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Construction Schedule of Medium Voltage Overhead Distribution Network Optimization Based on Neural Network Algorithm

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Abstract

INTRODUCTION: The medium voltage overhead distribution network is a complex planning problem, and monitoring the construction progress of the medium voltage overhead distribution network is an important aspect of the planning problem. Regarding the structure of the medium voltage overhead distribution network, it is one of the important components in China's distribution network system. If the construction progress of the medium voltage overhead distribution network is optimized, it will affect the normal operation of the entire power grid system in a certain region. Optimizing the construction progress of medium voltage overhead distribution networks using modern development related technologies or algorithms is one of the practical research topics.
OBJECTIVES: To better predict various issues that may arise during the construction progress of the distribution network. Complex geographical conditions lead to construction difficulties, and lack of technology leads to frequent stoppages of construction, further leading to frequent power outages in various regions. In terms of the overall power supply system, the reliability of power supply is not high.
METHODS: By comparing the BP neural network algorithm with the CNN network algorithm, the actual operation effect is evaluated by experts.
RESULTS: This article predicts the implementation progress of the medium voltage overhead distribution network, and the results show that the accuracy of the BP model for predicting the construction progress of the medium voltage overhead distribution network can reach 88%; The accuracy of the CNN medium voltage overhead distribution network construction progress prediction model reaches 77%.
CONCLUSION: The use of neural network algorithms to optimize the construction schedule of medium voltage overhead distribution networks has been evaluated by experts in practical applications, and the medium voltage overhead distribution network in power supply systems has potential application value.

Keywords: medium voltage overhead distribution network, construction schedule prediction, CNN algorithm model, BP algorithm model.

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1. Introduction

The medium voltage overhead distribution network is a complex planning problem, and the monitoring of the construction progress of the medium voltage overhead distribution network is an important matter of the planning problem [1]. The MV overhead distribution network structure is one of the more important components of the distribution network system in China,

and the optimization of the construction schedule of the MV overhead distribution network affects the normal operation of the entire network system in a certain area. Therefore, the optimization of the construction schedule of MV overhead distribution networks is one of the studies of practical importance if it is carried out using modern developed technologies or relevant algorithms [2].

China is a vast country with a large population distributed in various regions of the country [3], so the output lines of our distribution network are also complex and intertwined for thousands of miles, and some output lines are extremely complex due to the geographical location of the existing sites, which leads to an exponential increase in construction difficulty compared to the normal geographical situation, so how to handle and optimize the construction schedule of MV overhead distribution network is a matter of The construction schedule of MV overhead distribution network is therefore one of the key matters regarding the layout of the whole area and the reliability of power supply [4].

In recent years, with the rapid development of China's economy and the continued increase of various social needs, China's manufacturing industry continues to prosper, and the country's electricity demand from the whole continues to increase, and the relevant configuration of the power grid is limited by the development of the local economic level [5]. Under normal circumstances, if the region's economy is developed and the manufacturing industry is more developed, then the demand for electricity in the region is bound to be huge, so the monitoring of the construction progress of the medium voltage overhead distribution network in the region is also very important, and the wiring of the medium voltage overhead distribution network in the region is also more complex compared to less developed regions [6]. The demand for electricity in China is increasing, so more MV overhead distribution network base stations need to be built, which can be interpreted as more poles. Therefore, in general, if the construction schedule of the MV overhead distribution network is not optimized and handled in a certain way, it will lead to not only the progress and efficiency of the construction in the region, but more importantly, there is also the problem of power shortage that will greatly affect the quality of life of the local residents and the economic development of the region.

In order to meet the needs of social development and regional economic development, China's power supply bureau has divided the voltage of the distribution network into several levels in order to specify a unified standard and provide certain guidance for power distribution. the voltage transit of China's voltage distribution network can be divided into three levels, namely, high-voltage distribution network, medium-voltage distribution network, and low-voltage distribution network, in which these three levels are mutually accomplished, and different transforming operations need to be done between the different levels [7]. After generating high-voltage electricity and the transmission of high-voltage transmission network, it needs to go through primary substation to reach the high-voltage distribution network, and then go through secondary substation to reach the medium-voltage distribution network, and after reaching the medium-voltage distribution station, it will reach the low-voltage distribution network after going through another user substation [8]. Which in the high-voltage distribution network refers to the voltage standard of 35kv, 110kv, compared to the high-voltage distribution network of high voltage, medium-voltage distribution network voltage standard to be greatly reduced, only 10kv, 6kv, in the completion after the high-voltage distribution network and medium-voltage distribution network after the configuration of voltage, low-voltage distribution network only 0.38kv as well as 0.22kv. And the original high-voltage transmission network is with a voltage grid with 220kv and above. It can be seen that the medium-voltage distribution network is equivalent to the intermediate hub between the high-voltage distribution network and low-voltage distribution network and the transition period from high-voltage to medium-voltage and then to low-voltage, thus avoiding the direct completion of the voltage drop from high-voltage 35kv or 110kv to 0.38kv or 0.22kv, increasing the safety and reliability of the power transmission process.

