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Research Article

The Path of Agricultural Policy Finance in Smart Service for Rural Revitalization under Big Data Technology

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In order to explore the path of agricultural policy finance in the intelligent service of rural revitalization under the background of big data, this paper combines data mining technology for financial data processing and big data technology for rural revitalization data analysis. Moreover, this paper combines rural revitalization with agricultural policy-based financial smart services. In addition, with the support of data mining technology, this paper constructs a research system on the path of agricultural policy finance in smart services for rural revitalization based on big data technology. Finally, this paper analyzes the data from the National Statistical Yearbook. Through experimental research, it can be known that the system constructed in this paper has certain effects. Moreover, with the support of the data mining system, this paper conducts research on the path of agricultural policy finance in smart services for rural revitalization and puts forward some suggestions.

1. Introduction

China's agricultural policy financial institutions implement low interest rates on agricultural industries in order to better stimulate agricultural production. According to the "financial constraints" theory [1], our country should implement artificially priced low interest rates lower than the equilibrium interest rate in the rural financial market under the premise of stable food prices to overcome the incomplete information of the rural financial market and solve the problem of the incentive mechanism of agricultural policy financial institutions in the process of investing and financing agricultural production activities. The essence of the theory of financial constraints is that the government intervenes in financial market interest rates and creates rental income to encourage banks and enterprises [2]. The theory of financial restraint is different from the theory of financial restraint. (1) It advocates that the government control interest rates, implement low-interest deposits to reduce financing costs, issue mid- and long-term loans, and control loan interest rates to achieve economic stability. (2) Under the premise of an imperfectly competitive market, market mechanisms will aggravate information asymmetry. Therefore, the government should restrict bank competition, control franchise rights, formulate market access mechanisms, and restrict disorderly market competition to ensure rental income. (3) The government needs to pull deposits and restrict the transfer of deposits to nonfinancial institutions in order to improve the efficiency of resource allocation of financial institutions. For China, the government set up a special agricultural policy financial institution (Agricultural Development Bank) to ensure that agricultural policy financial institutions can obtain sufficient rental income to maintain their operations through concessions. At the same time, the financing channels of agricultural policy financial institutions include government appropriations, capital funds, bond markets and deposits, etc., and there are stable sources of funds to extend loans to obtain profits and achieve stable and sustainable operations [3].

The strategy of rural revitalization refers to the starting point for socialism with Chinese characteristics to enter a new era. Under the guidance of a series of theoretical systems of the Sinicization of Marxism, it is necessary to follow the basic laws of the market around the "three rural" issues in the new era, activate the main body, elements, and the market, and break the urban-rural dual structure by cultivating the endogenous force of rural development. At the same time, it is necessary to promote the overall prosperity and recovery of rural areas, accelerate the modernization of agriculture and rural areas, build and improve the integration of urban and rural economic and social development as the core, and accelerate major strategic measures to promote my country's agricultural power to become an agricultural power country.

In this paper, the path of agricultural policy finance in smart services for rural revitalization research is carried out in combination with big data technology. On this basis, this paper combines experimental research to verify the effect of the method.

2. Related Work

Due to different development stages and foundations, the research on modern agriculture and agricultural modernization started from developed countries and derived from modernization theories. Moreover, these studies are a combination of agricultural development and progress, and they define, summarize, and promote modern agriculture from the perspective of the development conditions, development momentum, and development effectiveness of agricultural production. In [4], the authors put forward the concepts of "traditional society" and "modern society" and at the same time put forward the "analysis" and "motivation" of modernization that constitute the source of Western modernization theory. Under the tide of the industrial revolution, in [5], the authors compared the differences between "traditional (agricultural)" and "modern" societies from different disciplines. However, these theories are full of the ideology of "Western supremacy," which believes that modernization is Westernization and Americanization. In [6], the authors questioned and impacted the westernized modernization theory. Some scholars began to develop modernization theories from different standpoints and perspectives. The authors from [7] believed that agriculture is by no means useless; on the contrary, it can become the driving force of economic growth, and agricultural modernization can be like a booster for launching satellites to promote economic take-off. In [8], the authors emphasized the need to transform from "consumption type" to "ecological type," from "open" to "closed" economic growth mode, and pursued the improvement of human welfare instead of output. This is considered to be the source of ideas for agricultural circular economy. The authors from [9] believed that modernization mainly includes industrialization, urbanization, social mobility, democratization, and intellectualization. Because modernization theory brings about a major change in the concept of modernization, the authors from [10] believed that any society has the possibility of developing modernity from tradition and adapting to the development of new functions from the original system of the country is more effective than copying the Western system. The authors from [11] believed that no matter what kind of country there is a path for modernization development, and meticulous research from different levels and different channels can establish a suitable modernization theory. In [12], the authors put forward the theory of induced technological innovation and showed that the relative scarcity of resource endowments induces farmers to choose different technologies. Since the new century, relevant research on modern agriculture has analyzed and explained modern agriculture from the perspective of the application of new technologies and new systems. Moreover, it has gradually transformed from emphasizing the increase of input elements to emphasizing the role of technological innovation and institutional innovation in agricultural development, improving production relations, and applying modern machinery and information technology to equip agriculture. With the acceleration of the world modernization process, the current foreign scholars' research on agriculture is increasingly in the field of ecology, green and sustainable development of agriculture [13]. The research on modern agriculture carried out by foreign scholars from different perspectives and different priorities provides a useful reference for my country to conduct modern agricultural theoretical research and promote agricultural progress.

