Hindawi
Wireless Communications and Mobile Computing
Volume 2023, Article ID 9810278, 1 page
https://doi.org/10.1155/2023/9810278

Retraction

Retracted: Application of Improved BP Neural Network in the Optimization of Regional Economic Energy Consumption Structure

Wireless Communications and Mobile Computing

Received 13 September 2023; Accepted 13 September 2023; Published 14 September 2023

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] Y. Wu, "Application of Improved BP Neural Network in the Optimization of Regional Economic Energy Consumption Structure," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 1191271, 9 pages, 2022.

Hindawi
Wireless Communications and Mobile Computing
Volume 2022, Article ID 1191271, 9 pages
https://doi.org/10.1155/2022/1191271

Research Article

Application of Improved BP Neural Network in the Optimization of Regional Economic Energy Consumption Structure

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Received 27 April 2022; Revised 17 May 2022; Accepted 19 May 2022; Published 4 July 2022

Academic Editor: Kalidoss Rajakani

At present, local regions have the problems of low optimization dimension and unbalanced supply side in the energy consumption structure in the process of economic development. Based on this, this paper studies the optimization method of the regional economic energy consumption structure based on big data and BP neural network analysis strategy and designs an intelligent extraction model of the regional economic energy consumption structure based on the BP neural network. According to the correlation and internal matching of energy consumption data involved in the process of economic development in different regions, the quantitative high-value analysis of regional economic energy consumption structure is realized, and the accuracy of the analysis results is analyzed by Newton Leibniz theory. The results show that the optimization model of regional economic energy consumption structure based on the BP neural network can effectively improve the application scope and data utilization of energy consumption structure, effectively complete the intelligent classification of energy consumption of different enterprises, and indirectly improve the energy utilization and matching efficiency of the regional economy.

1. Introduction

At present, in the process of economic development in different regions, dependence on energy is becoming stronger and stronger. There are different types of energy consumption and waste, ignoring the matching and intensity analysis of intelligent energy consumption [1]. In recent years, different types of economic green development theories have been preliminarily verified. The research results show that adopting an appropriate energy consumption structure optimization strategy can effectively improve the utilization rate of different types of energy [2]. Therefore, how to combine big data and artificial intelligence technology to realize the innovative optimization design of the optimization method of energy consumption structure of regional economy has become the focus of the development of energy economy [3]. At present, the existing optimization methods of the regional economic energy consumption structure mainly focus on multidimensional data analysis strategy. Although this method can effectively improve the utilization of different types of data, there are still many deficiencies. For example, it is unable to realize the best matching analysis of energy consumption related to different types of enterprises according to the requirements of regional economic energy consumption [4]. Based on this, this paper proposes an optimization analysis model of regional economic energy consumption structure based on the improved BP neural network algorithm.

In view of the problems of narrow application scope and poor economy in the energy consumption structure optimization model existing in the current regional enterprises in the process of economic development, this paper studies the pyramid hierarchical model of regional economic energy consumption structure optimization based on the improved BP neural network algorithm, which is mainly divided into four parts. Chapter 1 introduces the research background of the energy consumption structure optimization method and the framework of this research; Chapter 2 summarizes and analyzes the research status of neural network application, regional economic energy consumption structure

optimization, and application methods at home and abroad. In Chapter 3, the pyramid hierarchical model of regional economic energy consumption structure optimization based on the improved BP neural network algorithm is constructed. Combined with the multi-interconnect Einstein constant analysis strategy, the energy consumption data analysis system and evaluation index system based on artificial intelligence analysis are constructed. Chapter 4 analyzes and verifies the practicability and authenticity of the pyramid hierarchical analysis model for the optimization of regional economic energy consumption structure and draws a conclusion.

Compared with the traditional structural optimization model based on energy consumption prediction data strategy analysis, the innovation of this paper is that the artificial intelligence pyramid hierarchical analysis strategy based on the improved BP neural network algorithm is applied to the analysis and optimization of the energy consumption structure of regional economy. On this basis, it can realize rapid and accurate analysis of massive dynamic energy data, accurately extract high-quality and effective data information, realize the efficient combination of hierarchical data of energy consumption optimization pyramid, and quantitatively analyze and accurately fit different types of regional economic energy consumption structure optimization models with Newton Leibniz factor of high-dimensional equations, so as to realize high-precision matching and fitting of different types of data.