It can be seen that the medium-voltage distribution network plays a role of transition belt in the whole national power grid transmission process, and provides better reliability and safety for the power transmission of the whole power grid system, avoiding the unpredictable danger brought by the rapid voltage drop and increasing the safety of users. The optimization of the construction progress of medium voltage overhead distribution refers to the planning and monitoring optimization of the construction process of overhead lines in the implementation of medium voltage distribution networks, and hopes to provide technical support for the implementation and optimization of the construction progress of medium voltage overhead distribution networks by combining the rapid development of contemporary artificial intelligence and deep learning.

2. Research Background

The monitoring of the construction progress of MV overhead distribution networks in China is an important planning matter for the configuration of China's power grid. For the development of a city, a reasonable grid structure design and reasonable grid construction progress monitoring are sufficient and necessary conditions to meet the development of the city, the adequacy of power supply and the quality of life of the residents. And, to a certain extent, only a reasonable grid structure layout and reasonable construction supervision can make the operation of our electricity supply flexible and better reduce the overall network power consumption, improve the efficiency of electricity consumption and avoid

wasting electricity. This paper discusses the configuration of the medium voltage overhead lines of the power grid, the essence is that in the entire power grid system, the configuration of medium voltage, low voltage and high voltage should be mutually integrated, mutually matched and orderly in terms of strength and weakness, it is the harmonious operation between the three that can make our distribution grid system reach the overall optimization [9] .

The voltage unification of medium voltage overhead configuration system in China was completed in the 1970s, and the voltage of medium voltage distribution network was set to 10 kV . However, with the rapid development of China's economy and the fierce increase in the demand for electricity in social development, the medium-voltage voltage unification standard set in the last century has not been able to adapt to the development of society and the needs of economic development, and relatively speaking, due to the increase in the demand for electricity, if the voltage standard of 10 kV continues to be used, it will bring instability and security risks to the use of electricity in the region, so in order to adapt to the Therefore, in order to meet the development needs of the society, after realizing the medium-voltage unified voltage of 10 kV, China raised the unified standard voltage to 20 kV and directly supplied power to 380 V . On this basis, a new generation of power supply system was realized, which means that the power supply system of 35kv directly from 110kv was abolished on the basis of the original one, and the power supply system of 220, 20, 0.38kv and 110, 20, 0.38 kv was formed. In general, the overall operation diagram of the overall power supply system can be shown in Figure 1.

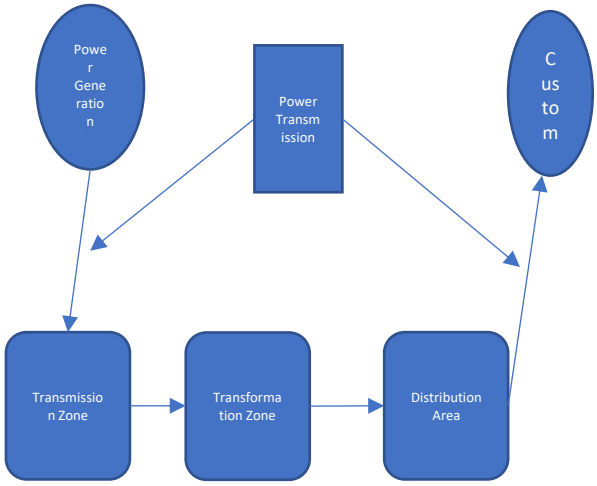

Figure 1. The basic framework of the overall power supply system

As can be seen from Figure 1, the basic framework of the overall power supply system can be composed of power generation, transmission, substation, distribution and customer areas from the perspective of the overall system. From the Figure, it can be seen that power transmission is the whole process of the overall power supply system, and it is responsible for transmitting the power from the power generation area to the customer area after the configuration of substation and distribution is completed. Combined with the medium voltage overhead distribution network discussed in this paper, it can be seen that this paper is mainly about the distribution area in the power supply system, which mainly completes the distribution duties in the power supply system [10].