The authors from [14] believed that modern agriculture is a highly technologically intensive industry based on biotechnology and information technology, and a new type of industry in the direction of diversification. In [15], the authors pointed out that the foundation of modern agriculture is modern industry and science and technology, and the core is scientificization. Moreover, it is a comprehensive agricultural system based on market demand and operating rules, using modern agricultural science and technology, modern industrial equipment, and modern management concepts. In [16], the authors suggested that efforts should be made in four aspects: technological innovation capability, technological promotion capability, infrastructure construction, and agricultural product subsidy system to accelerate the promotion of modern agriculture. The authors from [17] believed that the core issue of agricultural modernization is to break the constraints of agricultural production factors and market demand through technological innovation and institutional innovation. The authors from [18] believed that the essence of modern agriculture is a process of upgrading, and the only goal is to develop agricultural productivity. The authors from [19] believed that modern Internet technology is deconstructing the modern agricultural industry chain and business model and will become a key means for the transformation of modern agricultural development methods and the improvement of agricultural production efficiency. Through the panel data analysis of the level of agricultural mechanization and the scale of wheat planting, in [20], the authors proposed that prioritizing investment in mechanization and cultivating the outsourcing service market can effectively induce wheat growers to be involved in the division of labor and introduce smallholder production into the development track of modern agriculture.

3. High-Order Autoencoder Based on Subspace Mapping

This paper uses big data technology to analyze rural revitalization data and combines rural revitalization with agricultural policy-based financial smart services. The high-order automatic coding model based on subspace mapping maps the input data to an independent subspace by replacing the hidden layer of the basic depth calculation model with a subspace mapping layer, as shown in Figure 1.

In the subspace high-order autoencoder, the input data are mapped to two independent subspaces: $h_1 \in R^{P_1 \times P_2 \times \cdots \times P_S}$ and $h_2 \in R^{Q_1 \times Q_2 \times \cdots \times Q_T}$, as shown in the following formula:

$$H = \begin{pmatrix} h_1 \\ h_2 \end{pmatrix} = f\left(\begin{bmatrix} W_1^{(1)} \\ W_2^{(1)} \end{bmatrix} X + \begin{bmatrix} b_1^{(1)} \\ b_2^{(1)} \end{bmatrix}\right). \quad (1)$$

Among them, $W_1^{(1)} \in R^{I_1 \times I_2 \times \cdots \times I_N \times P_1 \times P_2 \times \cdots \times P_S}$ and $W_2^{(1)} \in R^{I_1 \times I_2 \times \cdots \times I_N \times Q_1 \times Q_2 \times \cdots \times Q_T}$ represent the weight tensors, and $b_1^{(1)} \in R^{P_1 \times P_2 \times \cdots \times P_S}$ and $b_2^{(1)} \in R^{Q_1 \times Q_2 \times \cdots \times Q_S}$ represent the bias tensors.

The subspace mapping hidden layer H is mapped to the output layer Y through the $(S+T+N)$-order tensor $W_2^{(1)} \in R^{I_1 \times I_2 \times \cdots \times I_N \times Q_1 \times Q_2 \times \cdots \times Q_T \times I_1 \times I_2 \times \cdots \times I_N}$, as shown in the following formula [21]:

$$y_{i_1 i_2 \cdots i_N} = f\left(\sum_{p_1=1 \cdots p_S=1}^{P_1 \cdots P_S} \sum_{q_1=1 \cdots q_T=1}^{Q_1 \cdots Q_T} w^{(2)}_{p_1 \cdots p_S, q_1 \cdots q_T, i_1 \cdots i_N} h_{1 p_1 \cdots p_S} \cdot h_{2 q_1 \cdots q_T} + b^{(2)}_{i_1 i_2 \cdots i_N}\right). \quad (2)$$

For an image with a title, h_1 represents the text feature learning subspace and h_2 represents the image feature learning subspace. Then, formula (2) associates with the features of the two subspaces by assigning a weight $w^{(2)}_{p_1 \cdots p_S, q_1 \cdots q_T, i_1 \cdots i_N}$ to each feature value $h_{1 p_1 \cdots p_S}$ and $h_{2 q_1 \cdots q_T}$ of the two subspaces to obtain the output $Y_{i_1 i_2 \cdots i_N}$.

Figure 2 shows an equivalent model of the subspace mapping high-order auto-encoding model. In the equivalent model of the subspace mapping high-order automatic coding model, the associated representation of the two subspaces h_1 and h_2 is defined as μ, as shown in the following formula:

$$\mu = h_1 \otimes h_2. \quad (3)$$

Among them, $\otimes$ represents the Kronecker product of two tensors. For two tensors $A \in R^{I_1 \times I_2 \times \cdots \times I_N}$ and $B \in R^{J_1 \times J_2 \times \cdots \times J_N}$, the Kroc product definition is as follows:

$$C \in R^{I_1 J_1 \times I_2 J_{12} \times \cdots \times I_N J_N},$$
$$c_{(i_i, j_1) \cdots (i_N, j_N)} = a_{i_1, \ldots, i_N} b_{j_1, \ldots, j_N}. \quad (4)$$

Among them, $(i_n, j_n) = j_n + (i_n - 1) J_n$. Formula (2) can be equivalent to

$$y_{i_1 i_2 \cdots i_N} = f\left(\sum_{p_1 \cdots p_S q_1 \cdots q_T}^{P_1 \cdots P_S Q_1 \cdots Q_T} w^{(2)}_{p_1 \cdots p_S, q_1 \cdots q_T, i_1 \cdots i_N} \cdot v_{p_1 \cdots p_S, q_1 \cdots q_T} + b^{(2)}_{i_1 i_2 \cdots i_N}\right). \quad (5)$$

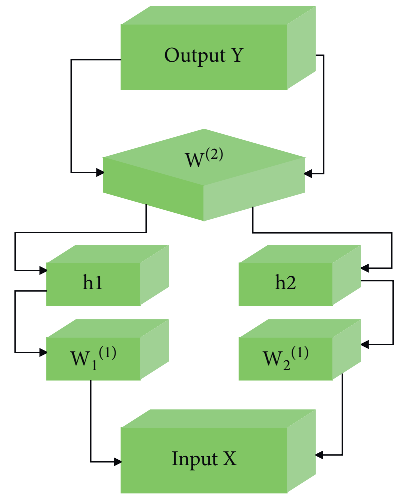

Figure 1: Subspace mapping high-order automatic coding model.

