Research on Dynamic Optimization Combination Method of Logistics Web Services based on Resource Integration

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The resources of logistics are different at anytime and anywhere, so how to integrate these resources has become the key issue of logistics scheduling. In view of the advantages of the Internet, especially the advantages of the mobile Internet, the dynamic allocation of resources has become the key issue of logistics allocation. Based on the characteristics of logistics allocation by Markov random graph method, this paper proposed a robust dynamic resource optimization problem. The simulation verifies the effectiveness of the method.

Keywords: Logistics scheduling; dynamic optimization; Markov random graph; resource optimization; the mobile Internet

1 Introduction

Along with the development of economic globalization, the regional scope of consumer goods is also extended by the traditional logistics to a wider global range. The level of demand for consumer goods to improve, not only to the quality, the appearance and other aspects are required. In recent years, cloud computing proposed by Google has pushed the Internet technology to a new height. In the field of logistics, it is necessary to analyze and control the manufacturing requirements of the manufacturing industry, but also to consider the conditions of transportation, the choice of the path and the distribution of the object; all of the considerations can be integrated and unified in space and time that is through the Internet, and powerful computing capabilities of the Internet can reasonably allocate logistics, making it possible to achieve the purpose of minimum consumption and the shortest time[1-3].

2. Related works

2.1 Research status of networked manufacturing

The advanced manufacturing mode of network manufacturing is produced at the end of the last century and developed rapidly. Therefore, the enterprise dynamic alliance is more dynamic and loose, which along with the common interests to the survive and gather, with the changes in market opportunities and dynamic adjustment. The essence of the dynamic alliance is to break through the legal boundary of the enterprise, the regional boundary and the time limit, so that the function of the enterprise can be extended; the goal is to integrate the enterprise external resources advantage to achieve fusion and create a superior competitive advantage; the strategy is to make full use of external resources, reduce investment risks and accelerate the realization of the market target; the most basic technical means are the computer technology and network technology, dynamic alliance consists of the leader enterprise, core leaguers and other federate, their importance in the dynamic alliance gradually decremented[4-5]. The information system of the enterprise dynamic alliance is composed of the various subsystems of the alliance, each subsystem has its own autonomy and independence. The most common method to construct the information system of enterprise dynamic alliance is based on Multi-Agent system construction method.

2.2 Data framework of cloud platform

In the concept and characteristic research of cloud computing, according to the definition of American national standard and institute of standards and technology: cloud computing is a kind of computing model using the Internet to achieve real-time and on-demand, easy access to a shared resource pool. Generalized cloud computing mainly refers to the generalized computing resources, in addition to the CPU, storage devices, including computing platform, application software, a large database, all kinds of the middleware and Internet related application service in various fields. It means that computing power can also be used as a commodity by the Internet for circulation [6].

In the aspects of architecture and development research of cloud computing, the cloud computing hierarchy is divided into five layers by a lot of scholars, which are cloud client, application service, platform service, infrastructure services and cloud servers. Cloud services also include the following four categories: public cloud, private cloud, hybrid cloud and interactive cloud. The U.S. government established the federal government website by using cloud computing technology, thereby reducing operating costs. A lot of large enterprises combine their own industrial characteristics and have developed a product development platform which is based on cloud computing environment.

3   Proposed scheme

3.1   Scheduling based on the distribution problem

The scheduling center does not master of all the information related to the distribution plan before the optimization scheduling, the information including customer information, distribution of environmental information and vehicle information that is, do not know all the distribution information before distribution; after optimization scheduled for execution, the known distribution information is not static, that is, the known distribution information will vary with time in the distribution process. Over time, when dynamic information is generated, the vehicle scheduling center needs to ensure that the distribution costs and service quality for the premise, either change the original route or re-open the route to respond to the dynamic demand information.

The information of dynamic vehicle scheduling problem is constantly changing, and it will produce new information at any time. It is necessary to establish a new mechanism of information updating. Firstly, according to the ratio of dynamic customer and static customer in dynamic distribution network, the visual complexity ratio is defined, denoted

$$\mu = \frac{c_l}{c} \tag{1}$$

Where c_l is the number of dynamic customers; c is the total amount of customers in the distribution network. The standard genetic algorithm by selection, crossover and mutation operations to achieve the evolution of population, and these operations are carried out in random. Because the quantum genetic algorithm can simultaneously have two kinds of algorithms, this parallel structure makes the algorithm has fast convergence and global optimization capability. The following design, quantum genetic algorithm for solving vehicle scheduling problems [7-9].

The first step, for the vehicle scheduling problem of n customers. Decoding transform adopts the two-step method of "group after the first line", the first step is to generate a sequence of customer service, by generating random numbers in [0,1] to generate the $m\Box m$ two-dimensional 0-1 observation matrix, search and adjust the matrix to ensure that each row and column of the matrix is only a 1, the abscissa represents the order of service, the ordinate represents the customer number.

