Research on Management Strategy of Coordination Behavior of Task Conflicts in In-service Thermal Power Unit Operation Based on Big Data Modeling

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Abstract: With the development of the Internet and information technology, the in-service thermal power unit is facing more challenges, and the innovation of the operation and management mode of the in-service thermal power unit is urgent and necessary. From the perspective of work conflict, this paper constructs a multi-objective genetic algorithm, which introduces big data modeling technology into the management innovation of in-service thermal power units. The algorithm solves the relationship between various operating entities in active thermal power units through functions. In order to get the optimal solution for vehicle distribution. Firstly, the contingency theory is introduced into the innovative design scheme of the in-service thermal power unit information system to optimize the management decision-making distribution path in the big data environment, design the multi-objective genetic algorithm steps, construct the non-dominated set, and combine the target cross-variation operations. The genetic sub-categories are jointly derived, and then the relationship between the parties in the management and decision-making innovation management activities of the in-service thermal power units is solved. The experimental results show that the shortest running time of the algorithm during the experimental operation is 0.56 seconds, and the longest running time is 2.48 seconds. The average running time in the whole process is less than 1 second, which meets the actual demand. The genetic algorithm can help the in-service thermal power unit. Reasonable arrangements for managing the delivery route of the decision-making fleet. The research in this paper has implications for the management innovation of in-service thermal power units in the information environment, and further expands the application field of big data modeling, which has practical significance.

Keywords: contingency perspective; big data modeling; in-service thermal power unit management; innovation

1. INTRODUCTION

With the continuous development of computer technology, the management of in-service thermal power units has gradually become intelligent and informatized, which brings new opportunities and challenges to the development of in-service thermal power units (Chen C J et al. 2016) [1]. The contingency management theory emphasizes that in management, it is necessary to randomly change according to the internal and external conditions of the organization, and to find different and most suitable management modes, schemes or methods for different specific conditions (Shao Z et al. 2016) [2]. Then, in the current information age, how to use computer technology to carry out innovative development is an issue worthy of discussion. Based on this, this paper studies the management innovation of in-service thermal power units in the era of big data modeling based on the contingency perspective, mainly from the perspective of big data modeling innovation in-service thermal power unit management decision-making operation system (Caputo A et al.2016) [3].

Big data modeling is an important part of the new generation of information technology, and an important stage of development in the "informatization" era. As the name suggests, big data modeling is the Internet of things connected. Big data modeling is widely used in the convergence of networks through communication-aware technologies such as intelligent sensing, recognition technology and pervasive computing. It is also called the third wave of the development of the world information industry after computers and the Internet (Lopez-Valeiras. E et al. 2016) [4]. For the management innovation of in-service thermal power units, big data modeling is often used first in the management decision management module of the in-service thermal power unit. Based on this, this paper uses big data modeling technology to optimize and innovate the management decision management of in-service thermal power units to improve the management efficiency of in-service thermal power units and promote the innovation of in-service thermal power unit management.

This paper is divided into three parts. The first part summarizes and expounds related research, and lays a theoretical foundation for the later writing. The second part analyzes the structure and system design of management decision management information system in big data environment. It is mainly carried out from three aspects: the design scheme of the in-service thermal power unit management decision information system, the solution of the multi-objective genetic algorithm, and the system workflow. The third part describes the algorithm application.