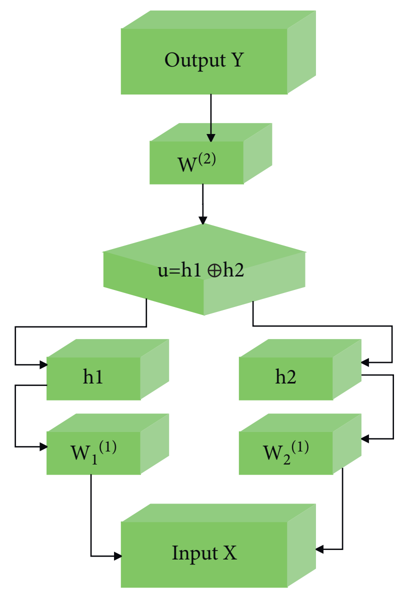

Figure 2: Equivalent model of subspace mapping high-order automatic coding model.

With the form of formula (5), the parameters of the subspace mapping high-order automatic coding model can be trained through the backpropagation strategy.

For any training sample X, the subspace mapping high-order automatic coding model defines its error function $J_{\mathrm{DPTAE}}(\theta, X)$ as shown in the following formula:

$$J_{\mathrm{DPTAE}}(\theta; X) = \frac{1}{2}(X - \hat{X}) = \frac{1}{2} \sum_{i_1}^{I_1} \cdots \sum_{i_N}^{I_N} \left(x_{i_1 i_2 \cdots i_N} - \hat{x}_{i_1 i_2 \cdots i_N}\right)^2. \quad (6)$$

Among them, $\theta = \{W_1^{(1)}, b_1^{(1)}, W_2^{(1)}, b_2^{(1)}; W^{(2)}, b^{(2)}\}$ represents the parameter to be trained and $\hat{X}$ represents the output of the subspace mapping high-order automatic coding model. For a dataset with m training samples, the subspace mapping high-order automatic coding model defines the overall error cost function as

$$J_{\mathrm{DPTAE}}(\theta)=\left[\frac{1}{m}\sum_{i=1}^{m}\left(\frac{1}{2}(X-\hat{X})^{T}(X-\hat{X})\right)\right]+\frac{\lambda}{2}\left(\sum_{i_1\cdots i_N}^{I_1\cdots I_N}\sum_{p_1\cdots p_S}^{P_1\cdots P_S}\left(w_{1\,(i_1\cdots i_N p_1\cdots p_S)i}^{(1)}\right)^2+\sum_{i_1\cdots i_N}^{I_1\cdots I_N}\sum_{q_1\cdots q_T}^{Q_1\cdots Q_T}\left(w_{2\,(i_1\cdots i_N q_1\cdots q_T)}^{(1)}\right)^2+\sum_{p_1\cdots p_S}^{P_1\cdots P_S}\sum_{q_1\cdots q_T}^{Q_1\cdots Q_T}\sum_{i_1\cdots i_N}^{I_1\cdots I_N}\left(w_{2\,(p_1\cdots p_S,q_1\cdots q_T,i_1\cdots i_N)}^{(2)}\right)^2\right). \tag{7}$$

In order to train the parameters of the subspace mapping high-order automatic coding model, first calculate the partial derivative of the error function $J_{\mathrm{DPTAE}}(\theta,X)$ with respect to each parameter through the following steps:

(1) The algorithm performs forward conduction and calculates the input and output of each neuron in the hidden layer and output layer. The calculation process is shown in formulas (8) to (13):

$$z_{(p_1p_2\cdots p_S)}^{(2)}=\sum_{i_1}^{I_1}\cdots\sum_{i_N}^{I_N}w_{1\,(i_1\cdots i_N,p_1\cdots p_S)}^{(2)}\cdot x_{i_1i_2\cdots i_N}+b_{1\,(p_1p_2\cdots p_S)}^{(1)}, \tag{8}$$

$$h_{1\,(p_1p_2\cdots p_S)}=f\left(z_{1\,(p_1p_2\cdots p_S)}^{(2)}\right), \tag{9}$$

$$z_{2\,(p_1p_2\cdots p_S)}^{(2)}=\sum_{i_1}^{I_1}\cdots\sum_{i_N}^{I_N}w_{1\,(i_1\cdots i_N,p_1\cdots p_S)}^{(2)}\cdot x_{i_1i_2\cdots i_N}+b_{1\,(q_1q_2\cdots q_S)}^{(1)}, \tag{10}$$

$$h_{2\,(p_1p_2\cdots p_S)}=f\left(z_{2\,(q_1q_2\cdots q_S)}^{(2)}\right), \tag{11}$$

$$z_{i_1i_2\cdots i_N}^{(3)}=\sum_{p_1\cdots p_S}^{P_1\cdots P_S}\sum_{q_1\cdots q_T}^{Q_1\cdots Q_T}w_{p_1\cdots p_S,q_1\cdots q_T,i_1\cdots i_N}^{(2)}\cdot h_{1\,(p_1p_2\cdots p_S)}\cdot h_{2\,(q_1q_2\cdots q_T)}+b_{i_1i_2\cdots i_N}^{(2)}, \tag{12}$$

$$y_{i_1i_2\cdots i_N}=f\left(z_{i_1i_2\cdots i_N}^{(3)}\right). \tag{13}$$

(2) For each neuron in the output layer, the algorithm uses formula (14) to calculate its "residual term" $\delta_{i_1i_2\cdots i_N}^{(3)}$.

$$\delta_{i_1i_2\cdots i_N}^{(3)}=\frac{\partial I_{\mathrm{DPTAE}}(\theta,X)}{\partial z_{i_1i_2\cdots i_N}^{(3)}}=\frac{\partial}{z_{i_1i_2\cdots i_N}^{(3)}}\left[\frac{1}{2}\sum_{i_1}^{I_1}\cdots\sum_{i_N}^{I_N}\left(y_{i_1\cdots i_N}-x_{i_1\cdots i_N}\right)^2\right]$$
$$f'\left(z_{i_1i_2\cdots i_N}^{(3)}\right)\left(y_{i_1\cdots i_N}-x_{i_1\cdots i_N}\right)=y_{i_1\cdots i_N}\left(1-y_{i_1\cdots i_N}\right)\left(y_{i_1\cdots i_N}-x_{i_1\cdots i_N}\right). \tag{14}$$

