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Research Article

Application of Digital Governance Technology under the Rural Revitalization Strategy

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With the mutual promotion of Internet information technology and economic globalization, the information economy has gradually become the focus of national development, and digital governance technology has been deeply integrated into the entire process of agricultural production. Through the reintegration of agricultural information flow, capital flow, business flow, and logistics, the transformation of intelligent agricultural production, networked operations, electronic management, and informatization of services has become an inevitable choice for rural revitalization. The purpose of this paper is to carry out a series of researches on the crowd-sensing and mining push technology of agricultural big data according to the application characteristics of agricultural data in the process of perception acquisition, analysis, and service. Therefore, we propose and study effective ways to collect IoT in rural complex environments, and how to use complex Internet data to mine rural areas vertically and provide a database source of large-scale data about agricultural resources. Experiments show that, from 10% of the death of a node to 90% of the death of a node, AODV passes about 550 laps, ExOR passes about 350 laps, and MWOR passes through less than 100 laps. From the results, the AODV algorithm is poor because it does not solve the problem of energy balance between nodes, while the ExOR algorithm selects the chance path with the least number of jumps.

1. Introduction

Since the reform and opening up, China has actively promoted the development of rural urbanization and achieved remarkable results. However, due to China's household registration system, the unbalanced development between urban and rural areas has become the most important issue. As we all know, the "three rural" issues are fundamental issues related to the national economy and people's livelihood. However, at present, people's livelihood problems such as the large gap between urban and rural development and the lagging of rural infrastructure construction have not been solved by research. In view of this, the 19th National Congress of the Communist Party of China proposed a rural revitalization strategy to increase villagers' participation and income, so that the vast rural population in the new era can enjoy the fruits of development and improve their living standards.

The essence of the research on the application of digital governance technology under the rural revitalization strategy is to use the Internet of Things, big data, cloud computing, and other Internet information technologies to realize the innovation of the traditional small-scale peasant economy, break the original agricultural production organization and management method to realize the intelligent, standardized, and large-scale agricultural production, the electronic and commercialization of agricultural product sales, and the socialization of agricultural production services. Therefore, planning and formulating the "Internet + Agriculture" development strategy are an objective demand that conforms to the development trend of agricultural economy, an effective way to promote farmers' increase in production and income, an important measure to improve the level of comprehensive agricultural productivity, and the basis for enhancing the process of urbanization. Through the development of "Internet + agriculture," it will help realize the transformation of agricultural production mode from extensive to intensive and then lead to realize the transformation from a large agricultural province

to a strong agricultural province, which is of great significance to the construction of modern agriculture.

The innovations of this paper are as follows: (1) due to the instability of the Internet of Things connection and the poor quality of data collection in the complex environment of agricultural production, effective methods for data collection of the Internet of Things are being studied to improve the reliability of data transmission. (2) The weights of opportunistic path selection and coordination are optimized through data correlation analysis between nodes and node energy consumption perception. The improved algorithm is verified by simulation experiments, and the IoT crowdsensing collection in the complex agricultural environment is realized.