2. Related Work

At this stage, the research on the optimization of energy consumption structure in the process of regional economic development is mainly based on the research of the multidimensional classification method and the innovation of the regional economic liberalization development analysis model, while the research on the combination innovation with intelligent data analysis method and big data analysis technology is less [5]. Wang and other scholars have proved through experiments that the energy consumption demand data of different enterprises in different regions have different data peaks, and their structural optimization efficiency can be improved from the perspective of intelligent data analysis of energy consumption data [6]. In order to adapt to the value matching analysis strategy in the process of economic development, Wang and other scholars analyze and numerically process the energy consumption structure of different regional economies to realize the dynamic treatment of the economic stability of different types of regions, which can effectively improve the accuracy of enterprises in different regions in selecting energy types, However, the application range has higher requirements [7]. The research results of Sheng and other scholars show that the energy consumption optimization model based on the two-in-one coupling model of data acquisition and data analysis has a higher impact on the effectiveness of enterprise economic development and can improve the accuracy of at least 20% compared with the traditional energy data management method [8]. Yan and other scholars uniformly manage the necessity of energy consumption from the aspects of intelligent management of energy consumption storage data and realize the matching of energy consumption data through adaptive and integrated tracking and analysis of the changes in energy consumption data of regional enterprises [9]. According to the analysis strategy of energy matching degree of regional economy, scholars such as Hnin et al. proposed an intensity-free matching analysis model that can be based on the unbalanced intelligent classification model of different regional economic development levels. The model can effectively classify the energy data ideas of different regional economic types and realize the efficient utilization and multidimensional matching of different energy sources [10]. Through the normalization of different types of regional economies in the process of energy consumption, Qiao and Wang try to realize the standardized analysis and quantitative representation of different energy consumption data from the perspective of intelligent distribution of the model [11]. Scholars from CY A and other universities found that the internal correlation data of different enterprises have obvious specific characteristics in the process of economic development. Therefore, according to the collaborative innovation theory, an optimization analysis model of energy consumption structure based on edge effect stabilization strategy is proposed, which can improve the waste of energy consumption, but more parameters need to be set [9]. Liu and other scholars proposed an energy consumption regional economic database allocation strategy based on multidimensional correlation data neural network analysis. By using the different energy consumption degrees of enterprises in different regions, through the redistribution of different types of energy structure optimization data, the efficiency of the neural network method in energy consumption matching is improved [12]. Wang and other scholars tracked and matched the energy consumption data and economic income of enterprises in different industries in multiple regions. Through the specific tracking of energy consumption data, the differentiated effective data can well save energy consumption in different stages. Therefore, they cited the optimization strategy based on the data analysis module of regional energy structure type. This strategy can realize the accurate matching of energy identification in different types of databases [13]. Through experiments, Zhang and other scholars found that different types of regional enterprises have different matching requirements for energy consumption demand and value degree in the development process due to different industries. A complementary model for energy consumption structure optimization based on adaptive matching analysis of supply-side demand of regional economy is proposed. The model can effectively improve the stability of different enterprises in terms of energy consumption structure [14]. Dai and other scholars put forward a classification strategy of enterprise energy consumption structure based on different data analyses according to the different energy consumption data required by regional economy at different times, so as to realize the accurate prediction of different energy consumptions in different periods [15].

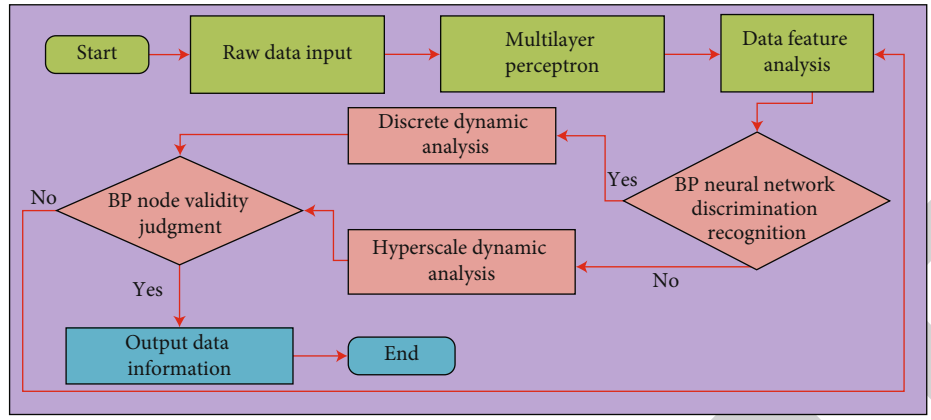

Figure 1: Regional analysis process of energy consumption data by BP neural network.