2. Related Work

With the continuous development of big data modeling technology, it has been widely applied to the innovation management of in-service thermal power units, which has improved the economic benefits of in-service thermal power units. In recent years, many scholars have carried out a lot of related research. Based on the development of big data modeling for industrial thermal power units, Basl J explores several aspects of ICT innovation and discovers the current understanding of Industry 4.0 principles and the penetration of these trends into companies, including the penetration of major IT trends. The integration of horizontal and in-service thermal power unit information system applications in Industry 4.0 (Basl J.2016) [5]. Fried A proposed an innovative management model for applying big data modeling to in-service thermal power plant supply chain management. The study found that this not only helps in-service thermal power plant managers accurately track and locate all goods flowing in the supply chain. It also increases the transparency of management (Fried A.2017) [6]. To CKM analyzes the consumer's demand analysis by analyzing the consumer's consumption record information by using big data modeling technology, and finds that the application of big data modeling technology improves the efficiency of service management of in-service thermal power units (To CK M.2017) [7]. A comprehensive study by domestic and foreign scholars has found that it mainly focuses on how innovative management of in-service thermal power units can use big data modeling techniques. In recent years, the contingency theory has become an effective theoretical tool for the management improvement and organizational change of different organizations and in-service thermal power units in various fields. Based on the previous studies, this paper studies the management innovation of thermal power units in the era of big data modeling from the perspective of contingency.

3. Innovative design of big data modeling information management system for in-service thermal power units under contingency theory

3.1 Innovative design scheme for information system of thermal power unit in service under contingency theory

The contingency theory provides a very useful perspective for people to analyze and deal with various management problems. It requires managers to flexibly handle specific management services based on the external environment in which the organization's specific conditions are extremely faced, using appropriate organizational structures, leadership styles, and management methods. In this way, the manager will shift his energy to the study of the actual situation, and according to the analysis of the specific situation, propose corresponding management countermeasures, which may make his management activities more in line with the actual situation and more effective. Based on the contingency theory, this paper analyzes the management innovation of the in-service thermal power unit big data modeling era. As we can see from the previous article, the core and foundation of big data modeling is still the Internet, which is an extension and expansion network based on the Internet. Data modeling is the application expansion of the Internet. It is not so much that big data modeling is a network. It is better to say that big data modeling is business and application. In big data modeling, objects and information are connected by network structure, and in-service thermal power The management decision-making activities in the crew require the connection of objects and information networks. Therefore, for the innovation of in-service thermal power unit information system, when big data modeling is applied to the innovation activities of in-service thermal power units, the first decision to apply big data modeling technology to the management decision-making activities of in-service thermal power units is undoubtedly one. This is a high-featured test. Therefore, this paper analyzes from the perspective of big data modeling innovation in-service thermal power unit management decision-making operation system.

Combined with the above analysis based on the contingency theory, this paper discusses the innovation of the management decision-making information system of the in-service thermal power unit. At this stage, with the development and growth of high-tech, the intelligent management decision-making transportation system has gradually replaced the traditional management decision-making transportation plan. The so-called intelligence refers to the introduction of information technology such as electronic radio frequency (RFID), geolocation global positioning system (GPS), geographic information system (GIS), etc. on the basis of a relatively complete infrastructure. Accurate feedback of the location to the information management system of the transportation. For the purpose of this research, that is, the management decision distribution optimization under the big data environment, when designing the management decision information system platform, the function of this system should be targeted. In this regard, the main functional modules involved in this system are as follows: cargo tracking. The safety of the cargo is the focus of the in-service thermal power unit and users. In order to facilitate the distribution of goods in the in-service thermal power unit, the user queries the goods information it needs, and sets different order numbers for different goods. The in-service thermal power unit provides the corresponding account number and password to the employer, and the employer can log in to the system to query the system function according to his own needs. Setting this function can improve the credit of the in-service thermal power unit and ensure the safety of the cargo. When the goods are in the process of transportation or there is a problem in the process of distribution, the in-service thermal power unit can promptly find out the reasons and take remedial measures in time to provide corresponding services for the employer. The employer can safely trust the in-service thermal power unit road selection module. This module is only open to the company's top management. The main function of this functional module is to provide a strategic decision-making solution for in-service thermal power units. In this functional module, the paper embeds relevant genetic algorithms to design road conditions and vehicle configuration conditions. This module is also the focus of this paper. Setting this feature can improve the overall transportation efficiency of the management decision-making company. The company's top decision-makers make the right decisions based on the daily order status and road conditions, improve the company's management decision-making transportation efficiency and bring higher economic benefits to the company's cost savings. .