(3) The algorithm uses formulae (15) and (16) to calculate the residual term of each neuron in the hidden layer:

$$\begin{aligned}\delta_{1\,(p_1p_2\cdots p_S)}^{(2)}&=\frac{\partial J_{\mathrm{DPTAE}}(\theta,X)}{\partial z_{1\,(p_1p_2\cdots p_S)}^{(2)}}\\&=\sum_{i_1}^{I_1}\cdots\sum_{i_N}^{I_N}\frac{\partial I_{\mathrm{DPTAE}}(\theta,X)}{\partial z_{i_1i_2\cdots i_N}^{(3)}}\cdot\frac{\partial z_{i_1i_2\cdots i_N}^{(3)}}{\partial z_{1\,(p_1p_2\cdots p_S)}^{(2)}},\\&=\sum_{i_1}^{I_1}\cdots\sum_{i_N}^{I_N}\delta_{i_1i_2\cdots i_N}^{(3)}\cdot\frac{\partial}{\partial z_{1\,(p_1p_2\cdots p_S)}^{(2)}}\\&\left(\sum_{p_1\cdots p_S}^{P_1\cdots P_S}\sum_{q_1\cdots q_T}^{Q_1\cdots Q_T}w_{p_1\cdots p_S,q_1\cdots q_T,i_1\cdots i_N}^{(2)}\cdot h_{1\,(p_1p_2\cdots p_S)}\cdot h_{2\,(q_1q_2\cdots q_T)}+b_{i_1i_2\cdots i_N}^{(2)}\right),\\&=\sum_{i_1}^{I_1}\cdots\sum_{i_N}^{I_N}\delta_{i_1i_2\cdots i_N}^{(3)}\sum_{q_1\cdots q_T}^{Q_1\cdots Q_T}w_{p_1\cdots p_S,q_1\cdots q_T,i_1\cdots i_N}^{(2)}h_{1\,(p_1p_2\cdots p_S)}\cdot h_{2\,(q_1q_2\cdots q_T)}\left(1-h_{1\,(p_1p_2\cdots p_S)}\right),\end{aligned} \tag{15}$$

$$\delta_{2\,(q_1q_2\cdots q_T)}^{(2)}=\frac{\partial J_{\mathrm{DPTAE}}(\theta,X)}{\partial z_{2\,(q_1q_2\cdots q_T)}^{(2)}}=,\ \sum_{i_1}^{I_1}\cdots\sum_{i_N}^{I_N}\left(\delta_{i_1i_2\cdots i_N}^{(3)}\sum_{p_1\cdots p_S}^{P_1\cdots P_S}w_{p_1\cdots p_S,q_1\cdots q_T,i_1\cdots i_N}^{(2)}h_{1\,(p_1p_2\cdots p_S)}\cdot h_{2\,(q_1q_2\cdots q_T)}\left(1-h_{2\,(q_1q_2\cdots q_T)}\right)\right). \tag{16}$$

(4) The algorithm uses formulae (17) to (19) to calculate the error term of each neuron in the hidden layer and the output layer:

$$\frac{\partial z^{(3)}_{i_1 i_2 \cdots i_N}}{\partial w^{(2)}_{p_1 \cdots p_S, q_1 \cdots q_T, i_1 \cdots i_N}} = \frac{\partial\left(\sum_{p_1 \cdots p_S}^{P_1 \cdots P_S} \sum_{q_1 \cdots q_T}^{Q_1 \cdots Q_T} w^{(2)}_{p_1 \cdots p_S, q_1 \cdots q_T, i_1 \cdots i_N} \cdot h_{1\,(p_1 p_2 \cdots p_S)} \cdot h_{2\,(q_1 q_2 \cdots q_T)} + b^{(2)}_{i_1 i_2 \cdots i_N}\right)}{\partial w^{(2)}_{p_1 \cdots p_S, q_1 \cdots q_T, i_1 \cdots i_N}} = h_{1\,(p_1 p_2 \cdots p_S)} \cdot h_{2\,(q_1 q_2 \cdots q_T)}, \tag{17}$$

$$\frac{\partial z^{(2)}_{1\,(p_1 p_2 \cdots p_S)}}{\partial w^{(1)}_{1\,(i_1 \cdots i_N, p_1 \cdots p_S)}} = x_{i_1 i_2 \cdots i_N}, \tag{18}$$

$$\frac{\partial z^{(2)}_{2\,(q_1 q_2 \cdots q_T)}}{\partial w^{(1)}_{2\,(i_1 \cdots i_N, q_1 \cdots q_T)}} = x_{i_1 i_2 \cdots i_N}. \tag{19}$$

(5) The algorithm uses formulae (20) to (22) to calculate the partial derivative of the error function for each parameter:

$$\frac{\partial J_{\mathrm{DPTAE}}(\theta, X)}{\partial z^{(2)}_{2\,(q_1 q_2 \cdots q_T)}} = \delta^{(2)}_{1\,(p_1 p_2 \cdots p_S)} \cdot x_{i_1 i_2 \cdots i_N}, \tag{20}$$

$$\begin{aligned}\frac{\partial J_{\mathrm{DPTAE}}(\theta, X)}{\partial b^{(l)}_{i_1 i_2 \cdots i_N}} &= \frac{\partial J_{\mathrm{DPTAE}}(\theta, X)}{\partial z^{(l)}_{i_1 i_2 \cdots i_N}} \cdot \frac{\partial z^{(l)}_{i_1 i_2 \cdots i_N}}{\partial b^{(l)}_{i_1 i_2 \cdots i_N}} \\ &= \delta^{(l)}_{1\,(p_1 p_2 \cdots p_S)} \ (l = 1, 2),\end{aligned} \tag{21}$$

$$\begin{aligned}\frac{\partial J_{\mathrm{DPTAE}}(\theta, X)}{\partial w^{(1)}_{2\,(i_1 \cdots i_N, q_1 \cdots q_T)}} &= \frac{\partial J_{\mathrm{DPTAE}}(\theta, X)}{\partial z^{(2)}_{2\,(q_1 q_2 \cdots q_T)}} \cdot \frac{\partial z^{(2)}_{2\,(q_1 q_2 \cdots q_T)}}{\partial w^{(1)}_{2\,(i_1 \cdots i_N, q_1 \cdots q_T)}} \\ &= \delta^{(2)}_{2\,(q_1 q_2 \cdots q_T)} \cdot x_{i_1 i_2 \cdots i_N}.\end{aligned} \tag{22}$$