The second step is to form the vehicle driving route, enabling a car at a time, according to the customers' order sequence table service customers, when the current vehicle can not meet the needs of the next customer, to enable a car, so you can convert the bit coding to integer coding, such as (0, 1, 3, 2, 0, 5, 4, 0), represents five customers demand schedule need two cars to finish, 0 represents the distribution center.

The third step, the calculation of sufficiency.Each chromosome in the population after decoding transform, the chromosome is changed into the integer, calculate its objective function value Z; if the chromosome violates the constraint condition, give Z a very big number. In this paper, the sufficiency function of the chromosomes is consistent with the objective function, thus, the smaller the function value, the better the chromosome[10-12].

3.2   Scheduling implementation based on cloud computing

With the rapid development of the market economy, the time of goods from the enterprise to the end customer is getting shorter and shorter, and the logistics distribution model of traditional large quantities and a few batches has been unable to adapt to the complex and changeable logistics needs. The development direction of logistics distribution is small quantities, multi batches. The distribution area is also expanding. At present, our country does not have the social joint distribution system. And then, small batch dispersion of logistics distribution is converted to a commercial cargo, so this will form a large distribution and realize low-cost, high quality logistics services [13].

The issue of joint distribution is the distribution pattern of "many to many", involving the vehicles of different distribution center for joint distribution, docking and replenishment etc. Therefore, this paper puts forward the overall algorithm of multi distribution center problem as follows:1)A virtual car yard is set, its position can be anything, the yard and the actual distribution center are connected;2)The cost of the virtual yard to distribution center is defined as 0;3)The actual distribution center is regarded as a special customer, and it's requirement is 0;4)The vehicle of whole distribution network is defined by the virtual yard departure and return. And when the vehicle starts and returns, it must go through the distribution center.

4   Software implementation

There is a huge difference between the vehicle scheduling system based on cloud distribution mode and the traditional vehicle scheduling system. The traditional vehicle scheduling system needs manual input distribution tasks, and the task is relatively simple, so we do not need to establish a relatively large database. The vehicle scheduling system based on cloud distribution mode is a distribution task which is matched by the cloud service distribution platform. The system can optimize the route according to the matching distribution task, and then the optimization scheme is generated, so the structure and function of the system is relatively high.
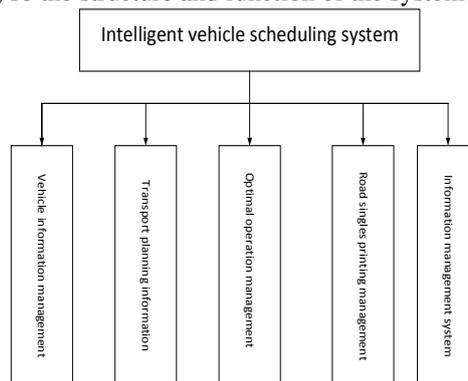

Fig. 1. System model

The optimal scheduling management module is the core of the intelligent vehicle scheduling system and other modules around it. Firstly, according to the matching distribution task, the system carries on the analysis of distribution vehicle condition and analyze whether need additional vehicles in the distribution process. When the vehicle is determined, intelligent algorithm in the optimization scheduling module starts to optimize the production scheme, and convert it to distribution waybill. Specific operating structure is as follows.
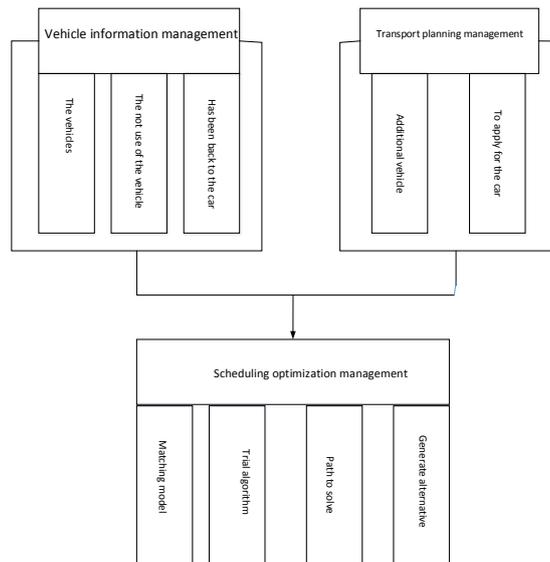

Fig. 2. The scheduling system

5   Conclusion

According to the integration of logistics resources, this paper proposes a dynamic scheduling scheme based on web. In this scheme, the improved genetic algorithm is used for data mining and optimization, and the platform of cloud computing is used to perform the algorithm. Finally, the software architecture of capable implementing this scheme is proposed. Subsequent more complex scheduling need to further research.

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