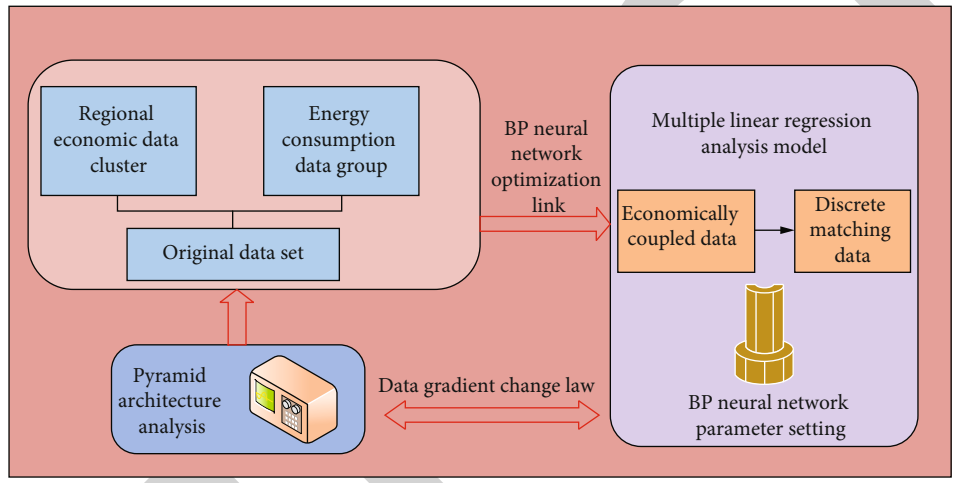

Figure 2: Data analysis process of improved BP neural network pyramid scattering structure based on data gradient change law.

To sum up, it can be seen that there are some problems in the research on the optimization of regional economic energy consumption structure, such as data lag, low reliability, and low value [16–18]. On the other hand, although diversified and innovative attempts have been made to optimize the energy consumption structure of regional economy, there are few research results that can be applied in practice, and there is no innovative application similar to the reliability model using the BP neural network algorithm and Newton Leibniz formula [19, 20].

3. Methodology

As the most popular data processing method in recent years, the neural network has been widely used and verified in solving specific problems in many fields [21]. The BP neural network algorithm is an innovative data analysis strategy based on the neural network algorithm, which uses progressive factors to analyze its high value. Its internal goal is to find its internal relationship to complex problems and realize its internal innovation and rapid solution by establishing function clusters [22]. The typical BP neural network structure is a highly regular association ladder function grid with different feature analysis modules and hierarchical transfer strategies. Its internal diversity is mainly reflected in the grid of multiple nodes and fast iterative links [23]. At present, in the process of studying the regional economy, we need to use the energy data of regional enterprises, such as energy consumption, energy demand analysis, and intelligent management of energy data. In order to further realize the intelligent classification of energy structure, we need to adopt multiple types of data analysis strategies; the BP neural network algorithm is a commonly used method in dealing with the coupling input analysis of regional economic energy consumption data [24]. The regional analysis process of energy consumption data in this stage is shown in Figure 1.

3.1. Establishment Process of Improved BP Neural Network Model Based on Data Gradient Change Correlation. In order to realize the gradient analysis of different regional economic energy consumption data sets, it is necessary to establish the high-value stability test model. The gradient descent method only uses one-step information of the objective function. It has strict mathematical theory support and simple calculation and implementation. It is the most commonly used

