Research on Communication Transmission Management Strategy Based on Artificial Neural Network Algorithm

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Abstract. Communication engineering technology belongs to a main component of electronic engineering. Its main operation principle is to transmit information in the form of light wave or electronic wave to achieve the effect and purpose of timely transmission and high-speed transmission. The real development of communication enterprises cannot only depend on the development of communication technology transmission, but also need to manage all aspects of communication technology transmission. Communication engineering technology transmission, as a key project of communication engineering, plays a key role in improving the competitiveness and market share of communication enterprises. Optimize and integrate the existing resources, manage the cost of each work in the communication engineering technology transmission, and improve the efficiency of technology transmission to the greatest extent, so as to ensure the transmission speed and quality. This paper analyzes the management problems of communication engineering technology transmission through the artificial neural network algorithm, designs the artificial neural network for information transmission loss prediction, and puts forward the corresponding solutions in order to promote the development of communication enterprises.

1. Introduction
With the continuous improvement of users' requirements for communication service quality, the competition in the communication market is increasingly fierce, and improving the reliability of equipment has become an urgent demand of suppliers. Communication engineering technology transmission belongs to the current key work of communication enterprises, which can effectively help communication enterprises to improve their competitive strength in the industry and seize a larger share of the communication market [1]. Through comprehensive management, resources can be comprehensively integrated and optimized, which is of great value for controlling various work costs, improving the efficiency of technical transmission and ensuring the transmission quality. The real development of communication enterprises cannot only depend on the development of communication technology transmission, but also need to manage all aspects of communication technology transmission [2]. An effective way to improve the reliability of the equipment is to improve the failure detection rate of the equipment, and to take timely measures to isolate and compensate the failure when it occurs [3]. At this stage, optical fiber communication technology has become the most important form of wired transmission technology. Therefore, in-depth exploration of large-capacity, long-distance optical fiber communication technology has become the main research topic of technical researchers [4]. As a key project of communication engineering, communication engineering technology transmission plays a key role in improving the competitiveness and market share of communication enterprises.
Communication enterprises should take the management of communication engineering technology transmission as the current core work so that they can profitably and quickly enhance the competitive strength of enterprises to gain a larger share of the communication market [5]. The neural network fault detection system uses the powerful computing power of the neural network to correctly classify faults and identify the severity level of the fault. It has certain fault warning capabilities [6]. Deeply optimize and comprehensively integrate the existing resources, manage the costs incurred in each work of communication engineering technology transmission, and maximize the efficiency of technical transmission, both to ensure the speed of transmission and the quality of transmission [7]. Deeply optimize and comprehensively integrate the existing resources, manage the costs incurred in each work of communication engineering technology transmission, and maximize the efficiency of technical transmission, both to ensure the speed of transmission and the quality of transmission [8]. How to improve the smoothness of communication engineering technology transmission and forecast the loss of information transmission in communication engineering has become the primary problem to be solved in current communication engineering. This paper analyzes the existing problems in the management of communication engineering technology transmission through artificial neural network algorithm, and puts forward corresponding solutions in order to promote the development of communication enterprises.

2. Problems Existing in Management of Communication Engineering Technology Transmission at Present

2.1 Low level of management and technology
At present, education has not fully realized the social importance of communication engineering technology transmission, so many communication enterprises are seriously short of technical talents in transmission. Communication engineering technology transmission plays a key role in the development of communication engineering. However, enterprises do not attach importance to transmission management, lack of relevant safety awareness, and do not pay attention to the use of resources and high-tech etc., which hinder the development of communication industry. The talents who manage communication engineering technology transmission present practical problems of insufficient professional knowledge and lack of quantity, which affect the implementation of communication engineering technology transmission management, lose the specification of communication engineering technology transmission, and make the management of communication engineering technology transmission lose its effectiveness [9]. Communication engineering technology transmission needs a large number of LAN lines to support. It can be said that line quality intuition affects the strength of technology transmission and is very important to technology transmission. The human brain has the ability to learn new knowledge from the external environment and use neurons to store knowledge information. Similarly, neural networks can absorb external information through the learning process and store it in simulated neurons. The number of professional communication engineering technology transmission talents is insufficient, and the effective personnel allocation cannot be carried out according to the actual needs of communication engineering technology transmission, thus the technical work cannot be normally promoted.

