) method is an efficient is supportive of decision making during defined criteria Used. This is PROMETHEE I.A partial ranking by, PROMETHEE I Provides complete ranking with. Scale between criteria eliminating effects and comprehensive managing incompatibility with rankings This superior method is characterized by. However, PROMETHEE does not provide guidelines for assigning weights to criteria and considers that decision makers can assign weights. PROMETHEE used in this review traffic provides an overview of samples and found in the literature Indicates gaps.

**Keywords:** Promethee, Outranking, Decision, Analytic hierarchy process, Fuzzy sets.

## 1. Introduction

For manufacturers and engineers, Optimal material candidates from various materials the ability to choose is very important. Used in modern industrial applications appropriate I.e. hundreds of thousands products choosing is an important and challenging process. Properties, many attributes such as physical, electrical, magnetic, mechanical, chemical and manufacturing, material cost, product form, material impact on the environment, performance characteristics, availability and fissionability should be considered during material selection. Market trends, cultural features, aesthetic, recycling skills and target group of production. Random voting methods are widely used for various information retrieval tasks these methods refer to the data as a random map and the centrality of the individual objects in the data or of the map to assess the significance all routes carry random walks. For example, it can be used to rank the results of search queries well known page ranking algorithm 15, web crossing the hyperlinks of the map Based on a random browsing model. In the text summary, the rest in the set of documents the sentence that most represents the sentence A random gait pattern can be used to identify. Previously used external detection Random gait for external detection as an alternative to algorithms using samples this paper explores., 2,3, 8,10,17 The heart of this approach weighing The basic database is referred to as the redirect map, of which 2 are HDK. Mooning & P.N. Each node represents an object and each (weighed) edge represents the similarity between objects. Change the proximity matrix of the map as probabilities by changing, the problem becomes a Markov chain process modelling and probability of change we Find the eugenics vectors that dominate the matrix. The values in the eigenvector are used to determine the exterior of each object Decision making is a daily process for every human being. There are no exceptions to that. For businesses, Decision making is a habit and a process. Effective and successful results for the company Profits make, failures cause losses. Therefore, corporate decision making in any company the process is a very important process. In the decision-making process, one of the few possible alternatives we choose Action. In the decision-making process, we have a number tools, Techniques and emotions can be used. In addition, we may make our own personal decisions or prefer collective decision making. In general, decision making is difficult. Most corporate decisions involve some form of dissatisfaction or conflict with another party. AHP has been used successfully in many companies and organizations. Although this method is very universal, it is still simple to implement in Excel. Is skill, in which all participants evaluate the pairs and decide the group mathematically the optimal consensus is determined? In timing, the solutions of this method are well accepted because the results are objective and devoid of political influence. AHP has a specific application in panel decision making It is also used in a variety of decision-making situations around the world, by government, Used in business, industry, health and education. In classical set theory, the elements in a set Member is binary based on binary status, An element belongs to a set or not. In contrast, the ambiguous set theory is the set of elements in a set Allows gradual evaluation of members; Obscure packages generalize to classical sets Because the indicator functions (i.e., characteristic functions) of the classical sets are ambiguous Membership functions of packages are special cases, if the latter takes only 0 or values. In ambiguous set theory, classical bipolar sets commonly called crisp packages. Information such as bio-informatics is incomplete or on Inaccurate wide range domains ambiguous set theory can be applied.

## 2. Promethee

This section of the article briefly describes PROMETHEE II, the best possible and worst complete possible alternative to a limited set to provide ranking. This method implements other PROMETHEE methods. Basic principle of PROMETHEE II is to compare its alternatives with each approved criterion. Alternatives are evaluated according to different criteria, which should be magnified or reduced. Two more types of information are needed to implement PROMETHEE II. The PROMETHEE method (priority ranking system for concentration estimation) is a multi-dimensional decision-making system developed by Barnes ET, which is a very simple ranking. System in terms of fertilization and application compared to other methods for diversified analysis. This is most appropriate for issues Considering a Number Open, Somatic Sonnaxitting Siritheria, A Serta in Number Obi Alternatives Must Be Deployed. The evaluation table is the starting point of this method. In this table, the alternatives are evaluated on different criteria.

