Research on Routing Analysis in Communication Management System

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Abstract. According to various typical business management structures and characteristics of power communication management business in China's power communication network. The optimization algorithm takes the average risk of business communication management and the degree of risk balance of business communication management as indicators for evaluating network reliability, and uses the method based on nonsga-II (non-dominated sorting genetic algorithm) to optimize the operation and management route of power communication network business. And distribution. In the process of genetic encoding, we have added blocking arrays during the process of chromosome decoding to effectively prevent the occurrence of chromosome dead ends. The simulation results verify the theoretical feasibility and effectiveness of the route optimization distribution algorithm widely used in the route distribution optimization of China's power communications network business. This optimization method is widely applicable to the various management and business needs of China's power communication network. The optimization of methods and other issues provide theoretical and practical reference.

Keywords: Power routing optimization; communication network reliability; routing optimization power communication network.

1. Introduction
Route-optimized power communication network is currently the first important physical communication network in China's power system. It undertakes the business and needs of production scheduling, operation management and internal information network security management of large-scale power grid construction companies in China. Its safety and reliability directly affect the safety, stability and normal operation of China's large-scale power grid. However, considering that the interconnection between China and the international power grid is also closer, the relevant literature points out that the study of the reliability of China's power communication network and its overall business is to study and guide the planning and design of the daily network business of China's power communication network operation management department , The optimization and adjustment of network business operation management methods and other network services have important guiding significance, and established an overall evaluation method and measurement indicators for the reliability of power communication network services based on the risk balance of the entire network.
business. Evaluation reliability model and its solution analysis method. The research literature mainly carried out the route optimization research without the given service routing multi-channel, and did not study in detail how to improve the route allocation method of network service reliability. In this study, the author found that the method of optimizing the distribution of business routes for networks that use the risk balance optimization degree of network communication services as the main indicator of reliability evaluation has certain limitations, and the business route optimization with the least risk balance of network communication service routes The method of allocation is not necessarily considered to be the method of allocating the optimal business route risk degree in practical applications.

2. Route optimization index and method selection

The evaluation index br of the risk balance optimization degree of the network communication service reflects the situation that the risk degree of the network service route carried by each service channel simultaneously carried on the mobile communication network is balanced and optimized. If the path index is too high, it may indicate that the network service routes carried on each service operation channel in the current network are unevenly distributed. However, the method for optimizing and allocating the service route of the network based on the current risk balance of the network operation business to evaluate the main indicators may still have its limitations.

![Figure 1. Legend of business topology of power mobile communication network](image)

The China Power Mobile Communication Network shown in Figure 1 is a legend based on topology. There is only one path n1 to n5 in the network at a time. The service scheduling data network runs services.) This business alternative path. Find the business-related indicators under this optional path separately, as shown in Table 1.

| Path index                  | N1-N2-N5 | N1-N3-N6-N4-N5 |
|-----------------------------|----------|----------------|
| Operational risk of the entire network | 11.96    | 23.92          |
| Business average risk       | 1.495    | 2.99           |
| Business risk balance       | 0.793    | 0.748          |

It can be clearly seen from the routing table 1 that to complete the requirements of network services, path 1 needs to go through a channel, and path 2 needs to go through 5 channels. We are more inclined to accurately select users' needs to complete network services through path 1, that is to say, route evaluation and optimization based solely on the risk balance index of network services may not be appropriate.In practice, it should be combined with network services The characteristics and needs of different reliability evaluation indicators and methods to determine the appropriate route.

A core function of the multi-objective genetic algorithm is to find the optimal route decomposition set that can make the functions of the same target as small as possible (or relatively large) by adjusting the priority relationship between the optimization functions of the same target. nsgaii genetic algorithm is the most commonly used multi-objective routing optimization algorithm, and its routing optimization calculation efficiency and robustness are relatively good.
3. Method for optimizing and assigning routing chromosome using genetic algorithm NSGAII

One of the first keys means of applying genetic algorithm to multi-target routing chromosome optimization and allocation of chromosomes is indirect coding and priority decoding of chromosome routing, that is, first determine the reliability of the index and the priority between the index and the chromosome contact.