After obtaining the partial derivative of the error function with respect to the parameter, the algorithm can use formulae (23) and (24) to calculate the partial derivative of the overall error cost function $J_{\mathrm{DPTAE}}(\theta, X)$ with respect to the parameter:

$$\frac{\partial J_{\mathrm{TAE}}(\theta)}{\partial W^{(l)}} = \left[\frac{1}{m} \sum_{i=1}^{m} \frac{\partial J_{\mathrm{TAE}}\left(\theta; X^{(i)}\right)}{\partial W^{(l)}}\right] + \lambda W^{(l)}, \tag{23}$$

$$\frac{\partial J_{\mathrm{TAE}}(\theta)}{\partial b^{(l)}} = \frac{1}{m} \sum_{i=1}^{m} \frac{\partial J_{\mathrm{TAE}}\left(\theta; X^{(i)}\right)}{\partial b^{(l)}}. \tag{24}$$

Finally, the parameters are updated through the gradient descent method. If the learning rate is assumed to be α, the formula for updating the parameters using the gradient descent method is shown in (25) and (26):

$$W^{(l)} = W^{(l)} - \alpha \frac{\partial J_{\mathrm{DPTAE}}(\theta)}{\partial W^{(l)}}, \tag{25}$$

$$b^{(l)} = b^{(l)} - \alpha \frac{\partial J_{\mathrm{DPTAE}}(\theta)}{\partial b^{(l)}}. \tag{26}$$

Connecting multiple subspace mapping high-order autoencoders from bottom to top can form a depth calculation model based on subspace mapping, as shown in Figure 3.

h^0 and h^l, respectively, represent the input layer and output layer of the depth calculation model based on subspace mapping. The depth calculation model based on subspace mapping first maps the input layer h^0 through two weight tensors $W_1^{(1)}$ and $W_2^{(1)}$ and two bias tensors $b_1^{(1)}$ and $b_2^{(1)}$ to a hidden layer h^1 with two independent subspaces h_1^1 and h_2^1. Then, each subspace in the hidden layer h^1 is divided and mapped to a second hidden layer h^2 with two independent subspaces h_1^2 and h_2^2. This mapping relationship is iterated upwards until the output layer h^l.

Figure 4 shows the equivalent model of the depth calculation model based on subspace mapping. In the equivalent model shown in Figure 4, the interaction of the two subspaces of each hidden layer is mapped to a feature tensor through the Kronecker product of the tensor, which is used as the input tensor of the next hidden layer.

4. Research on Path of Agricultural Policy Finance in Smart Service for Rural Revitalization Based on Big Data Technology

Agricultural policy finance has not given it a definite concept in academia. Generally speaking, “agriculture” is the object of the concept and the object of policy efforts and financial regulation. Various financial instruments will be limited to its scope; “policy” reflects the publicity of the concept and shows the social and economic effects the government wants to achieve, and the achievement of such effects cannot be achieved without the strictness of the government’s credit and legal system; “finance” is the category of means in this concept, including all funds storage except administrative power and loan issuance. Industry policy-based finance is not profitable, and it takes agency behavior as a prerequisite and uses government integrity as an endorsement to cooperate with the implementation of relevant policies to support the development of agriculture and the construction of rural areas and promote the solution of the three rural issues. In addition, special financial law assistance should be provided for agricultural activities in terms of borrowing funds.

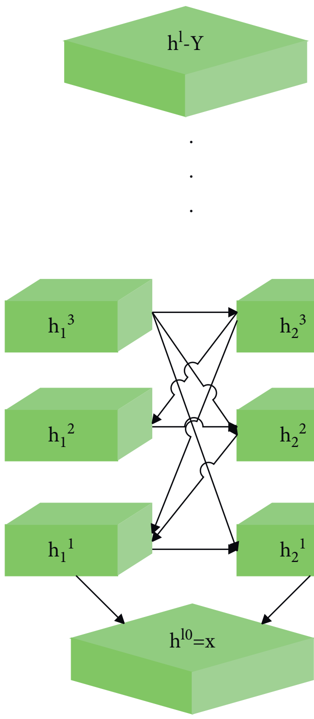

FIGURE 3: Depth calculation model based on subspace mapping.

If local governments want to achieve steady economic development, it is closely related to the support of financial funds. However, in the common practice of commercial financial institutions, instead of pulling out local funds, the purpose of asset injection is not achieved. A major feature of China is its large population, accounting for 20% of the global population. In order to solve the problem of the survival of the large population, the steady development of agriculture must be realized. Only the health of agriculture can guarantee the basic conditions for the survival of all citizens. At this stage, various parts of China are facing a shortage of funds. One of the reasons is that local funds have fled the place through commercial financial institutions. Due to the shortage of funds, various localities are generally inadequate in agricultural investment. The agricultural policy financial institution, as a functional department that guides the market, is the implementer of the national macro-control objectives and therefore should also be the solver of local funding problems. The basis for the existence of agricultural policy finance is that there are deficiencies in market means, and the free competition system cannot achieve good regulation. Therefore, the country has to adjust the supply and demand of funds with the help of policy means to achieve the full play of social resources at all levels. In the context of the free market, funds will exhibit the "Matthew effect" and excessive concentration in wealthy areas will result in the flow of funds from rural areas to cities, which will make agriculture, which lacked investment in the past, face a greater crisis. In addition, through policy arrangements, the return of funds to the countryside can achieve a balanced allocation of social capital to a certain extent, adjust the social layout, improve agricultural efficiency, and realize the rational use of social resources.