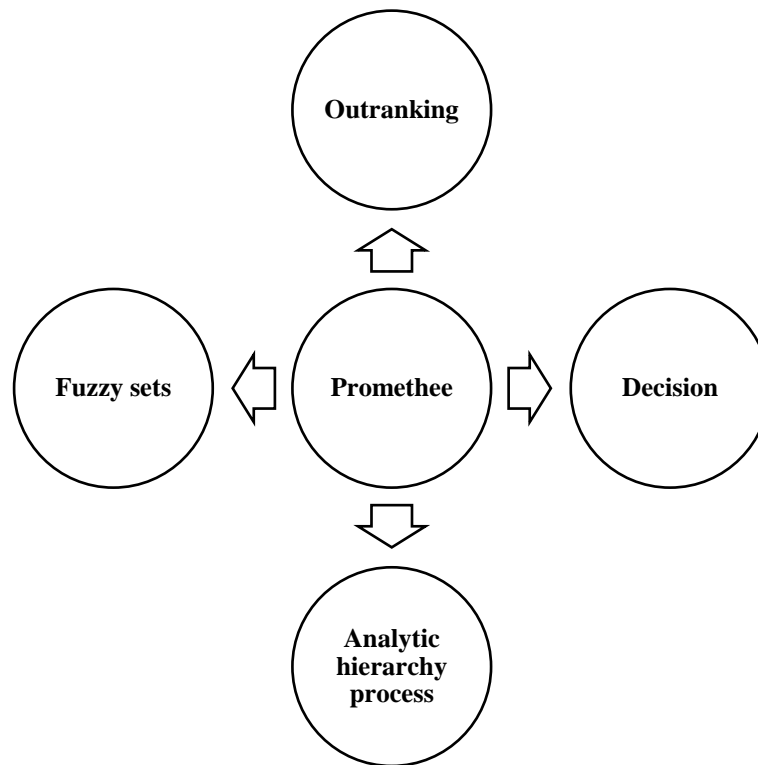


FIGURE 1. Promethee

Two additional information is required to activate PROMETHEE. The PROMETHEE method is one of the most Considering a Number Open, Soma dial Connecting Syrderia, A Certain Number Obi Alternatives Sal Rank Well-Known and Wheatly Set Over-the-Counter Methods. for comparing alternatives at each individual level. In PROMETHEE I, Positive and negative outreach flows The area estimate is obtained by calculation. Both streams Usually does not reveal the same ranking. Decision maker is selected for PROMETHEE II rating because he or she always wants to get the full ranking. This method starts with a set of alternatives and criteria, which are then generated as the final sequence of man. Alternative to a given criterion and to illustrate the comparative difference between weights It suggests six types of selection functions. Proposed extension to the PROMETHEE method, Renewable energy considered by George Populus et al The case study is illustrated by its application. (1998) First, this MCDA technique was identified Including additional discussion of limitations, a description of the PROMETHEE Outreach system is provided. e PROMETHEE Process Criteria Values are generally not a concept, but can take a range of possible values. It is not enough to assign realistic values to the possible minimum, mean and maximum criteria. Minimal and maximum sensations are particularly rare events with a low probability of occurring in general. Doing a PROMETHEE with this high sensitivity will give unspecified but erroneous results. PROMETHEE net flows are measured at an interval level Link change of net flows Does not change the ranking of items or the differences between items. For full portfolios The same is true when using this approach. Decision making and resource management in ED PROMETHEE II aims to improve. Possible alternatives to solve a specific problem in ED This method is used for sorting. This sheet is structured as follows: First, the PROMETHEE II method is offered. On the method used and recommendations for future studies The article ends with an argument. To prove the reliability of the proposed method, For Small and Medium Enterprises (SMEs) in Istanbul, Turkey an application is made on the issue of ERP examination. The proposed hybrid system successfully lined up the alternatives and based on data obtained from several SMEs participating in this study Identified the best ERP system. PROMETHEE belongs to the family of transcendental systems, which seek to enrich the dominant relationship and trade low credibility for a large number of comparable pair actions. There are some notable methods in this area due to Roy's classification of the Prometheus method as a type II multicriteria integration process. The PROMETHEE method, which has advanced approaches to comparing alternatives in pairs, is a very welcome feature as there are currently some alternative ways to compare.