The research topic of this paper is about the optimization of the construction progress of the erection of overhead lines in the medium voltage distribution network, so what is an overhead line? First of all overhead lines refer to one of the line structures in power lines. Generally speaking, power lines can be divided into two categories: overhead line structures and cable line structures, if they are differentiated according to their structure. The basic structure of overhead lines is shown in Figure 2 below.

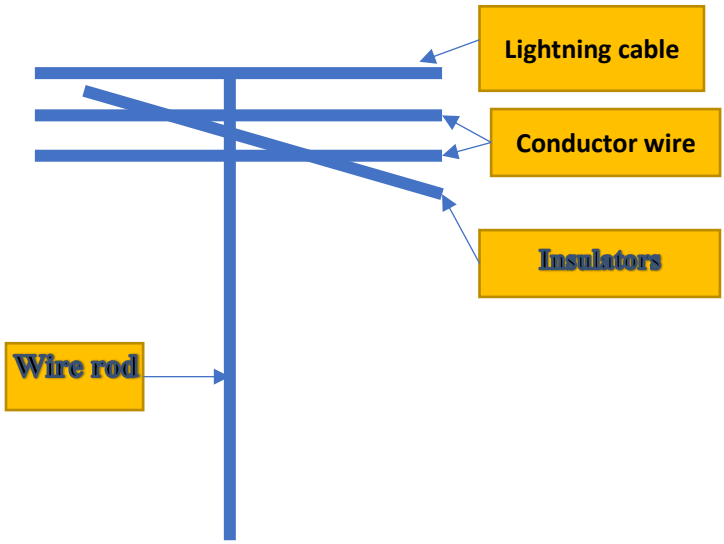

Figure2. The basic structure of overhead lines

As can be seen from Figure 3, the basic structure of overhead lines is mainly composed of four parts, which are poles, insulators, wires and lightning lines. It can be seen that the overhead line is mainly realized by placing several wires directly on the pole, and the general form of power supply is radial power supply. In the form of overhead line power supply, there are three main ways of supplying overhead lines, namely, radial, ring, and segmental contact [11]. In the form of radial power supply, it can be divided into dual power supply and single-side power supply with multiple segments and

single radiation supply, in which the line utilization rate of single-side power supply with multiple segments and single radiation is twice as high as that of dual power supply, where the former is 100% and the latter is only 50%. The main application sites of the dual power supply are those with high reliability and more dedicated users, while the single power supply is mostly used in urban or rural areas with low requirements for electricity. In the form of ring power supply, there are two main forms of power supply, one is a double-side power supply with multiple segments and single contact, and the other is a ring network wiring with three feeders, for the above two forms of ring power supply, the line utilization rate is only 50%, but the reliability of both is higher than that of the radial single-side power supply with multiple segments and single radiation. In the form of segmented contact power supply, there are also two main forms of power supply, one is two segments and two contacts, and one is three segments and three contacts. For the above two forms of multi-segment multi-contact power supply, the line utilization rate is also limited [12].

In summary, it can be seen that China's power grid after decades of development of its power supply forms, transmission methods, grid configuration, etc. are constantly developing, from the original single gradually to diversification. From the perspective of social and socio-economic development, the development of the power grid is inevitable, and the development of a country needs a huge power supply system as support. Therefore, this paper, based on the study of China's power development and power supply system, completes the optimization of China's medium-voltage distribution network overhead lines in the construction schedule, and fully combines the neural network algorithm to implement the monitoring and prediction of the construction schedule of China's medium-voltage distribution network overhead lines. The project is fully integrated with neural network algorithms to monitor and predict the construction progress of overhead lines of MV distribution networks in China.