2.2 Lack of safety awareness in management
At present, most communication engineering technology transmission in the market is outsourced to some specialized line companies, which generally cannot guarantee the quality of transmission lines. Many enterprises have lost market share due to lax quality control, resulting in negligence or loopholes in management. Communication technology transmission relies on the network, so it is necessary to build a communication environment in the network. However, with the continuous development of network informatization, the network environment and network structure have gradually become complicated. Learning methods of neural network can be divided into supervised learning and unsupervised learning. Quality management is the basis to ensure the transmission effect of
communication engineering technology and is highly related to the management level of communication enterprises. Supervised learning method will correct the weight stored in each learning according to the given output reference, while unsupervised learning method does not need to correct the weight. Because the learning process and the output judgment process of the network do not need manual intervention. During the construction of the network communication environment, relevant technicians are required to establish a strong security awareness to avoid the occurrence of security vulnerabilities. Communication network has the characteristics of complexity, and various security vulnerabilities are easy to appear in the design and construction of communication network.

3. Management Strategy of Communication Engineering Technology Transmission

3.1 Design of Artificial Neural Network for Predicting Information Transmission Loss

The main factors that affect the transmission loss in troposcatter communication are: frequency, antenna gain, antenna elevation, terrain, communication distance and meteorological and climatic factors. When the link is fixed, the frequency, antenna gain, antenna elevation, terrain and communication distance are also fixed. At this time, the main factors affecting the transmission loss of troposcatter communication are meteorological and climatic factors, namely temperature, humidity and atmospheric pressure.

Build a three-layer neural network topology, as shown in Figure 1. $x = [x_1, x_2, \ldots, x_n]$ is the input vector. If $x_0 = -1$ is added, threshold value can be introduced for input layer neurons. Output vector of hidden layer $y = [y_1, y_2, \ldots, y_m]$, generally $m = \sqrt{n+l+a}$, where $n$ is the number of input layer neurons, $l$ is the number of output layer neurons, a value range is 1-10, and $y_0 = -1$ is added, threshold value can be introduced for hidden layer neurons. $O$ is the output vector, $W = [w_1, w_2, \ldots, w_n]$ is the weight matrix between the output layer and the hidden layer, and the column vector $w_k$ is the weight vector corresponding to the j th neuron in the hidden layer. $V = [v_1, v_2, \ldots, v_m]$ is the weight matrix between hidden layer and output layer. The column vector $v_j$ is the weight vector corresponding to the k th neuron in the hidden layer.

![Artificial neural network topology](image)

Figure 1 Artificial neural network topology

The input-output relationship of neural network is obtained by continuously updating weight vectors $W$ and $V$ through network training.
For hidden layers:

\[ \text{net}_j = \sum_{i=0}^{n} w_{ij} x_i \quad j = 1,2,\ldots,m \]  
\[ y_j = f(\text{net}_j) \quad j = 1,2,\ldots,m \]  

For the output layer:

\[ \text{net}_k = \sum_{j=0}^{n} v_{kj} y_j \quad k = 1,2,\ldots,l \]  
\[ o_k = g(\text{net}_k) \quad k = 1,2,\ldots,l \]  

The main meteorological characteristics of troposphere are temperature T, humidity (water vapor pressure) E and atmospheric pressure P, so the input parameters can be set as follows:

\[ \text{input} = [T, E, P]^T \]  

In the formula, T, E and P are all P-dimensional row vectors when the neural network prediction model is established, and P is the number of test values used in the modeling. In actual application after the model is established, the size of P value can be adjusted according to the number of points to be predicted. It can be seen that the input matrix is a 3×P matrix, and the number of input elements in this model is n=3.

