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Effectiveness Evaluation Method Based on the Grey Interval Correlation

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Description

The effectiveness evaluation method based on the combination of AHP and grey interval correlation analysis is proposed. Interval number is used for the expert score in the improved method, the influence of the subjective fuzziness and objective fuzziness on the expert score using the single judging value is overcame. Interval number improved the reliability of the evaluation data. Combination weighting approach considering the influence of subjective and objective factors, the weight is more reasonable. The concrete steps of the improved effectiveness evaluation method are given. The improved method is proved to be more reasonable and reliable through an example. AHP, Interval Number, Grey Relational Degree, Combination Weighting Approach, Effectiveness Evaluation. The grey system theory proposed by Professor Deng Ju-long is a method of studying on the uncertain problem whose part of the information is known, while some of the information is unknown, small sample and Poor information. Grey relational degree is often used to indicate the degree of correlation or the degree of similarity between grey system factors, and the grey relational degree plays an important role in the quantitative analysis of grey system theory.

The results of the grey relational degree efficiency evaluation are based on the expert's scoring value, so the accuracy of the expert's scoring value directly affects the reliability of the results. At present, Chen Kai, Zhao Yu-hui, Du Jun proposed that the index was given different weights according to the actual important degree of the different index, to overcome the problem of using same weight and poor objectivity of the index in the calculation of correlation degree. Chang Shuang-jun and Ma Jin-ya used synthetically optimization based on grey associated method for effectiveness evaluation of weapon system to avoid the results of effectiveness evaluation which is too partial or inferior to make the evaluation results more reasonable. Ning Xiao-lei et al. proposed simulation models based on the improved grey. Relational analysis, which combines the geometric similarity and numerical similarity, and reduces the risk of conventional grey correlation analysis and improves the credibility of the results of the verification. Wang used the grey correlation analysis method to optimize the green production project, which can use the minimum energy consumption to get lean production and so on.

Grey Interval Correlation

The experts' score data used a single value however it does not meet the people's fuzzy thinking habits. Because of the ambiguity of the human mind and the influence of the objective factors, the value of the index judged by many people is a certain interval and the interval number is more able to reflect the reliability of expert scoring. Therefore, in order to make the evaluation result more reasonable and credible, this paper proposes a method of combining AHP with grey interval correlation. The grey system is complex and information incomplete; it has a large number of factors, complex logic relationship. Therefore, it is very difficult to evaluate the effectiveness of the grey system. The analytic hierarchy process method decomposes the complex system into several elements, such as target, criterion, index and then, according to the different attributes, these elements are arranged into a hierarchical relationship. It is the core idea of the AHP to establish an effective and reasonable hierarchical relationship. In the process of the effectiveness evaluation, the index weight is very important, and it has a great influence on the evaluation results. Therefore, the determination of the weights of the index should be scientific and reasonable and the reliability of the results for the effectiveness evaluation is related to it.

At present, there are some subjective weighting methods, such as analytic hierarchy process, expert investigation method and so on. Objective weighting method includes the method of maximizing deviation, information entropy method, etc. In order to make the results more reasonable and reliable, combination weighting approach can be used to not only consider the preference of the experts to the index, but also reduce the subjective randomness. In the improved effectiveness evaluation method based on the combination of AHP and grey interval correlation analysis, reasonable hierarchical relationship is established by AHP. The expert points are unified by using the evaluation interval number so the accuracy of the evaluation data is promoted. By using the combination weight approach to determine the weight, and by taking into account the subjective and objective factors, the weight is more reasonable. Extraction of the information vector of interval numbers after weighted, the vector similarity algorithm has represented the grey relational degree of the comparison scheme’s information vector and the reference scheme’s information vector the ideal optimal or worst scheme. And quality of the scheme is represented by the grey relational degree. According to numerical value of the grey relational degree, correlation degree sequence should be ranked.

Electromagnetic Interferences

Compared with the optimal reference information vector, the greater of the grey relational degree, the expressed scheme is better. Compared with the worst reference information vector, the smaller of the gray relational degree, the expressed scheme is better. And then the efficiency of the grey system is analyzed quantitatively. Through above steps, the complex grey system can be decomposed into some indexes. Experts use the interval number to score for each index. Overcome the problem of the reliability of the score data are not enough because of the effect of the subjective and objective fuzzy factors in the traditional grey correlation theory by using a single numerical value. Using this method, the results of effectiveness evaluation quantitative analysis are more reasonable and reliable. An improved effectiveness evaluation method based on the combination

of AHP and grey interval correlation analysis is proposed. The evaluation index value is replaced a single value by judging interval, which is used to solve the problem of the reliability of the data that is caused by subjective and objective fuzziness in the traditional grey correlation theory. The concrete steps of effectiveness evaluation based on the improved method are given. Example comparison shows the effectiveness evaluation method based on the combination of AHP and grey interval correlation analysis is feasible. Because of the selection of the expert data that the interval array is used, the result is more reasonable and reliable.

Electrical characteristics of semiconductors are sensitive to changes in temperature, in particular power devices. The study device is used in different application areas like telecoms base station, radars and space activities. The continuing trend towards devices miniaturization makes the consideration of the thermal aspects very critical, both in the design and operation. The technology evolution puts stringent requirements on performance and hence requires powerful characterization and simulation tools that can adequately assess the quality and reliability of the produced devices in different operating modes. The temperature increase can modify transistor behavior and cause irreversible degradation of its performances. Therefore, the use of cooling systems is very essential to enhance measurement conditions of the device and to obtain better heat dissipation. Electro thermal model that takes into account self-heating. The model has been used to better understand the physical dynamics responsible of the degradation of performance. An increase in temperature can alter and degrade the transistor behavior irreversibly, hence the importance of controlling the cooling systems and improving techniques for temperature measuring to better evaluate the thermal effects. Different levels of the system have been modelled successfully and the thermal dependencies have been properly captured. More heat cells can be added to better fit and reflect the heat dissipation in the device. Future work will focus on the S-parameters simulation for a complete compact model and studying the impact of temperature on electromagnetic interferences.