3. Materials and methods

3.1. Overview of neural network algorithm

Neural networks are the basis of deep learning and machine learning. The origin of neural networks can be traced back to the 1950s or 1960s, when the discovery and proposal of perceptron facilitated the development of neural networks. One of the perceptrons specifically receives the content of any binary input and produces a binary output [12]. Thus, for the perceptron, the model is many-to-one. In the perceptron, there are n inputs x_1, x_2, x_3, ...x_n; one output y. Then the corresponding weights in the perceptron model are set to w_1, w_2, w_3, ..., w_n. Thus, for the output, the final more accurate output model is obtained as.

$$y = 0, \quad if \sum_j w_j x_i <= threhold \tag{1}$$

$$y = 1, \quad if \sum_j w_j x_i > threhold \tag{2}$$

From equation (1) (2), it can be seen that for the perceptron, the threhold represents the threshold of the perceptron, which plays the role that the size of the threshold selection will eventually affect the final output, and the threshold represents a real number. The threshold $\sum_j w_j x_i$ value determines the sum after assigning the weights. That is, the size of the threshold determines whether the value of the output y is 0 or 1. Using the threshold decision method is only the decision model of the perceptron at the beginning, and as the weights and thresholds keep changing, different decision models can be obtained through the perceptron model, but the full decision model cannot be obtained through this model, i.e., not all decision possibilities can be obtained through the perceptron. Also, observing the formula, it is mainly the if that determines whether the output is "0" or "1" by multiplying the inputs and weights. Therefore, in order to make the perceptron more comprehensive and accurate, some researchers have improved the perceptron by moving the threshold to the left side of the inequality sign of the above equation (1)(2) through a mathematical form, and then using a bias to represent it, so that the final formula of the perceptron evolves to

$$y = 0, if\,(wx + b <= 0) \tag{3}$$

$$y = 1, if\,(wx + b > 0) \tag{4}$$

From Eqs. (3) and (4), it is clear that b is the bias value. Where the output y is 0 when the formula wx+b<=0 holds, and 1 when the formula wx+b>0 holds. This gives rise to the predecessor of neural networks, the perceptron.

The perceptual machine is equivalent for neural learning to the first artificial neural network model in the world that can learn autonomously. It was its appearance that could lead to a surge of research and a deeper push in the scientific community on neural networks. The biggest drawback of perceptron is that it can only handle linear classification tasks, but not nonlinear problems, which is determined by its implementation principle, because all training of perceptron models is based on linear relationships. Therefore it is inevitable that it has no way to handle tasks with nonlinear relations. Therefore, in order to solve this problem, researchers have started to study neural network models and implement the processing of nonlinear relations in neural network models.

3.2. Construction progress monitoring and prediction construction of medium voltage

overhead distribution network based on CNN algorithm is constructed

CNN algorithm, also known as convolutional neural network algorithm, is a network algorithm that shares the weights of neurons. Implementing the detection and prediction of relevant progress in MV overhead distribution network construction is a relatively research significance study. Since research on this part is inherently scarce, and the application of neural network algorithms to power grid systems is even scarcer, this paper will implement the construction progress detection prediction of medium voltage overhead distribution networks using the CNN algorithm from this perspective [14].

CNN algorithms have received great recognition and vast applications in the field of machine learning and deep learning since they were mentioned in the 1960s. Until now, CNN algorithms have been widely used in the fields of image processing, image restoration, image classification and recognition, and pattern recognition. And in order to use the development of society and the progress of technology, researchers have improved CNN algorithms in different ways in order to make them applicable to different problems and applications.

In general, the basic structure of CNN algorithm can be divided into two layers, one for feature extraction and one for feature mapping [15]. These two basic layers in terms of meaning, one layer represents the extraction of features and one layer is the mapping of the extracted features. In feature extraction, by connecting the input of each neuron to the output of the previous layer, the output of the previous layer can also be understood as the local receptive domain of the previous layer since it is in the feature extraction layer. Thus the feature extraction of this CNN algorithm model is performed by connecting to the local receptive domain of the previous layer and extracting its corresponding local features. When the local features are extracted by the next layer, the relationship between the features of the previous layer and the current layer is also determined, which completes the extraction of the local features in the CNN algorithm model. The feature mapping layer is performed after the feature extraction layer. In CNN neural networks, there are many feature mappings between each computational layer and the computational layer, and it is these feature mappings that make the whole CNN neural network model work continuously, and it is this layer that makes the whole CNN neural network model able to deal with nonlinear relationships, because in the feature mapping layer, the mapping relationships are nonlinear. The main implementation in the feature mapping layer is the implementation of the activation function, in which the mapping relationship between the independent and dependent variables of the activation function determines the mapping relationship between the features in the neural network. Moreover, as it is known above, the weights in the convolutional neural network are shared, and it is also due to the mutual sharing of weights of neurons on the mapping surface that the number of free parameters of the network can be reduced, which in turn reduces the complexity of the co-computation in the CNN neural network model. Among them, the specific implementation framework regarding the weight sharing model of CNN neural networks is shown in Figure3 below.