The output vector is L and is a P-dimensional row vector:

\[ L = [L_{w1}, L_{w2}, \ldots, L_{wp}] \]  

In artificial neural networks, hidden layer nodes are used to extract and store their internal rules from samples. Each hidden layer node has several weights, and each weight is a parameter of network mapping. When determining the number of hidden layer nodes, a simpler estimation method of hidden layer nodes can be selected:

\[ m = \sqrt{n+l} + a \]  

Where m is the number of hidden layer nodes, n=3 is the number of input elements, l=1 is the number of output elements, and a is selected between 1 and 10.

In general, Sigmoid function is needed for hidden layer transfer function to deal with nonlinear problems. The mathematical expression of unipolar Sigmoid function is:

\[ f(x) = \frac{1}{1+e^{-\gamma x}} \]  

In the formula, \( \gamma \) takes 1, and the transfer function of output layer generally adopts linear function:

\[ g(x) = x \]  

According to the structure of BP neural network, the output function of neural network without threshold can be expressed as:

\[ o = g \left( \sum_{i=1}^{n} v_i f \left( \sum_{j=1}^{m} w_{ij} x_j \right) \right) \]  

Through training, the weight matrix W from the input layer to the hidden layer and the weight matrix V from the hidden layer to the output layer can be obtained, and the output value of the network can be inverted to obtain the predicted value under the corresponding conditions.

3.2 Management Method of Communication Engineering Technology Transmission

Enterprises should attach importance to the research and analysis of actual work, obtain accurate data through various channels, establish data models, and introduce planning experience of advanced management departments to make comprehensive use of the actual development of the enterprise. As the basic equipment of communication engineering technology transmission, the quality of transmission line and transmission equipment is directly related to the stability of transmission. Communication
engineering technology transmission includes many aspects, such as troubleshooting, self-repairing of vulnerabilities, prediction and prevention of potentially dangerous information, multiple backup and preservation of important data, etc. High-quality transmission equipment is conducive to the transmission management of communication engineering technology, and the reduction of failure frequency can save maintenance costs. In order to realize these contents of communication engineering technology transmission in safety management, it is necessary to continuously research and develop new technologies to catch up with the continuous upgrading of transmission products so as to better meet the safety requirements of people when using communication technology and transmission technology [10].

In order to better ensure the stability of technology transmission, the first thing to do is to upgrade the transmission equipment. High-quality and stable transmission lines have strong self-repairing ability and intelligent troubleshooting function for some smaller line problems. In the process of communication network construction, communication enterprises should be good at using high and new technologies generated in the development of the times, such as wireless monitoring equipment with various functions and intensities. Broadband power line communication technology has been the main technology of communication engineering in the past ten years. At present, its dominant position is gradually declining, but it still has a lot of users and development space. At present, the fault detection of communication equipment only monitors the temperature and power module, and the monitoring of the business module is generally completed by the upper software. Effective update and management of transmission equipment can not only reduce the maintenance cost in the process of equipment operation, but also strengthen the speed of network operation, so as to enhance the competitiveness of communication enterprises in the industry. In order to fully realize the content of technical transmission and security management of communication engineering, we should continue to develop and research some new technologies to better serve the communication engineering, promote the optimization and upgrading of transmission products, and finally better meet the security requirements of people in the application of communication technology and transmission technology.

4. Summary

Communication transmission is the life of the whole communication to improve the management of communication engineering technology transmission. To control the communication engineering technology transmission with more effective strategies is the basic requirement of the communication industry. In order to improve the quality and stability of transmission, it is necessary to take a series of measures, such as using high-tech or high-quality equipment, making full use of various effective resources, improving the professional quality of relevant talents, and strengthening the network security management. With the rapid development of communication engineering, more and more enterprises begin to invest in the construction of communication engineering, so the competition pressure of the whole communication engineering is also increasing. In order to fully realize the content of technical transmission and safety management of communication engineering, we should also continuously develop and study some brand-new technologies to better serve communication engineering and promote the optimization and upgrading of transmission products. Many enterprises have lost market share due to lax quality control, resulting in negligence or loopholes in management. In order to better manage the communication engineering technology transmission, reduce the information transmission loss in the communication process and improve the management effectiveness, various information transmission resources and various advanced transmission technology conditions should be fully utilized in the communication engineering technology transmission management to promote the transmission rate and effect of the communication technology.

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