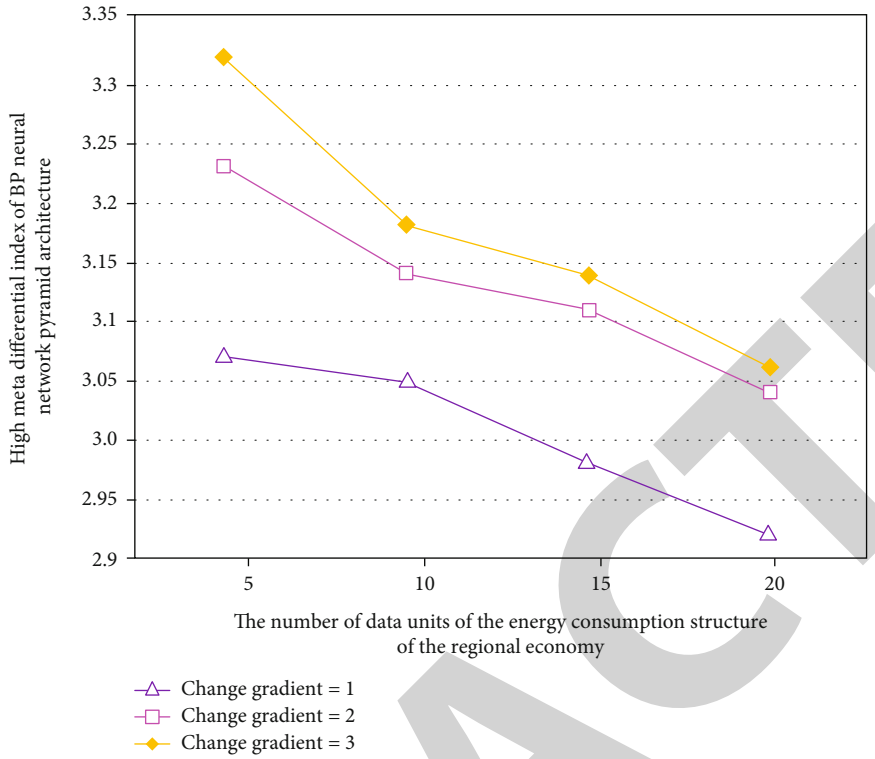

Figure 3: High element differential simulation results of energy consumption structural data unit optimization of regional economy.

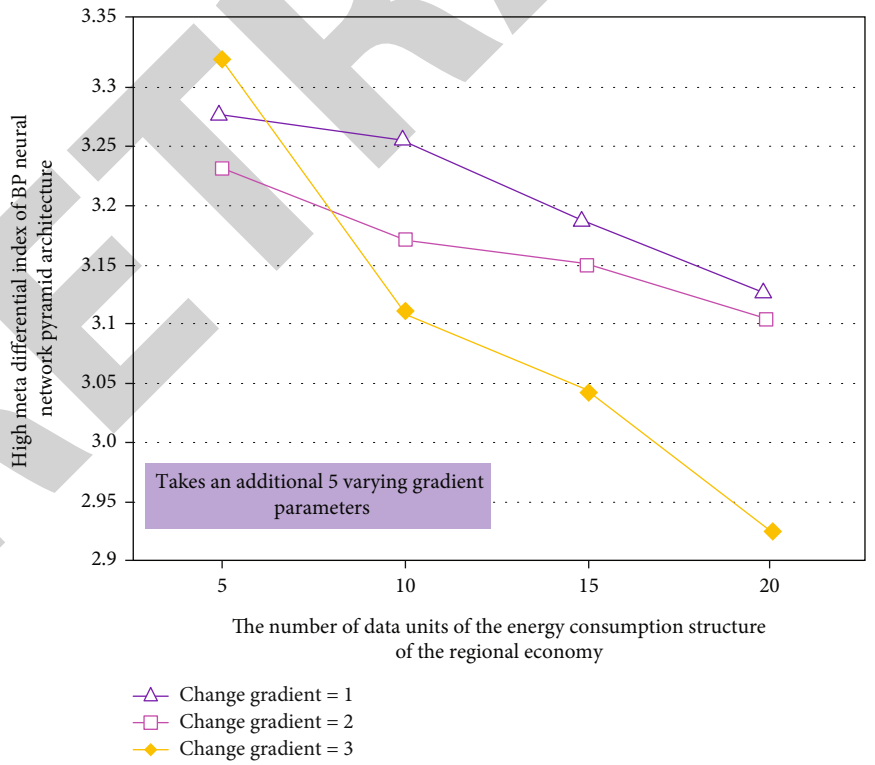

Figure 4: The BP neural network gradient value analysis results of the primary for the regional economic energy consumption data elements (using 5 additional changing gradient parameters).