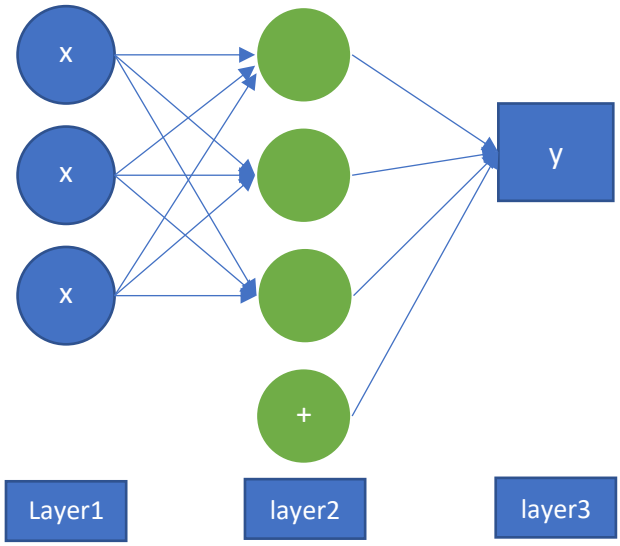

Figure 3 Basic implementation framework of CNN neural network model for medium voltage overhead distribution network

From Figure 3, the basic implementation framework of CNN neural network model for MV overhead distribution network can be composed of the following layers: layer1, layer2 and layer3 respectively. Layer1 represents the input layer of the whole MV overhead distribution network, and the above Figure 3 shows that there are three input layers, i.e., x1, x2, and x3; layer2 represents the hidden layer, where the "+1" in the hidden layer represents the bias value b; for layer3, it represents the output layer y. In the CNN neural network model, each layer can be considered as a part of units, i.e., cells, i.e., each layer should be viewed as a unit and decomposed in a modular way to obtain the feature vector needed for the whole model. The connection points in each layer have a certain weight, which will be passed to the input of the next layer with the output of the previous layer. The weights will directly affect the direction of the whole CNN neural system and the final correct value. There is no limit to the number of hidden layers in a CNN neural network, and it can be infinite. However, as the number of hidden layers deepens, the complexity of the whole CNN neural network model will also deepen, which will affect the operation efficiency of the whole training model.

In summary, the CNN algorithm-based construction progress monitoring and prediction model of MV

overhead distribution network is constructed by collecting and processing the collected MV overhead distribution network related data, and then forming a CNN neural network that can be used as the CNN overhead distribution network construction season progress prediction model. The model will be trained and its performance will be evaluated by observing the loss function and the correct rate of the model, which will provide ideas and practical implications for the implementation of MV overhead distribution network and other related HV overhead distribution network or LV overhead distribution network.

3.3. Construction progress monitoring and prediction of MV overhead distribution network based on BP algorithm

BP algorithm, also known as back propagation algorithm, was mainly proposed around 1990s. In the BP algorithm, compared with the CNN algorithm, there is mainly a back propagation path, which is not present in the CNN algorithm. And the basis of BP algorithm implementation is mainly based on the optimization of the error function of the gradient function. And it is because of the proposed BP algorithm that the efficiency of the neural network can be greatly improved, which can make the development of deep learning unprecedented [16].

The basic process of BP algorithm implementation in MV overhead distribution network can be seen in Figure 4, but unlike Figure 4, the BP algorithm needs to add a feedback loop to adjust the training parameters of the model in order to make the model develop in a better direction and get a more friendly accuracy rate and higher accuracy. In the process of BP algorithm implementation, firstly, the input layer is connected to the hidden layer for extracting the feature vectors between the input vectors, while the activation function is involved in the whole model operation and uses the mapping relationship between its input and output relations to determine the feature mapping between the different layers and thus the feature positions between the layers. The BP algorithm neural network model is based on the calculation of different weights for different neurons, and the weighted sum of the output of the nodes in the previous layer and the mapping is calculated, and then the output of the layer is calculated mainly by the activation function in the mapping. After the above discussion, it can be seen that the implementation of BP algorithm in MV overhead distribution network is mainly about the selection and calculation of weights and the reasonableness of the selection of activation function, which will affect the final accuracy, completeness and comprehensiveness of the whole model.