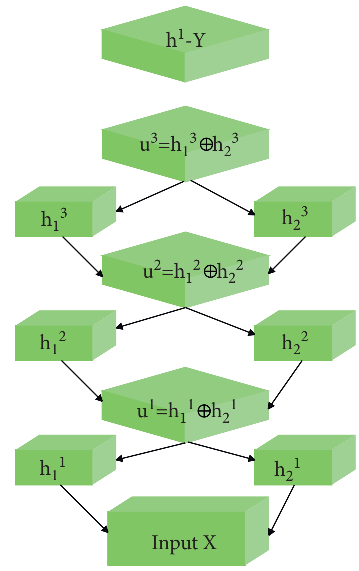

FIGURE 4: Equivalent model of the depth calculation model based on subspace mapping.

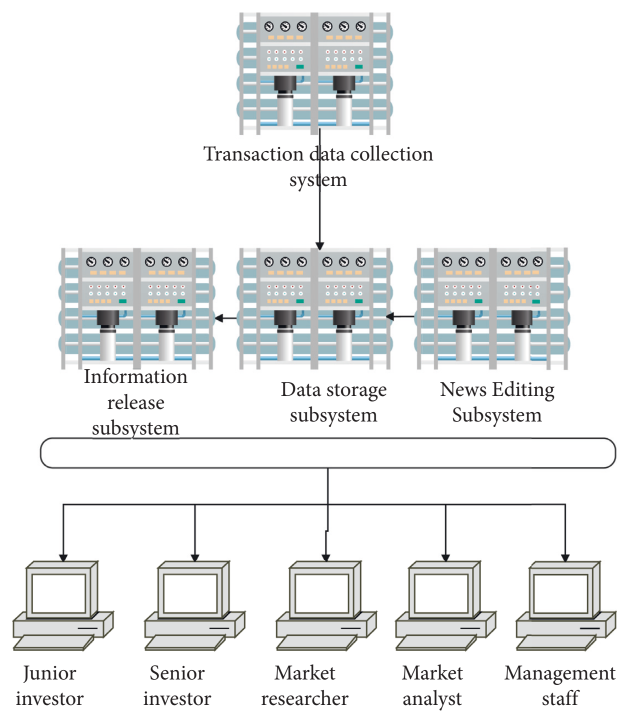

FIGURE 5: System overall architecture diagram.

The overall structure of the agricultural policy-based financial intelligent service knowledge system is shown in Figure 5. It is divided into four parts: transaction data collection, news data collection, data storage, information release, and knowledge service. The knowledge service part runs on the user's computer terminal in the form of client software, providing knowledge services for junior investors, senior investors, market researchers, market analysts, and information management personnel.

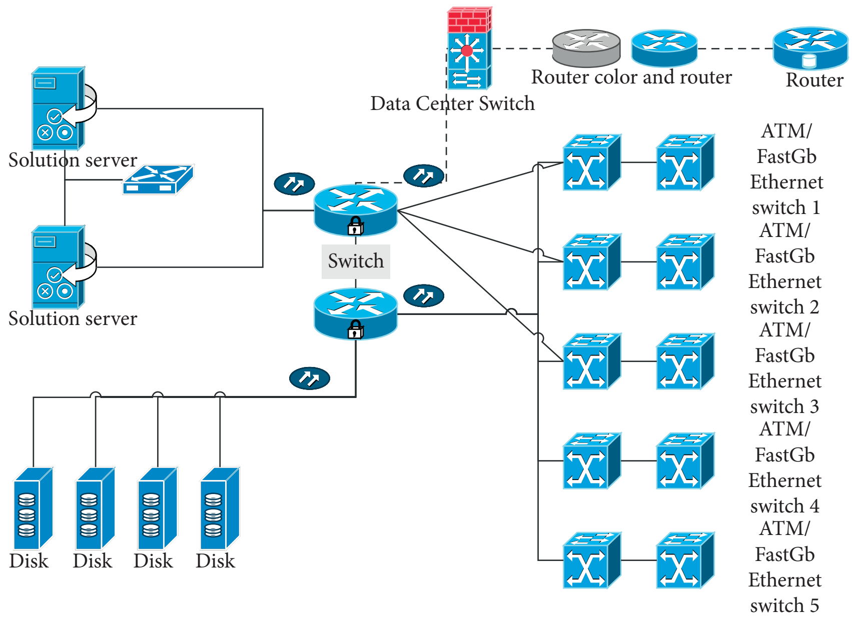

Figure 6: Product hardware architecture and topology scheme.

The hardware architecture and topology of the product are shown in Figure 6, which contains the following components.

The system includes a client, load balancing, an application server, a web server, a database server, a full-text index server, an ETL server, an information analysis and mining server, a manual editing and maintenance platform, an ETL manual verification platform, and various data sources, as shown in Figure 7. Among them, the client, ETL manual verification client, and information manual editing and maintenance client are placed on the external network and separated from the internal network by a firewall. For other tentative intranets, the application server and the web server are placed on the same network segment. Moreover, the database server and the full-text index server are placed on a separate network segment, and the external network is not visible. The ETL and the information analysis part are placed on the same network segment. The data source is processed according to the actual deployment situation, and the same network segment is tentatively determined.