3.2 Solution of multi-objective genetic algorithm

The contingency theory believes that the effectiveness of leadership does not depend on the unchanging quality and behavior of the leader, but on the cooperation of the leader, the leader and the situational conditions, that is, the operation of the thermal power unit in service. In the process, the smooth operation of the in-service thermal power unit has a great relationship with the various entities in the organization. Therefore, it is necessary to solve the relationship between the various operating entities between the in-service thermal power units through functions. The same is true for the management decision-making activities in the in-service thermal power units. Vehicles, customers, and goods are all factors that need to be solved. Therefore, this paper uses multi-objective genetic algorithm to solve it. Vehicle routing and routing paths can have multiple resolution modes, single target, and multiple targets; there are capacity constraints, time distance constraints, and time windows. The research method of this thesis is to define the vehicle distribution path as a multi-objective optimization problem through the study and research of genetic algorithm. The innovative approach of this paper is also the first time to link multi-objective optimization with genetic algorithm, so that in the learning of genetic algorithm, the total number of vehicle paths and the number of vehicles are divided into two different dimension search spaces. Therefore, when designing an algorithm, it is not necessary to specifically define which number of vehicles and the route of the vehicle are prioritized. The practical application of this paper in the vehicle routing problem is the minimal method. In constructing the non-dominated set, the rule of the stop is adopted, and the population in the set continuously experiences the population iteration, thereby generating an optimal solution set. The construction of the initial population in the multi-objective genetic algorithm is the setting of chromosomes in the genetic algorithm. Each customer point is each gene in the chromosome, and the order of the different genes is the order in which the vehicle arrives at different customer points. The chromosomes in the genetic algorithm use an encoding mechanism of natural number string integers. The initial set value is a random number, also known as a random function. In constructing the initial population, the forward insertion method is used to generate a relatively good feasible individual, and the convergence speed of the algorithm is accelerated by the individual. Then, in the realm of the feasible individual, a new part of the individual is decomposed, and the number of these individuals only occupies one tenth of the initial population size. The optimal improvement work after finding a feasible solution is achieved by global or local optimization. This method is the most advanced forward heuristic search strategy at this stage. The idea of this method is to randomly select a serviced customer point as the initial path, and there is only one service object on the initial path. Other customers, if they meet the time window and load weight in the initial path, are inserted one after another into the current customer point. For customers who do not meet the constraints, re-initialize a new path. Repeat the above plan until you have completed all the services of the customer. Therefore, when setting the cost evaluation function, two different variables need to be set, one is to select the cost function of the initial sub-customer, and the setting is:

$$\cos t(c_1) = -\alpha t_0 + \beta b_i + \gamma \left(\frac{|p_i - p_j|}{360} t_{oi} \right) \tag{1}$$

p_i is the polar angle of the current customer point is the polar angle of the last visited customer point of the vehicle path on p_j. Another insertion cost function for other customers who do not meet the criteria, namely:

$$\cos t(c_1) = D_k + \varphi w_i + \eta O_k + kT_k \tag{2}$$

D_k is the total travel distance of the vehicle k; w_i the total travel time of the vehicle k; O_k is the overload amount of the vehicle k; T_k is the total delay waiting time of the vehicle k. It can be seen from the above formula that when selecting the initial customer point, the most ideal choice should satisfy three points: try to stay away from the distribution center; the time window time is set short; the distance between the customer points is closer.