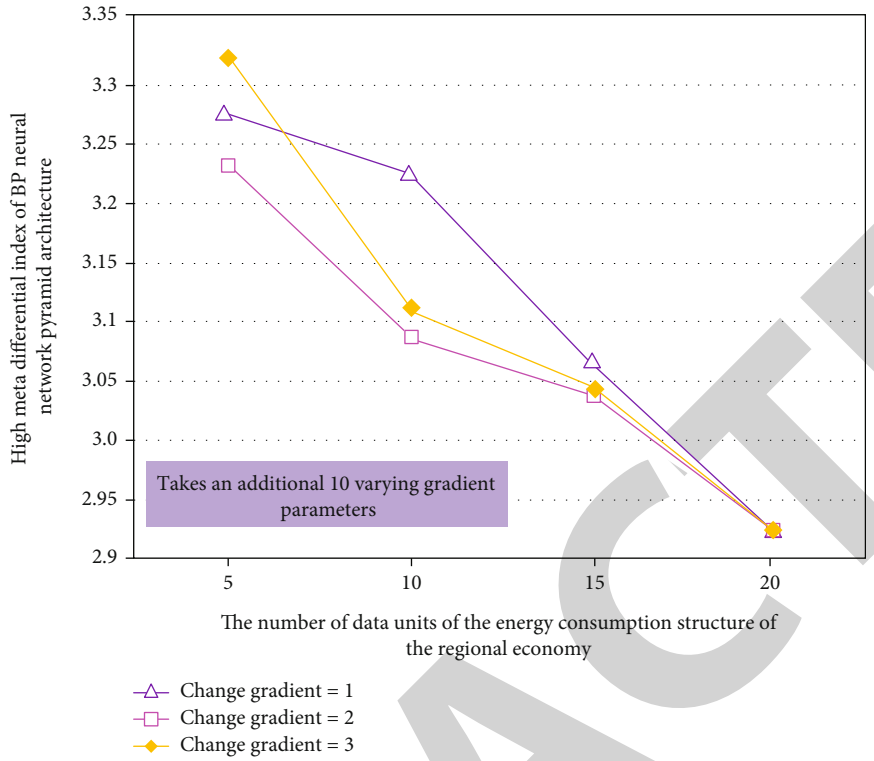

Figure 5: The BP neural network gradient value analysis results of the primary for the regional economic energy consumption data elements (using 10 additional changing gradient parameters).

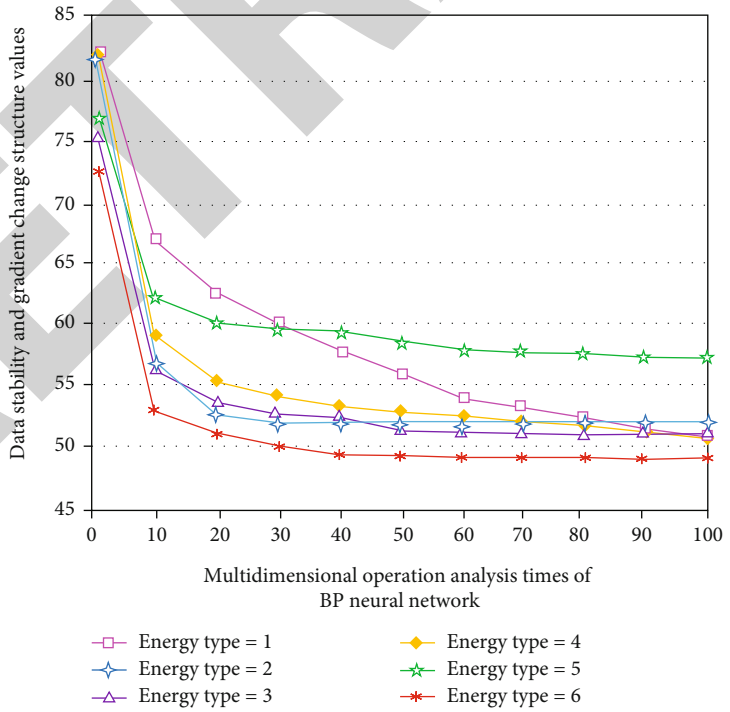

Figure 6: Experimental results of an intelligent regional economic energy consumption structure optimization model.

and effective optimization method in neural network training at present. Therefore, in the process of analyzing the optimization model of the regional economic energy consumption structure, it is necessary to adopt the high-value gradient change analysis method based on neural network strategy and combined with the data calculation characteristics of neurons, realizing the data coupling processing and analysis of regional economy. The data analysis process of the improved BP neural network pyramid decentralized structure based on the variation law of data gradient is shown in Figure 2.