Calculation method: When the priority method of the communication nodes and services of each power grid is obtained by the decoding method based on the chromosome of the priority network, the priority calculation method in Section 1 can be used to comprehensively calculate the network risk assessment and various indicators the average network risk ravg of the communication business corresponding to the chromosome nodes of each network and the risk balance of the chromosome business are obtained.

a). The initial population P0 is randomly generated. Calculate the average business risk and business risk balance of each individual; according to the values of these two objective functions, sort the population non-inferiorly and calculate the crowding distance.

b). According to the results of non-inferior sorting and crowding distance calculation, P0 is selected, crossed, and mutated to obtain a new population, and t = 0.

c). Form a new population and calculate the Ravg and BR of each individual; according to the values of these two objective functions, sort the new population non-inferiorly and calculate the crowded distance.

d). According to the results of non-inferior sorting and crowding distance calculation, the best N individuals in the new population Rt are selected to form a new population Pt + 1; the population Pt + 1 is selected, crossed and mutated to obtain a new population Qt + 1.

e). If the conditions for the termination of the genetic process are fully established, the genetic process ends; otherwise, t = t + 1, jump to the third step to continue, and then perform the second cycle.

In the genetic algorithm, the process of gene selection mainly adopts the binary genetic championship. The crossover process mainly uses the genetic algorithm of gene hybridization based on the chromosome position.

4. Algorithm optimization

The number of service execution nodes in the design network is 6, and the number of nodes on the service execution channel side is 8. The nodes in the designed network have 5 business requirements, namely: business scheduling data network management services of nodes n1 to n5 in the network; business scheduling data network management services of nodes n1 to n6; intelligent substation management of nodes n1 to n4 And integrated monitoring data network services; international smart grid management and information system support (sg-erp) services from nodes n1 to n5; international conference broadcasting and television monitoring system data network services from nodes n1 to n6 in the network. The use of genetic algorithms can optimize and allocate network routing nodes. If there are 5 chromosome segment business nodes in a network, each individual with chromosome segments can have 5 network chromosome segments; if the number of network routing nodes is 6, the total length of each network segment with chromosome segments and the number of nodes is 6; then the total length of each business node with chromosomes is 30.
Figure 2. Proportion of the number of Pareto optimal solutions

Figure 2 shows the variation ratio of the population proportion corresponding to the optimal solution set by the pareto set in the study example in the initial population during the iteration and optimization process. The maximum population operation and optimization times set in the study example in this article is 00 times. It can be seen from the calculation example in this article that when the number of runs reaches about 30 generations, the proportion of the population corresponding to the pareto optimal solution in the initial population has basically remained stable. About 45%.

Figure 3 analyzes the distribution space of the initial population of nsga ii algorithm and the population after running 00 generations. The analysis results show that the nsga ii algorithm can be used to ensure the best effectiveness of power communication and Internet routing optimization. Due to the contradiction between the optimal objective function of business average risk degree ravg and business risk balance degree br, under normal circumstances, it is not possible to simultaneously maximize or minimize the objective function at the same time, so usually according to the actual situation Solve the two subsets for comprehensive analysis and selection of functions.
5. Conclusion
Comprehensive analysis of the reliability factors of the business. This article is a method of optimization and distribution of power network business channels and routing networks that the author fully considers to improve the reliability of power communication network services. It can be used for all power systems and communication technologies when the network topology has been fully determined. The department reasonably arranges the channels of the power network business and the operation and management methods of the organization business, and provides scientific and reasonably intelligent auxiliary data analysis decisions and schemes, so that all businesses based on the power communication network can run in a highly reliable manner. All of them need in-depth auxiliary data analysis and research.

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Research on intelligent auxiliary analysis technology of communication operation mode.

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