3.3 system workflow

Based on the contingency theory to solve the relationship between the parties in the management decision-making management activities of the in-service thermal power unit, it is necessary to sort out the system workflow. When designing the algorithm, the unloaded vehicle scheduling problem is decomposed into two related sub-problems , namely: vehicle routing and vehicle selection and distribution. The algorithm flow of the under-loaded vehicle optimization scheduling problem is shown in Figure 1:

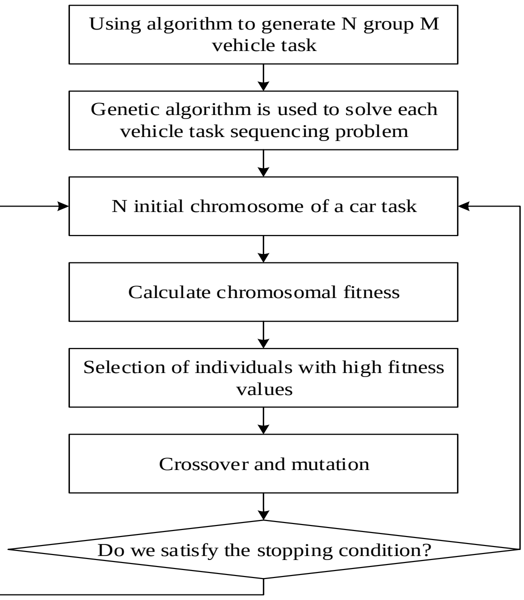

Fig. 1 flow chart of vehicle distribution problem with no load

The basic steps of the multi-objective genetic algorithm in which the vehicle is not full in the routing and distribution path are as follows: the Floyd algorithm is used to calculate the shortest distance matrix a between the distribution points and the corresponding shortest path matrix P, and the path matrix P between any two points. Through the research and learning of the Floyd algorithm, the matrix a of the shortest route between different distribution customer points is calculated, and the matrix p corresponding to the optimal one path is obtained. Set the distance distance matrix between any two customer points to p. The language used by the algorithm is c language, which uses matlab software to help implement the function. Use the sweep algorithm when encountering multiple tasks waiting for allocation. The customer point allocation diagram is shown in Figure 2.

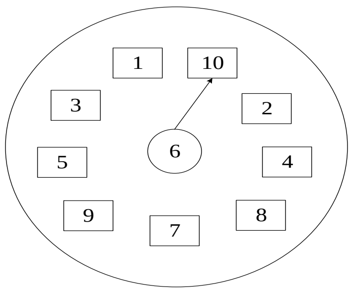

Fig. 2 node distribution diagram

A total of ten customer points are set, of which 6 is the origin, that is, the total distribution center, and the others are customer points. The demand for the quantity of goods is shown in Table 1.

Table 1 quantity distribution of different customers' demand

Customer point	1	2	3	4	5	6	8	9	10
Requirement	21	26	29	20	14	16	10	15	17

The core idea of the algorithm is to select a customer point from the starting point, that is, the origin 6 as the initial point, starting from that point, scanning clockwise, and calculating the customer points of each distribution through the Floyd algorithm during the scanning process angle. And sort according to the size of the angle. Introduce a sequence of 1, 3, 5, 9, 7, 8, 4, 2, 10. Since the load of the vehicle cannot exceed the maximum load Q that was previously set. This condition is introduced into the total algorithm. After scanning, a set of 9 groups is obtained, which is {6,7,10,2,4,3,6/6,9,8,6/6,5,1,6 }. After determining the total task and the load map, it is necessary to sort the form of each batch of vehicles by genetic algorithm. This sorting design is a series of complicated steps such as coding problems on chromosomes, setting of initial data, determining fitness function, selection of genetic operators, etc.