In the process of fitting the value degree and gradient change law of energy consumption data in regional economy, it is necessary to quantitatively analyze the correlation degree ladder value of different data groups. If each data group has multiple branches of energy consumption data structure with different dimensions, after BP disturbance and neural network stable fitting, the data set with data gradient value change analysis can be obtained as follows:

$$\begin{aligned} Q_1 &= \frac{(x_1(1), 2x_1(2), \cdots, nx_1(n))}{x_1(1) - x_1(2) - \cdots - x_1(n)} + \frac{(x_1(1), x_1(2), \cdots, nx_1(n))}{x_1(1) + x_1(2) + \cdots + x_1(n)}, \\ Q_2 &= \frac{\sqrt{Q_1 + x_1(1), x_1(2), \cdots, nx_1(n)/x_1(1) + x_1(2) + \cdots + x_1(n)}}{x_1(1) + x_1(2) + \cdots + nx_1(n)}, \\ Q_3 &= \frac{Q_2 + \sqrt{1 + \sqrt{(x_3(1), x_3(2), \cdots, x_3(n))/x_3(1) + x_3(2) + \cdots + x_3(n)/x_3(n)}}}{x_3(n) + x_3(n+1)}, \\ Q_M &= Q_n + \cdots + \frac{Q_{n-2} + \sqrt{1 + \sqrt{x_3(1), x_3(2), \cdots, x_{3m}(n)/x_3(1) + x_3(2) + \cdots + x_{3m}(n)/x_{3m}(n)}}}{x_m(n) + x_m(n+1)}. \end{aligned} \tag{1}$$

$x(n)$ is the data unit of regional economic energy consumption. Q is the data set with data gradient value change analysis. After the stability matching of regional economic energy consumption structure, combined with different degrees of energy consumption speed, we can know the gradient change coefficient Γ between data groups, and its calculation formula is

$$\Gamma = \frac{\sqrt{m + \sqrt{Q_m - Q_{m+1}/Q_m + Q_{m-1}}/mQ_m + (m-1)Q_{m-1}} + \sqrt{m - \sqrt{Q_m - Q_{m+1}/Q_m - Q_{m-1}}/Q_m - Q_{m-1}}}{2mQ_m + (2m-1)Q_{m-1}}. \tag{2}$$

Next, the differential coupling function based on regular gradient change needs to be constructed for the regional economic energy consumption database $E(x)$, and its expression is

$$E(x) = \frac{m-1}{m^2+1} + \frac{\sqrt{m\Gamma x^2 + (m\Gamma+1)x^4 + 1/m\Gamma x^2 + (m\Gamma-1)x^3 + (m\Gamma-2)x^4 + 2\Gamma_{ii}}}{(\Gamma - 2m)x^4 + 2}. \tag{3}$$

$\Gamma_{ii} = 1,\ i = 1, 2, \cdots, m$. At this time, the high-dimensional differential simulation results of the optimization of the energy consumption structure data unit of the regional economy are shown in Figure 3. At this time, the change gradient parameters are 1, 2, and 3.

After the primary BP neural network gradient value analysis of regional economic energy consumption data elements (using five additional variable gradient parameters), the simulation results are shown in Figure 4.

After the primary BP neural network gradient value analysis of regional economic energy consumption data elements (using 10 additional variable gradient parameters), the simulation results are shown in Figure 5.

It can be seen from the three groups of data results in Figures 3–5 that when normalizing and simulating the change uniformity of different regional economic energy consumption structure optimization data groups according to their gradient rules, with the accumulation of the