So how to adjust the weights in the construction of the BP algorithm for monitoring and predicting the construction progress of medium voltage overhead distribution network? First of all, the adjustment of the weights is actually a problem of gradient direction change. In this paper, the difference between the actual MV overhead distribution network construction progress and the output of the defined BP network is defined as e(n), and this difference e(n) is a function of all the weights w in the network, and the values of the weights are interacting with each other. Therefore, in mathematical thinking, e(n) can be defined as the rate of change on the weights w, which means that it can be understood as a partial derivative of the function of the weights w. Therefore, the adjustment of the weights implemented in the BP algorithm is actually to make e(n go in a smaller direction. In order to optimize the performance of the model, it is therefore necessary to make e(n) move in the direction of negative gradient when w changes. This means that the weights w are adjusted in the direction of decreasing e(n) so that the gap between the actual construction schedule and the target schedule of the MV overhead distribution network becomes smaller and smaller. The final result is a trained training model for the construction schedule of MV overhead distribution networks. With this model, it is possible to use the model to predict and monitor the construction schedule of all subsequent MV overhead distribution networks.

4. Results and Discussion

4.1. Implementation strategy of MV overhead distribution network construction schedule optimization

With the progress and development of China's society, it is inevitable to monitor and optimize the construction progress in the completion of a project. And in the construction of China's power supply system, the construction of medium-voltage overhead distribution network is very important, because the medium-voltage distribution network is equivalent to the intermediate hub of power transmission in the entire power system, greatly affecting the reliability and safety of power transmission, and can be used in the process of construction of distribution lines, overhead lines are used to combine the power grid and user electricity together, in the process of power generation The process of power supply to transmission is completed to ensure that the power supply to the use of electricity. However, in practice, because the entire power system operating environment is relatively complex, and overhead lines need to use poles, so the area covered in the overall is relatively complex and full of unknown, so in the construction of a region or a city's power system, not only need to consider the reality of environmental factors, but also need to consider the construction schedule in the actual environment to complete the difficulty and the impact on the entire construction schedule. Therefore, it is necessary to strengthen the supervision and management of the construction progress in the construction of the distribution network, so as to provide stable power

support for the adequacy and quality of power supply for the whole society.

In the construction of the electric power system, the construction supervision of the medium voltage overhead distribution network is inevitable, but in the supervision process can not be separated from the reasonable management of the management staff and reasonable division of labor layout, but in the reality of the construction of the power system project requires close cooperation between the management staff and construction personnel, and in China due to the special nature of the profession, China in this area of talent is still lacking, which is China in the power system This is a relatively large problem in the construction of China's power system - the lack of professional management and development of the progress of each process of the power system talent. The second problem is that there are various problems in the implementation of the medium voltage overhead distribution network project, for example, because of the industrial boom and the continuous promotion of the industrial economy, the demand for electricity in China is unparalleled compared to the period before the reform and opening up.

After the above analysis, it can be seen that there are various problems in the construction of China's power system, such as the lack of professional management personnel and talents to develop the construction schedule of the project, as well as various fault problems arising from the gradual growth of the power system, and the problem of the imperfect schedule system. According to the importance of the problems generated by the project, it can be seen that for different problems people think that the importance of handling is different, and the specific results are shown in Figure 4 below.

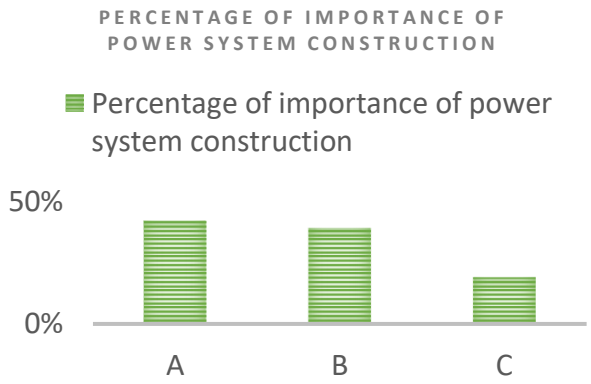

Figure 4 Analysis of the percentage of the three kinds of problems in the construction of the power system

As can be seen from Figure 5, the Figure shows three major problems in the construction of the power system, which are mainly described in three ways, namely A, B and C. A represents the lack of management personnel as discussed above, B represents the slow progress and many problems in the construction progress of medium voltage overhead distribution network as discussed above, and C represents the various failure problems in the construction of the power system due to the complexity of the actual environment, including instrumentation, weather, geographical location, etc. Observe A, B and C three kinds of problems in the power system construction in the proportion of important problems can be known, in the entire power system construction, the proportion of A problems is the largest, B is the second, C is the least. And carefully observe that the weight of A and B problems is about the same, so in the whole process of power system construction, it can be concluded that the training for management personnel and the grasp of the construction progress of medium voltage overhead distribution network is very important, and its importance is much higher than that of C problems, that is to say, much higher than the importance of the failure problems that appear in the process of power system construction due to the real environment.