4. Experimental Design and Analysis

4.1 Algorithm Application

Based on the contingency perspective, this paper takes the management decision-making activities of the in-service thermal power units as an example to design an innovative model of the thermal power unit management in the era of big data modeling. Next, the model and algorithm are tested. Based on the platform of building a basic management decision-making distribution optimization path information system, this research paper introduces the multi-objective genetic algorithm learning. After Floyd algorithm and sweep algorithm research, it finally brings in specific test data. To prove that the genetic algorithm used is superior to other design algorithms. Since the data of the management decision-making system belong to the internal confidential information of the management decision-making company, this paper cannot find the actual specific data. Therefore, the in-service thermal power unit supply chain textbook "Supply Chain Management-Strategy, Planning and Operation" was selected. The test data in this article is from the classic case of this book. In this paper, the data in the textbook is brought into the genetic algorithm of learning. After a series of arithmetic coding, the final cost is 161. It can be seen that by introducing the concept of multi-objective into the genetic algorithm, the number of vehicles and the driving route of the vehicle are considered at the same time, instead of a single learning plan considering one point, the final result is that the results in the teaching material are more superior. The analysis process is as follows: According to the narrative in the textbook, the US network pioneer company received a list on a certain day, which requires the management decision-making distribution company to deliver goods for 13 customers. The company has a disposable property of four vehicles with a total load of 200 units. In the case, the management decision-making party unilaterally considers the total distance traveled by the vehicle, and they believe that the total transportation cost is related to the total distance traveled by the vehicle. Therefore, when designing the route, it is only a unilateral design of a shorter route. Although the final network company used a method called the savings matrix to come up with a solution, but he was partially restrictive. As shown in table 2:

Table 2 roadmap of network company

	Distribution Centre	1	2	3	4	5	6	7	8	9	10	11	12	13
1	11	8												
2	8	7	0											
3	16	9	12	0										

4	17	9	9	4	0									
5	16	17	9	14	11	0								
6	19	23	16	20	15	6	0							
7	17	22	13	20	16	6	4	0						
8	9	17	9	19	16	11	14	10	0					
9	7	18	12	22	20	17	20	16	6	0				
10	16	23	14	22	19	9	8	4	8	14	0			
11	20	28	18	26	22	11	7	6	13	19	6	0		
12	12	22	14	24	21	14	16	12	6	7	9	13	0	
13	15	27	20	30	28	22	23	20	12	9	16	20	8	0

The research scheme of this thesis is a multi-objective genetic algorithm. It is the simultaneous consideration of the number of vehicles and the total distance traveled by the vehicle. The encoding setting selects a simpler natural number encoding. For the set size of the population, the set value is 49, the ending value of the population is 100; the probability of the crossover operator is 0.93, the maximum value is 0.59; the probability of the mutation operator is 0.049, and the maximum value is 0.011. While setting these initial values, you can also set a desired optimal value. According to the solution from the lesson plan, this paper is temporarily set to 175. When the scheme runs, after several iterations of the genetic algorithm, if the output is lower than 175, the program is terminated and the optimal result is output; If the genetic run to the end value of 100, still can not output the optimal result, then the last data is the optimal solution. The solution example is shown in Figure 3.

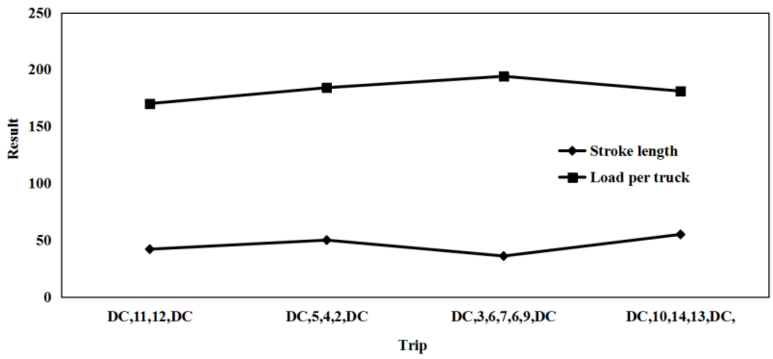

Fig. 3 scheme table for optimal path solution

Comparing the data in the two tables, it is concluded that the scheme studied in this paper is much better than the method in the material. The result is even more excellent. After the solution is obtained, the expected value is modified, the other parameters are unchanged, and then run 13 times. The results are shown in Table 3.