### 3. Outranking

Surpasses many existing criteria. The number of practitioners who use these methods for decision-making problems, as well as the number of researchers interested in developing and / Or the sensitivity of these methods, Increasing year by year, Number of documents (see notes) and Using one or more PROMETHEE methods Can be explained by conference presentations. Contradiction is considered a realistic concept in multi-criterion decision-making assistance. Including portfolio issue Advanced methods for applications. Relatively few Releases though are found based on methods directly related to portfolio selection, Context to be analyzed And depending on its suitability This type of method is appropriate. Deployment-based approaches to multiple criterion problems. For portfolio problems Use of PROMETHEE proposed by Barnes & Marshall, This is also known as the PROMETHEE V method. Sorting method of group decision making using intuitive ambiguous sets. Inspired by the above inquiry, we are trying to improve the classical PROMETHEE method using IFSS. The key contributions to our mission are twofold. Advanced Methods. PROMETHEE is a recommended method for ordering actions according to the decision maker's preferences. In fact, two rankings are generated: a partial ranking is often built on undeniable preferences and the full, possibly less robust, rankings can also be obtained depending on the needs of the decision makers. GAIA is an explanatory method. PROMETHEE's Multicriteria Outreach Methods (Priority Rating System for Concentration Estimates) to Explain Comprehensive Water Resource planning in Jordan And management. Improving water resource planning efforts Individual in Jordan each year in the effort Several objective results for the optimal selection of the portfolio of water resources This work described the use of support procedures. In that study, water supply and demand could be affected List of options with decision makers in the field Developed by close consultation. Subsequently, these options were integrated into possible strategies, And then to create processes for partial restoration, And to create alternatives to exit streams, entry flows and net flows Improved using PROMETHEE. Proposed Interval Type-2 of ambiguous PROMETHEE I and II methods Possibility and compatibility landscape The procedure of site selection was verified using the MCDA issue. PI, and RI are e-flow values representing preference, indifference, and incomparable relationships, respectively. The two runs usually do not trigger the same ranking. Outlining methods use a preferred modelling approach based on 47 assignment examples and a unique approach to conducting a conclusive analysis that can take up to 48 minutes. However, one may mention some other type of indirect optional information that does not receive proper attention.

### 4. Decision

The goal of the decision maker is to find an alternative that satisfies all criteria at once. But, there is no alternative to improving all the criteria at once, especially when the conditions are conflicting and it is difficult to achieve. Decision-making tool with pair-wise comparative measurements. It is the scores of different decision-making criteria and Is a structured approach to determining weights. However, alternatives of the size or criteria of the steps The paradox increases as it increases. This situation is often expert wise their pair Forces comparative measurements to be re-evaluated. Decision maker. Without losing the general character, we can assume that these criteria should be true value and max. If rank reversal is not possible, the multi-criterion assistance system is Rank Reversal-Free (RRF). The decision maker, like the parameters of the common criteria and weighing factors, are considered as regular data with accurate numerical values. In other words, the effectiveness of alternative solutions was considered ambiguous, while the decision maker had no choice. By the way, which supplier is best. On the other hand, in many sources, supplier capacity, there are some limitations such as quality and distribution, they are considered in the supplier selection process. In other words, Total needs of the buyer Cannot be filled by any supplier and the buyer must first meet the buyer's part and the buyer another part of the demand from another supplier. The decision-making process results in more realistic rankings, in which the accuracy of the data is considered and of low temperature liquids Alternative scenarios for the exploitation of the geothermal field Used for problem in ranking. Decision making should be done by a team, not an individual. At the peak of the industry, Two or more alternatives for decision making Crisp data are not available for comparison. So in this paper, for evaluating various alternatives We propose a vague PROMETHEE GDSS approach. The result method (PROMETHEE II method and EDAS method) is greater than 0.8, This illustrates a strong relationship between our proposed method and the two classic methods. Based on these analyses we can conclude that our proposed method is not only more suitable for classic methods but also related to the latest methods. Distrust of decision makers on properly designed recommendations. Furthermore, this should significantly reduce the inaccuracy of the calculations as a result of the simplifications often used in ambiguous calculations.