From the above discussion, it is clear that the slow construction progress about our medium voltage overhead distribution network is also one of the more concerned issues when building the power system in China, under the condition of fully considering the influence of multiple factors. Therefore, based on this paper, some strategies are proposed for the above-mentioned problems.

In the construction of the entire power system of medium voltage overhead distribution network construction progress, need to use certain management means, combined with information management technology, in order to ensure that all the details of the project can be grasped by the construction staff, and to achieve the project implementation of all departments of information resources sharing, to ensure that all the project information can be understood and controlled by all departments. And on this basis, all the work is subdivided and monitored. In this paper, two approaches will be taken to predict the construction schedule of the MV overhead distribution network in the power system in order to promote the optimization of the entire MV overhead distribution network implementation schedule.

4.2. Experimental Analysis

After the above analysis and the explanation of the principles of CNN algorithm and BP algorithm, this paper will use BP algorithm and CNN algorithm to predict the construction schedule of MV overhead distribution network in power system construction, so that the implementation schedule of MV overhead distribution network can be optimized subsequently [17,18].

In order to better train the neural network model of MV overhead distribution network and to obtain the optimal

accuracy of the model, this paper collects and organizes the problems arising from the implementation of MV overhead distribution network in the power system, so as to form a CNN algorithm for the prediction model of MV overhead distribution network. This paper collects and organizes the problems arising from the implementation of MV overhead distribution network in the power system in order to form a dataset applicable to the CNN algorithm - prediction model of MV overhead distribution network construction progress and the BP algorithm - prediction model of MV overhead distribution network construction progress. In order to adapt the dataset to the two neural network models, data preprocessing operations such as data cleaning are required so that the data can be used as input vectors for the neural network models [19]. Therefore, after building the CNN - medium voltage overhead distribution network construction progress prediction model, the final correctness curve obtained after layers of training is shown in Figure 5 below.

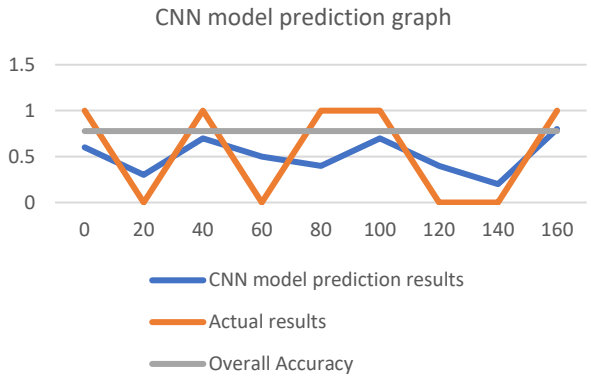

Figure5 CNN - Prediction model results of construction progress of medium voltage overhead distribution network

As can be seen from Figure5, the CNN prediction model for the construction schedule of MV overhead distribution network can be composed of three curves, which are the prediction result of the CNN model, the actual result of faults generated in the construction schedule of MV overhead configuration, and the total accuracy of the whole model after the comparison of the prediction result and the actual result. In the CNN model prediction, the number of iterative updates is 160, in which one prediction result is generated in each iteration update, and finally the results shown in Figure 6 are obtained. In the actual results, the accuracy of the prediction results is mainly indicated by setting "0" and "1" in the program in order to facilitate comparison with the prediction results. When the probability of failure in the construction progress of a certain area is greater than 50% of the set threshold, the actual failure is predicted to occur in the construction progress of a certain area, and for comparison, if the value is "0" in the actual result, it means that the actual failure does not occur in the area. If the value is "1", it means that the actual failure will occur in the area. If the value is between [0,1], then a rounding mechanism is used, and all values greater than or equal to 0.5 are written as "1", and all values less than 0.5 are set to "0". Therefore, after comparison, the accuracy of the whole CNN - medium voltage overhead distribution network construction schedule prediction model is about 77.77%. However, the construction schedule prediction model of MV overhead distribution network using CNN model is more complicated and takes longer time to run, so BP - MV overhead distribution network construction schedule prediction model is constructed, and the model training results are shown in Figure 6 below.