In the process of three-dimensional search, there are three main processes: The first part is the establishment of the search domain. This step is the most critical. The information needs to be cleaned, word segmented, and coded and other preprocessing, and then multi-dimensional analysis is performed, such as the information to which the information belongs The multiple categories of, establish the corresponding relationship with the structured data according to the association relationship of the category. Discover hot topics based on clustering, discover market-related sentiments through sentiment analysis, and extract and analyze information-focused objects through keyword extraction. On this basis, the management of the retrieval domain is realized. The second part is the storage of search objects. Because the search is based on the full-text index and the related information needs to be queried at the same time,

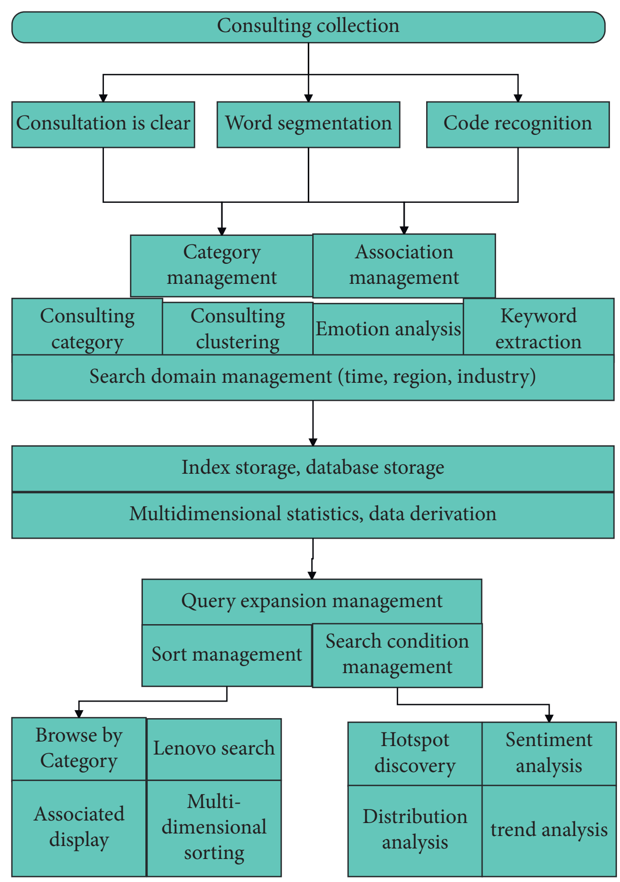

Figure 7: System workflow.

the information data need to be stored in the full-text index and structured database at the same time. In addition, in order to increase the richness of the search level, it is necessary to establish a statistical derivative table based on the business. The third part is the display part of the search results, including query expansion management, which is used to automatically map the most suitable query object according to the query conditions input by the user. Sorting management is to return the returned results according to the needs of users. Search condition management is to provide users with search conditions. The retrieval part shows the returned results seen by the user in different ways. Derivative results are a series of statistical analysis results based on user input query conditions, including keyword distribution analysis, trend analysis, sentiment analysis, hot spot discovery, and other results derived according to business needs.

The status of financing institutions engaged in policy guarantees is twofold. It is between the borrower and the lender. While reducing the loan issuance risk of financial institutions, it also bears the risk of unrecoverable loans. Due to the policy endorsement, it will stimulate the speculative psychology and negative behavior of some financial institutions and lenders. Under the influence of speculative psychology, in order to realize their own interests, both borrowers and lenders will ignore or falsely report important information, which will increase the risk and cause the consequences of harm to others. Since there are policy guarantees, lenders will focus their attention on high-risk projects because once the project succeeds, the return will be very fast, and once the project fails, it will be backed by a policy guarantee. In this way, it will have a reverse elimination effect, which will exclude many projects with high security but low returns. However, there is a positive relationship between the higher risk and lower loan repayment rate, and the process of reverse elimination will eventually damage the effectiveness of agricultural policy finance, thereby undermining the implementation of agricultural support policies. On the other hand, the party receiving the loan will not use the funds in areas with a higher margin of safety, but will invest in areas with higher risks. The idea is nothing more than if the risk is successful, you can get huge profits, and if the risk fails, there is a guarantee provided by the state as a shared responsibility. The meaning of negative actions is that the parties who should have taken positive measures chose a negative attitude when they had the conditions to act positively. For the parties who provide loans, having national credit as an endorsement will lead to problems of relaxation of review and negligence of supervision, thereby increasing the possibility of not being able to recover the loan. In addition, the parties who obtain loans will also relax management and neglect risk factors, which will lead to the accumulation of risks and increased hidden dangers. This will also weaken the enthusiasm of relevant state agencies for guaranteeing agricultural projects, resulting in a shortage of funds for agricultural support and long-term development restricted.

Relevant institutions that undertake agricultural policy-based financial functions can directly provide funds to agricultural practitioners so as to provide efficient financing for the development of agriculture. Because commercialized financial entities are subject to the purpose of maximizing profits, they are relatively indifferent to agricultural projects with low returns. Therefore, it is not easy for agricultural borrowers to obtain loans from commercial banks and other institutions. In addition, private financing also exists in agricultural areas. Private financing has the advantages of wide coverage, simple procedures, and more ways to obtain it. However, it also has shortcomings such as strict interest requirements and illegal subject qualifications. In addition, due to the restrictions of national laws and regulations, it is unable to make great achievements in supporting agriculture and benefiting agriculture. Therefore, in the process of developing the rural economy, policy financing has become the best choice. It has a nonprofit business method and does not pursue an excessively high profit rate so that it can provide more low-interest loans than commercial banks. This will greatly promote the development of weak industries, especially the agricultural product purchase industry. However, agricultural policy-based finance can play a limited role in directly supporting agriculture and cannot provide all the funds needed for agricultural revitalization. Therefore, the driving effect of its financing must be used to indirectly promote rural prosperity. The statistical agricultural production index is shown in Table 1 and Figure 8. Table 1 and Figure 8 show the agricultural production indexes in the past few years (source: China Statistical Yearbook).

This article combines the statistical yearbook data to study the system of this paper, explores the effect of formulating related strategies, conducts research on data analysis and decision-making effects through multiple sets of data, and obtains the results shown in Table 2 and Figure 9.

From the above research, this paper introduces the following strategies.