### 5. Analytic hierarchy process

Analytic hierarchy process can be avoided. Finally, the new approach is 1–9 salt Also avoids the use of rating. Although this criterion is considered to be consistent with the limited rational constraints faced by Human decision makers, Here is the approach followed Allows for greater flexibility. Nine-point scale for each level using AHP Pair-wise comparisons are made according to aesthetic criteria. The relative aesthetics of each pair-wise comparison Indicates the evaluation of the criteria priorities. Pair-wise comparison rates are in crisp real numbers. The single criterion of 1-9 is simplicity and Despite the

advantages of ease of use it is associated with intrinsic uncertainty and decision maker perception mapping for accurate numbers, not considering its inability to adequately manipulate emotions (Deng 1999). (2007) Most decision makers use their knowledge, past experience and They base their assessments on subjective judgment. Jane (1965) adds that as the complexity of an organization increases, so does the ability to produce accurate and significant reports. And beyond that accuracy and fit (or fit) become almost mutually exclusive attributes. So regular AHP is not enough for this job. AHP is used to determine weights in a hierarchy of criteria. Two different types of MCDM methods are used: PROMETHEE is a great system and VIKOR is a great alternative in choosing Is a compromise ranking system for the ranking and selection process with confidence. Another reason to use these methods is, Is their successful application to MCDM problems in the literature. AHP is integrated in both modes, so using the obtained criterion weight, the soft pair-wise comparison is not sufficient and does not seem very accurate Decision maker (DM) To catch judgments. Hence, the ambiguous logic of AHP's pair-wise comparison Introduced to compensate for this shortcoming in regular AHP And the technique is called ambiguous AHP. Weigh these criteria AHP method was used. In the AHP system, the importance of criteria should be determined with a relatively integrated comparative approach. Pair comparison committees were formed from estimates made based on the criteria of 4 political parties. For every political party with these teams The AHP system was used for the purpose of determining the weight of the criteria. Super Decision program is preferred as software. Thanks to this scheme, weights and stability values were calculated.

## 6. Fuzzy sets

Vague packages for multi-criterion result Analysis. The theory of interval type-2 ambiguous sets is conclusive For dealing with uncertain and ambiguous information in fields Intuition and calculation provide a possible way. Many studies have multiple criteria in the context of interval type-2 ambiguous sets Have developed analytical methods; Most of these methods can be classified as scoring or compromising models. Nevertheless, extended versions of the surplus methods have not been fully explored. This sheet spacing type-2 Establishes obscure PROMETHEE methods for sorting alternatives between multiple criteria based on common criteria based on the signed distance and the concept of detailed custom codes. Among the alternative types we create Gap Type-2 Obscure PROMETHEE I and spacing for partial and complete ranking intermediate type 2 ambiguous PROMETHEE II processes. Finally, the feasibility of the proposed methods and Compatibility is explained by the practical complexity of landscape site selection. A comparative analysis is done with normal ambiguity. Fuzzy Group package tours based on risk perception About the inherent risks with PROMETHEE to explore Represents uncertain information. Hybrid fuzzy developed for machine tool selection AHP-PROMETHEE Ultimate Support System. Obscure packages. However, of IT2FS based PROMETHEE methods Not much focus on development. Several effective methods have been proposed to solve various MCDA problems.

## 7. Conclusion

For manufacturers For engineers, from a variety of materials The ability to select the optimal subject candidates is very important. Hundreds of thousands used in modern industrial applications Selecting the appropriate material from the materials is an important and challenging process. Exceeds many existing criteria. The preferred function of the decision maker he / she uses when comparing the contribution of alternatives based on each individual criterion. Sequence of results, criteria used Weights are assigned using AHP in the second stage of equipment selection. At this point, pair-wise comparative metrics are developed to determine the scale weights. The AHP system the criteria for each political party with these teams were used for the purpose of determining weight. Preferred as Super End Program Software. Thanks for this project, Weights and stability Values were calculated. Many studies in the context of gap type-2 ambiguous sets Have developed several criterion analysis methods; Most of these methods Can be classified as scoring or compromising models.

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