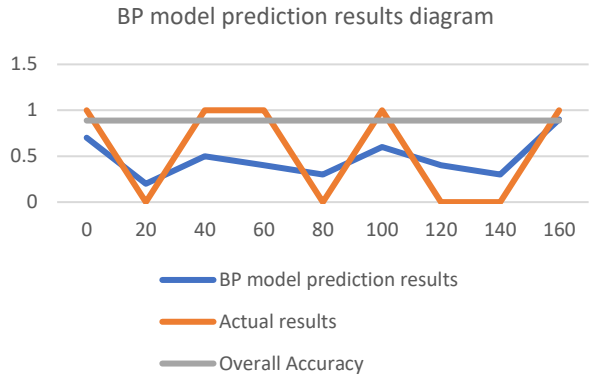

Figure6 BP - Prediction model results of medium voltage overhead distribution network construction progress schematic diagram

As can be seen from Figure 6, the representation is a schematic diagram about the results of the construction schedule prediction model for the medium voltage overhead distribution network. From the Figure, there are three curves, which are the prediction result, the actual result and the total accuracy of the BP model. The actual results are calculated in the same way as Figure 6, and the numbers "0" and "1" are used to indicate whether the results are consistent with the model predictions. Comparing Figure 5 and Figure 6, it can be seen that the accuracy of the BP - medium voltage overhead distribution network construction schedule prediction model in Figure 7 is better than that of the CNN - medium voltage overhead distribution network construction schedule prediction model in terms of the total accuracy.

Similarly, in order to more accurately reflect the performance of the MV overhead distribution network construction schedule prediction model, this paper invited 25 experts to conduct a survey after describing the relevant data sources, the principles of CNN and BP neural network models for MV overhead distribution network construction schedule fault prediction, and their predictions of the traditional MV overhead distribution network, CNN -prediction of MV overhead distribution

network and BP -prediction of MV overhead distribution network were surveyed as shown in Figure 7 below.

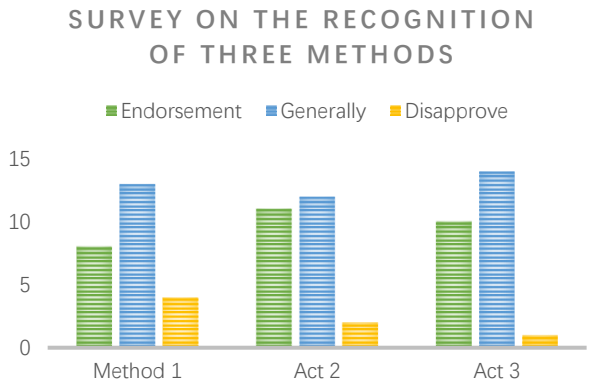

Figure7 Survey on the recognition of the three methods of the medium voltage overhead distribution network construction schedule optimization model

As can be seen from Figure 8, among the three methods, Method 1, Method 2 and Method 3, the recognition of Method 2 and Method 3 is mainly higher. Method 1 represents the recognition of the traditional MV overhead distribution network construction schedule scheme, Method 2 represents the recognition of the CNN - MV overhead distribution network construction schedule scheme by experts, and Method 3 represents the recognition of the BP - MV overhead distribution network construction schedule scheme [20]. It shows that in this paper, the research of construction schedule optimization of MV overhead distribution network by using neural network algorithm is approved by most experts, and it also shows that this paper has achieved the requirements for MV overhead distribution network in power supply system in the sense of research.

5. Conclusion

Since there is no unified interface standard for power supply system in China, and the demand for electricity in China's social and economic development is increasing, the application of overhead lines in medium voltage distribution network is extensive. Therefore, this paper predicts the implementation progress of the medium voltage overhead distribution network, and can achieve the effect of optimizing it. The final experimental results show that this paper achieves an accuracy of about 88% in the implementation of the BP model for predicting the construction progress of MV overhead distribution network, while the accuracy of the CNN model for predicting the construction progress of MV overhead distribution network achieves an accuracy of about 10% in the implementation of the CNN model for predicting the construction progress of MV overhead distribution network. The accuracy of the model is about 77%. In order to more fully reflect the application of neural network algorithm to the fault prediction of MV overhead distribution network construction, 25 experts were invited to investigate the recognition of the above two neural network models applied to MV overhead distribution network, and the survey results showed that the experts recognized the application of CNN or BP algorithm. The results of the survey show that the experts approve the application of CNN or BP algorithms. This also shows the infinite possibilities of neural network algorithms in power supply systems.

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