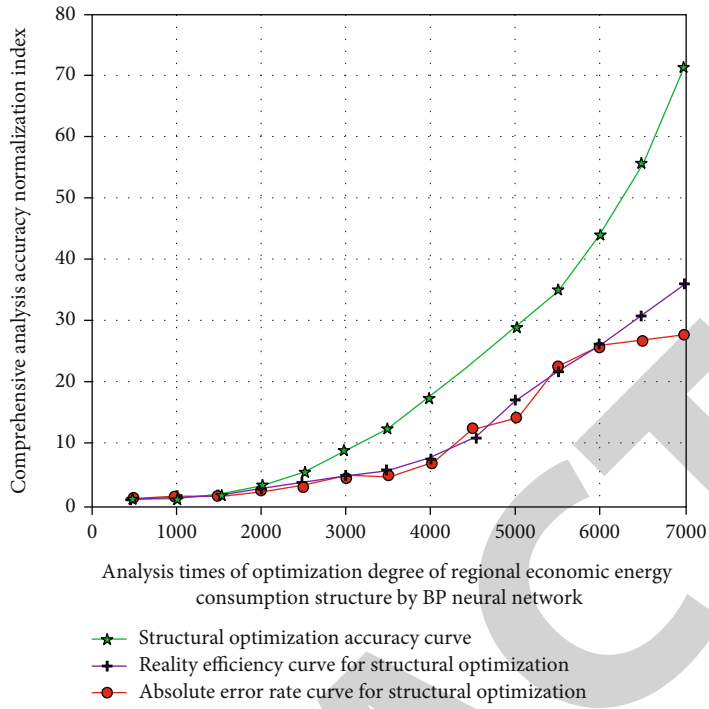

Figure 7: Analysis of the accuracy of the data in the experimental results.

stratification times of gradient fuzzy pyramid, the value matching rate and comprehensive impact rate of the corresponding regional economic energy consumption structure have a downward trend. This is because in the process of gradient discreteness analysis of the economic energy consumption structure by using the improved BP neural network algorithm, combined with the high-intensity energy consumption data model, the randomness of data processing will also be strong, and the gradient rules of different characteristics are also quite different. The corresponding BP multidimensional gradient rule function in this process is $P(x)$:

$$P(x) = \sum_{j=1}^{2k} \frac{x_j^k(j) + x_j^k(k) + x_j^k(jk)}{\Gamma x_j^k(k) + j x_j^k(k+j) + k x_j^k(jk-1)}, \tag{4}$$

where $x_j^k(*)$ is the normalization function of the high-value degree of energy consumption stratum of regional economy. Then, BP three-dimensional continuous normalized value function is used for nondissimilation treatment, and its expression is

$$T(x) = \frac{\sum_{j=1}^{k} x + Q(x)/x_j^k(jk) + x_j^k(jk-1)}{\sum_{j=1}^{k} x - Q(x)/x_j^k(k) + x_j^k(j)}. \tag{5}$$

Next, we need to carry out value around combination analysis on the data group. The corresponding limit function is $S(x)$, and the local limit function is $F(x)$:

$$\begin{aligned} S(x) &= \sum_{j=1}^{k} \frac{Q(x) + x_j^k(k) - x/x_j^k(j) - x_j^k(k)}{Q(x) + P(k-1)}, \\ F(x) &= \sum_{j=1}^{k} \left(\frac{Q(3x) - 2x}{Q(x) - Q(2x)} \right)^2. \end{aligned} \tag{6}$$

3.2. Data Processing Process of Pyramid Hierarchical Optimization Model of Regional Economic Energy Consumption Structure Based on Improved BP Neural Network. After completing the one-dimensional analysis of the energy consumption structure of regional economy, it is also necessary to carry out the value evaluation strategy. Therefore, it is necessary to introduce the source node learning value coefficient Ω:

$$\Omega = \frac{\sqrt{\sum_{j=1}^{k} Q(x-1) + \sum_{j=1}^{k} Q(x+1)}}{Q(x) + \Gamma_j^k} + \Gamma_j^k. \tag{7}$$

Normalize it; that is, limit its value to within 1, then

$$\Omega' = \left| \frac{\sqrt{\sum_{j=1}^{k} Q(x-1) + \sum_{j=1}^{k} Q(x+1)}/Q(x) + \Gamma_j^k + \Gamma_j^k}{Q^k(x-1) + Q^k(x+1) + Q^k(x) + \Gamma_j^k} \right|. \tag{8}$$

Combined with the gradient change law of the learning value coefficient of the source node, the post follow factor is adopted to make it become a discrete variable away class

function, and its expression is

$$\Psi(x) = \frac{\Omega - 1}{\Gamma_j^k + \Omega Q(x)} \sqrt{\frac{\Gamma_j^k + Q(x)}{\Omega \Gamma_j^k + Q(x)}}. \tag{9}$$