Table 3 operation result data

frequency	1	2	3	4	5	6	7	8	9	10	11	12	13
Result	161	164	100	177	162	176	176	169	165	170	169	167	175

It is concluded that except for the fourth result of 177, the result is the last data output when the value is terminated, and the other data are less than 176. Although the research scheme of this algorithm has obtained a solution superior to the textbook, but because the system design is not perfect, the system only makes a detailed design for the user query function, real-time tracking of the vehicle, gps positioning and other functional modules. It can be further added to the system. When designing the genetic algorithm, the constraints of the time window are also ignored. If the time window is limited, the final result will be more ideal.

4.2 Real-time testing of the algorithm

First, we screen out all the stations that are directly connected to the starting and ending sites and remove the single site that is impossible to transfer on the round-trip and ring-line, so we get a set of possible transfer points with a smaller range; Secondly, we perform matrix analysis, which can quickly determine all feasible transfer points through matrix analysis; Finally, we use a branch and bound algorithm, so we get the best route to meet different needs. By adopting this algorithm, we can query any three pairs of sites on the 2.4GHZ CPU, so that we can get the best route plan to meet different needs. The shortest running time is 0.56 seconds. The long running time is 2.48 seconds, and the average running time in the whole process is less than 1 second. This can prove to some extent that the algorithm can be applied to a humanized self-query network system that solves the problem of distribution line selection.

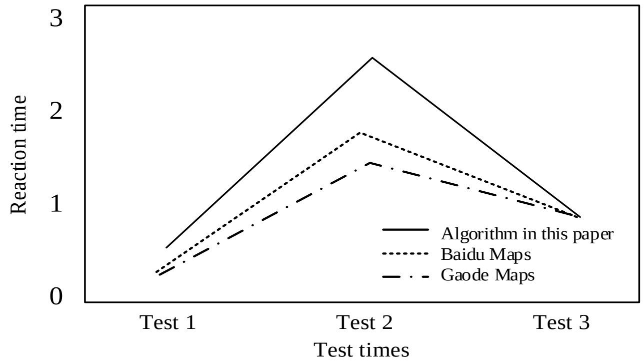

Fig 4. Comparison of reaction time of different systems

Table 4 Comparison of different reaction time and route number of sites

Station number	The number of paths	Time length
1	1	0.69
2	3	0.77
3	6	0.54
4	8	0.65
5	10	0.66
6	12	0.59
7	18	0.68
8	22	0.57

When compared with other systems, we found that the algorithm in this paper is slower than

Baidu map and Gaode map in some cases (Figure 4), but the number of sites will not have a huge impact on the running time, such as is shown in 4, its universality is strong.

5. CONCLUSION

With the rapid development of big data modeling in today's society, the management decision-making industry has gradually become an important part of promoting social and economic development. The contingency theory is regarded as a dynamic process. It believes that the operation of the in-service thermal power units depends on the cooperation of the main units in the operation of the thermal power units. Based on this theory, this paper takes the management decision-making activities of the in-service thermal power units as an example. The innovative model of the in-service thermal power unit business under the contingency theory is designed and solved by genetic algorithm. In view of the current economic and social development trend, this paper establishes a management decision-making distribution information management platform through analysis and inspection of the management decision-making industry. According to the needs analysis of the system users, the users of different rights are provided with relevant information query, and the main functional modules of the system are established. This paper mainly introduces the mathematical model of vehicle routing and routing path and genetic algorithm, the scheduling assignment problem under the condition of vehicle under-fill, and the application of multi-objective algorithm in genetic algorithm. What needs to be proposed is that the algorithm adopts a platform method to construct some non-dominated sets. In the research of the algorithm, the number of vehicles and the driving route of the vehicle are considered in the constraint at the same time, because there is no preference setting, so the obtained solution does not produce corresponding deviation due to the difference of preferences.

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