2. Related Work

Information and Communication Technology (ICT) is no longer limited to the urban population; it is increasingly related to the rural population. The use of ICT is evident by providing ICT services to all in rural Malaysia. Kamarudin S discusses the importance of ICT for rural communities and the government's initiatives to increase ICT usage, especially in telecentres. The importance of telecentres as ICT centers is of excellence in rural areas. Telecentres provide ICT facilities such as the Internet and computer training rooms for use by rural communities [1]. India's rural healthcare system is managing patient data in a traditional paper-based system. Most rural hospitals in India lack the resources to maintain and manage patient health data. Ganiga R research found that as the world goes digital, one of the main challenges facing developing countries such as India is healthcare data from rural to urban in digital form. Advances in IT technology in healthcare have made it possible to maintain and manage patient data in digital form at all levels of the healthcare system. Cloud computing has become the main way to provide healthcare SOLUTIONS [2]. Rural and agricultural development requires accurate spatial information to achieve the accuracy of sustainable development planning. Aiming to identify strategies for sustainable agricultural development planning in rural areas, Arham I uses spatial data methods to acquire village images generated using drones. Actual land use analysis was performed using ArcGIS software through a participatory digitization process. The land carrying capacity was analyzed using the methods of land availability and land demand [3]. Although the analysis results become a reference for the preparation of rural sustainable development planning directions, the use of the Analytic Hierarchy Process (AHP) method to analyze the priorities of alternative plans loses some precision. In some policy areas, the successful implementation of market reforms poses formidable challenges to a country's institutional capacity. Fox research finds that, with Mexico's ambitious rural development reforms, the exit from the heavy state economic intervention model of the past was accompanied by the construction of new regulatory agencies that maintained the central government's vital involvement in rural life. He analyzes the structural adjustment of state intervention in four policy areas: rural economic development, decentralization to rural cities, efforts to improve the administration of justice, and electoral processes in rural areas. The first two groups of reforms are influenced by the latter two groups: economic development and decentralization are influenced by judicial administration and democratization [4]. Tarsem used exploratory factor analysis, confirmatory factor analysis, analysis of variance, t-test, and structural equation modeling for scale purification and data analysis. The results of the study show that achieving financial inclusion through cooperatives has a direct and significant effect on rural development. Furthermore, the results support the idea that financial inclusion is an inclusive growth strategy, but inclusive growth itself is a subset of inclusive development on a larger scale. This means that benefits must reach all, especially women and children, minorities, the extremely poor, and those pushed below the poverty line due to natural and man-made disasters [5]. The Internet of Things (IoT) and artificial intelligence (AI) have been used in agriculture for a long time, along with other advanced computing technologies. However, there is currently a growing focus on the use of this smart technology. Agriculture has provided humans with an important source of food for thousands of years, including the development of appropriate farming methods for different types of crops. Alreshidi E study found that the emergence of new advanced IoT technologies has the potential to monitor the agricultural environment to ensure high-quality products. However, research and development in Smart Sustainable Agriculture (SSA) is still lacking, with complex barriers arising from the fragmentation of agricultural processes (i.e., IoT/AI machine control and operation); data sharing and management; interoperability; and a lot of data analysis and storage [6]. IoT technology is a hot research topic worldwide. Wang research shows that, in agriculture, the use of IoT technology can reduce labor costs and increase productivity. He introduced the application of IoT in agriculture in detail from three aspects: perception layer, network layer, and application layer [7]. A growing global population requires increased production levels to provide food in all sectors, especially agriculture. Still, there are times when demand and supply will not match. Managing and maintaining capital and manpower remain a formidable challenge to improve agricultural production. Suma V research shows that smart farming is a better option for increasing food production, resource management, and workforce. His research outlines predictive analytics, Internet of Things (IoT) devices with cloud management, and multicultural security units in the agricultural sector and takes into account farmers' experience. It also highlights the challenges and complexities expected when integrating modern technologies into traditional agricultural practices. Statistical and quantitative based methods have revolutionized the current agricultural system for the better [8]. Although the drone activation of IoT will encounter crop status and stages irrigation and plant leaf diseases in green spaces, there are still some challenges in practical application. The increase in population has greatly increased the pressure on the agricultural sector. This decade has seen a shift from traditional to state-of-the-art methods as

technology emerges. Kour VP research shows that species hybridization and real-time monitoring of farms pave the way for resource optimization. Scientists, research institutions, academicians, and most countries in the world are moving towards the practice and execution of collaborative projects to explore the vision of this field serving humanity, and the technology industry is racing to provide more optimized solutions [9]. While IoT, cloud computing, big data analytics, and wireless sensor networks can provide ample scope to predict, process, and analyze situations and improve activities in real-time scenarios, challenges remain in the realm of practical applications.

3. Opportunistic Routing Method for Agricultural IoT Based on Correlation Analysis Data

The rural revitalization strategy is a comprehensive and systematic plan to solve the "three rural" issues in the new era, focusing on clarifying the scientific logic of rural revitalization and development in the new era, exploring the strategic path of rural revitalization according to local conditions, and it has important application value to effectively promote the overall upgrading of regional agriculture, the overall progress of the countryside, and the overall development of farmers [10, 11]. The rural revitalization strategy is shown in Figure 1.

As can be seen from Figure 1, rural revitalization includes industrial revitalization, talent revitalization, cultural revitalization, ecological revitalization, and organizational revitalization [12].