At the current stage, the Agricultural Development Bank can consider focusing its work on the following three main industries. The first is the agricultural productive service industry, such as companies that supply all kinds of materials needed for production, companies that master newer industrial technologies, companies that carry out mechanical operations and lease and sell institutional power to the outside world, companies that provide third-party agricultural labor and employment, companies that are committed to expanding agricultural product marketing networks, and agricultural companies that operate Internet platforms to expand their influence. This achieves the intensive use of labor and increases the stock of large-scale modern industrial economies. The second is rural leisure and tourism. The Agricultural Development Bank needs to maintain a sensitive vision of social and market changes and select those agricultural projects that have advantageous geographical locations and distinctive products and are suitable for free market competition. Moreover, the Agricultural Development Bank needs to provide large-scale funding to help develop more tourism industries in rural areas and attract urban populations and other resources to migrate to the countryside, thereby invigorating the rural economy and increasing farmers' incomes. The third is the rural elderly care service industry. Rural elderly care has its unique advantages. With the rapid increase of the elderly population, urban elderly care faces a variety of difficulties, which has also generated huge social needs. The Agricultural

Table 1: Agricultural production index.

Years	Total index	Crops	Forest industry	Animal husbandry	Fishery
2008	105.10	101.60	232.70	97.80	126.60
2009	103.30	102.60	236.60	97.40	115.20
2010	105.50	105.40	217.30	98.70	117.40
2011	109.40	111.90	214.50	102.00	115.70
2012	107.50	107.30	222.20	100.60	118.80
2013	106.30	106.70	241.50	98.60	117.30
2014	107.40	110.20	207.20	98.70	116.20
2015	103.80	105.10	125.60	98.10	110.50
2016	100.00	100.00	100.00	100.00	100.00
2017	105.70	109.70	84.90	99.70	105.20
2018	108.50	113.10	61.20	102.70	105.30

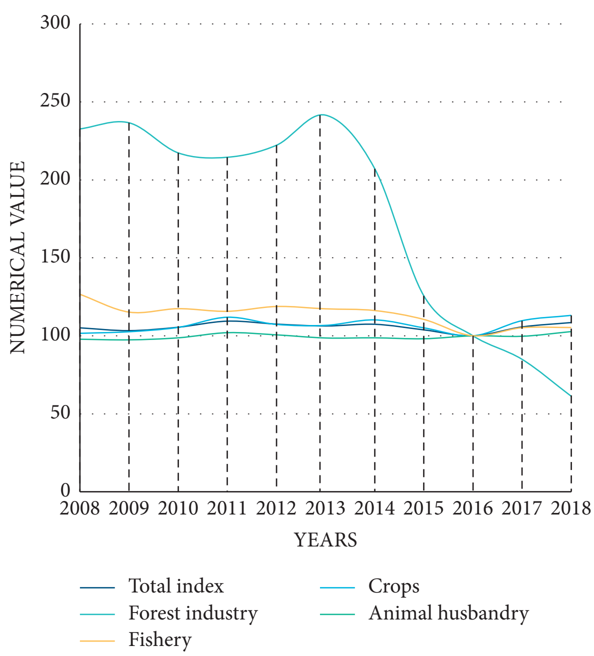

Figure 8: Line chart of agricultural production index.

Table 2: System test research.

Number	Data analysis	Decision effect
1	96.99	85.46
2	95.21	72.43
3	95.22	79.75
4	97.21	79.88
5	94.39	75.16
6	97.27	87.24
7	94.68	71.75
8	94.19	80.84
9	97.75	72.63
10	97.52	90.11
11	94.25	75.28
12	95.25	81.36
13	97.87	87.68

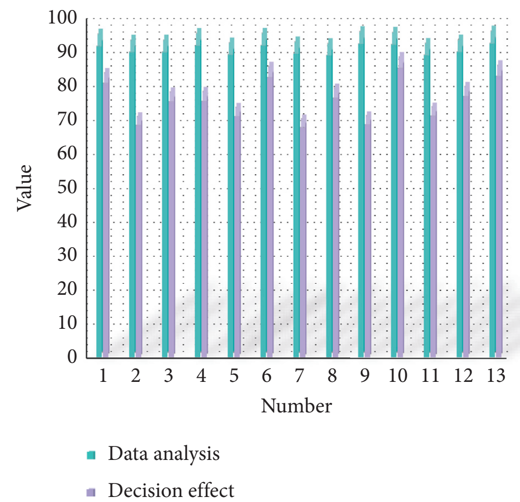

Figure 9: Performance verification of the platform system.

Development Bank should have sufficient foresight and increase investment in the industry. It is possible to select those villages with sufficient medical resources, convenient transportation, and pleasant environment to develop the industry, and provide financing services to them to cultivate the market.

As a financial institution that implements national policies, the service policy is the first responsibility of the Agricultural Development Bank, and the implementation of the policy requires the Agricultural Development Bank to maintain close contact with relevant state institutions. Therefore, the Agricultural Development Bank should maintain a close relationship with the local management at all levels and promote the financing of agriculture with the help of the good cooperation system between the government and the bank.

5. Conclusion

This paper uses big data technology to analyze rural revitalization data and combines rural revitalization with agricultural policy-based financial smart services. Based on the rural revitalization policy, this paper conducts research on the impact of agricultural policy-based financial institutions in supporting the transformation and upgrading of rural industries from two aspects: theoretical analysis and empirical research. Our country's rural economic foundation is poor, industrial development is lagging behind, and rural financial services such as commercial bank loans and commercial insurance have reduced capital investment, and there are frequent chaos in private financial lending. Under this current situation, agricultural policy-oriented financial institutions actively respond to national policies and can effectively promote the upgrading of rural industrial structure. This paper uses big data technology to analyze rural revitalization data and combines rural revitalization with agricultural policy-based financial smart services.

Moreover, this paper constructs a path of agricultural policy finance in smart services for the rural revitalization research system based on big data technology and analyzes it with data from the National Statistical Yearbook. Through experimental research, it can be known that the system constructed in this paper has certain effects.

Data Availability

The data used to support the findings of this study are available from the author upon request.

Conflicts of Interest

The author declares that he has no conflicts of interest.

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