After high-order derivation and separation of variations, we can get

$$\Psi'(x) = \frac{\sqrt{\Omega - 1/\Gamma_j^k + \Omega Q(x)} + \sqrt{\Gamma_j^k + Q(x)/\Omega \Gamma_j^k + Q(x)}}{\Omega \Gamma_j^k + Q(x+1)}. \tag{10}$$

Then, carry out parameter calibration and pyramid classification and get

$$\Psi''(x) = \frac{\sqrt{\Gamma_j^k + Q(x)/\Omega \Gamma_j^k + Q(x)}}{\Omega \Gamma_j^k + Q(x+1)} + \frac{\sqrt{\Gamma_j^k Q(x-1) + Q(x+1)/\Omega \Gamma_j^k + Q(x-1)}}{Q(x) + Q(x+1)}. \tag{11}$$

x is the original group of energy consumption structure of regional economy.

4. Result Analysis and Discussion

4.1. Experimental Process of Intelligent Regional Economic Energy Consumption Structure Optimization Model. In order to verify the feasibility and real efficiency of the regional economic energy consumption structure model with normalization characteristics proposed in this study, this study is combined with the economic energy consumption data groups in different regions in recent years. On the other hand, in order to ensure the universality and rapid iteration of the structural optimization model, the consumption data and structural characteristics corresponding to different types of energy are randomly selected for experiment, analysis, and verification. The preliminary experimental results are shown in Figure 6.

It can be seen from Figure 6 that during the experiment, different types of economic energy consumptions corresponding to different regions have great differences in the corresponding data stability and gradient change after the multidimensional operation analysis of the BP neural network, and the optimization of structural nodes is presented in the gradient change law of energy consumption structure to varying degrees. This is because under the BP neural network algorithm, when the processed regional economic energy consumption data groups are different, their internal absoluteness and stability will be rebounded and separated to varying degrees. Therefore, it can be presented regularly in the form of data, and its internal diversified value also has a similar change law.

4.2. Data Analysis of Accuracy of Regional Economic Energy Consumption Structure Optimization Based on BP Neural Network. The comprehensive analysis results of the experimental results of the previous part in terms of accuracy, authenticity, efficiency, influence rate, and error rate are shown in Figure 7.

From the experimental results in Figure 6 and the normalized comprehensive analysis results in Figure 7, it can be seen that in the process of optimizing the regional economic energy consumption structure in the experimental process, the change law is obvious and presents the characteristics of energy consumption with different value degrees, and in the process of compensation by BP neural network, the optimization point and matching degree of its energy consumption structure also have different change laws, because this method can arrange and match the value degree of regional economic energy consumption optimization data of different industries according to the specific pyramid structure and can realize its urgency, stability, and high-value matching classification in combination with the optimization characteristics of energy consumption structure. Then, it effectively reduces its internal data error and improves the efficiency and impact on the optimization of regional economic energy consumption structure.

5. Conclusion

(1) In the process of economic development, there are problems of low optimization dimension of energy consumption structure and imbalance on the supply side. This paper studies the optimization method of regional economic energy consumption structure based on big data and BP neural network analysis strategy and designs an intelligent extraction model of regional economic energy consumption structure based on BP neural network

(2) Combining the big data analysis strategy with the artificial intelligence analysis strategy, the BP neural network algorithm is used to intelligently analyze the energy consumption structure of big data information. According to the correlation and internal matching of energy consumption data involved in the process of economic development in different regions, the quantitative high-value analysis of regional economic energy consumption structure is realized, and the accuracy of the analysis results is verified by the Newton Leibniz method

(3) The optimization model of regional economic energy consumption structure based on the BP neural network can effectively improve the application scope and data utilization of energy consumption structure, effectively complete the intelligent classification of energy consumption of different enterprises, and indirectly improve the energy utilization and regional economic matching efficiency

(4) The optimization model of the regional economic energy consumption structure proposed in this

paper can only carry out loopback analysis and error analysis of energy consumption data information in different regions, without considering other potential influencing factors in the process of energy consumption. Therefore, the comprehensive analysis of the index evaluation system and the influence degree of other factors need to be further studied

Data Availability

The figures used to support the findings of this study are included in the article.

Conflicts of Interest

The author declares that they have no conflicts of interest.

Acknowledgments

The author would like to show sincere thanks to those techniques who have contributed to this research.

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