3.1. Compression Model of Spatiotemporal Correlation of Agricultural IoT Data. The nodes collect environmental parameters cyclically, and the strong correlation between monitoring data in adjacent collection intervals is due to the slow and continuous change of farmland environmental parameters [13, 14]. Not only has the environment of farmland changed regularly and regularly every day, but also the field climate has obvious seasonal changes. The collected values can be predicted by the environmental parameter model, and the environmental parameters can be compressed by temporal correlation. Specifically, it involves the following steps:

(1) The collection node periodically collects environmental parameters based on the collection period T and stores historical data [15]. For any node S in the chain, for environment parameters,

$$SH_k' = \sum_i \left(a_k(i) ES_k(i)\right). \tag{1}$$

Among them, SH_k' is the predicted value of the kth environmental parameter, $ES_k(i)$ is the historical value of the kth environmental parameter, and i is the time reverse order of the historical data. The larger the time interval, the weaker the correlation between the data. $a_k(i)$ is the data time correlation factor.

(2) Since the environmental parameters of agricultural production change irregularly under the influence of meteorological conditions, the predicted value has a large deviation only due to the correlation of historical data. In the method of the present invention, the predicted value is adjusted accordingly.

$$SH_k = W_k(t) \cdot SH_k'. \tag{2}$$

Among them, SH_k is the predicted value after the correction of environmental parameters, and $W_k(t)$ is the time correction model corrected by the meteorological model [16, 17].

For the correction function, there are

$$W_j(t) = a \cdot e^{-(t-b)^2/c^2}. \tag{3}$$

For a normal receiving node, the exponential function is still complex [18], making

$$W(t) = k \cdot t + d, \tag{4}$$

where k and d are the time-dependent coefficients of the linear meteorological model, and t is the current time received from the submerged node, transmitted and updated in the first round of the daily data collection cycle [19].

(3) Node S collects and records n environment parameters currently declared as {ES1, ES2,... ES,... ESn}.

(4) To distinguish the actual value collected in step 3 from the modified predicted value obtained in step 2, use

$$\mathrm{E}p_i = SH_i - ES_i. \tag{5}$$

That is, the current differential processing result EP = {EP1, EP2, .., EP, ..EPn};

$$a_k(i) = \left(\left|ES_k(i-1) - ES_k(i)\right|\right)^{0.5}. \tag{6}$$

Among them, k represents the monitoring value of the kth parameter, and the current actual measurement value is ES_k (0) [20]. The flow chart of the model is shown in Figure 2.

It can be seen from Figure 2 that, due to the environmental complexity of agricultural production scenarios, it is easy to cause uncertainty in the connectivity of transmission paths between agricultural IoT nodes. Therefore, it is necessary to consider the opportunistic connectivity of the network connection when establishing the data association model, to effectively improve the association compression rate in the process of intranetwork data transmission. Among them, (x_0, y_0) and (x_1, y_1) are the coordinates of the two points of node $n(x_0, y_0)$, respectively, and the node communication radius is r to define the spatial correlation of data between nodes as

$$I\left(n\left(x_0, y_0\right), n\left(x_0, y_0\right)\right) = \begin{cases} 0 r\left(n\left(x_0, y_0\right), n\left(x_1, y_1\right)\right) > r, \\ 1 - \dfrac{\sqrt{\left(x_0 - x_1\right)^2 - \left(y_0 - y\right)^2}}{r} r\left(n\left(x_0, y_0\right) n\left(x_1, y_1\right)\right) \leq r. \end{cases} \tag{7}$$

Supposing that any node $n(x_0, y_0)$ has m neighbor nodes, then define its spatial dimension information as

$$I^s\left(n\left(x_0, y_0\right)\right) = \sum_{i=1}^{m}\left(1 - I\left(n\left(x_0, y_0\right), n\left(x_i, y_i\right)\right)\right). \tag{8}$$

The amount of time dimension information of the collected data is

$$I_{t0}^t\left(n\left(x_0, y_0\right)\right) = 1 - \sum_{i=1}^{m} w_i F_{t_0 - iT_0}, \tag{9}$$

where $\sum_{i=1}^{m} w_i = 1$ and when $i > k$, $w_i < w_k$. From the calculation formula of the amount of information at the node $n(x_0, y_0)$, it can be obtained at the collection time point t_0. The amount of information collected:

$$I\left(n\left(x_0, y_0\right)\right) = \lambda I^s\left(n\left(x_0, y_0\right)\right) + \gamma I_{t0}^t\left(n\left(x_0, y_0\right)\right). \tag{10}$$

The numerical sequence of any node $n(x,y)$ in the storage chain is recorded as

$$D(n(x, y)) = \left\{d_{n(x,y)}\left(t_0\right), d_{n(x,y)}\left(t_0 - T_0\right), d_{n(x,y)}\left(t_0 - 2T_0\right), \ldots, d_{n(x,y)}\left(t_0 - (s-1)T_0\right)\right\}. \tag{11}$$

The chain head also stores the data source of node $n(x, y)$:

$$F(n(x, y)) = \left\{f_{n(x,y)}\left(t_0\right), f_{n(x,y)}\left(t_0 - T_0\right), f_{n(x,y)}\left(t_0 - 2T_0\right), \ldots, f_{n(x,y)}\left(t_0 - (s-1)T_0\right)\right\}. \tag{12}$$

If the data is the real data collected by the node, $f_{n(x,y)}(t) = 1$; otherwise, $f_{n(x,y)}(t) = 0$.

A certain node $n(x_0, y_0)$ in the chain is a dormant node, and the value of node $n(x_0, y_0)$ at time point 4 is estimated according to the collected historical data:

$$\widehat{d}'_{n\left(x_0, y_0\right)}\left(t_0\right) = \sum_{i=1}^{u} \xi_i \frac{d_{n\left(x_0, y_0\right)}\left(t_0 - (i+1)T_0\right)}{d_{n\left(x_0, y_0\right)}\left(t_0 - iT_0\right)} \cdot d_{n\left(x_0, y_0\right)}\left(t_0 - T_0\right). \tag{13}$$

Adjusting based on the node $n(x_0, y_0)$ time series estimate:

$$\widehat{d}_{n\left(x_0, y_0\right)}\left(t_0\right) = \widehat{d}'_{n\left(x_0, y_0\right)}\left(t_0\right) + \sum_{i=1}^{u} \xi_i f_{n\left(x_i, y_i\right)}\left(\widehat{d}'_{n\left(x_0, y_0\right)}\left(t_0\right) - d_{n\left(x_0, y_0\right)}\left(t_0\right)\right). \tag{14}$$

3.2. Network Opportunity Awareness Model and Candidate Node Set Construction. To better construct the network node candidate forwarding set, the key nodes in the network are firstly defined, which refer to those nodes on the edge of the substructure of the network topology. To this end, this paper proposes a new path selection metric EADX, based on the hop count metric ETX of the ExOR algorithm and the weighted average path hop count EAX of the OAPF protocol, so that the expected data transmission volume on all forwarding paths is defined as EADX.

$$EA\ DX(s, d) = S(s, d) + Z(s, d), \tag{15}$$

where s is the source node, and d is the target node.

$$S(s, d) = \frac{\sum I_i D}{1 - \prod_i\left(1 - f_i a_i\right)}, Z(s, d) = \frac{\sum_i \lambda_i f_i EaX\left(c_i, d\right) I_i}{1 - \prod_i\left(1 - f_i\right)}. \tag{16}$$

Among them, $S(s,d)$ is the expected amount of forwarding data from the source node s to the current candidate forwarding node set C, and $Z(s,d)$ is the expected forwarding data volume from the candidate forwarding node set C to the target node.

$$\lambda_i = \prod_{j,<i}\left(1 - f_j + f_j\left(1 - a_j^i\right)\right) \prod_{k>i}\left(1 - a_j^k a_k^i f_k\right), \tag{17}$$

Figure 1: Rural revitalization strategy.

where a_j^i is the success probability of direct transmission from node c_j to node c_i.

3.3. Weight-Based Opportunistic Routing Energy Consumption-Aware Optimization. This paper proposes a multi-weight energy consumption-aware opportunistic routing method, which integrates parameters such as node residual energy, node location, and data correlation and proposes a comprehensive routing protocol that integrates node residual energy and link status. Thereby, candidate forwarding, node selection, and opportunistic path coordination are performed.

(1) The minimum residual energy of the path

$$E\min_l = \min\left(E_1, E_2, \ldots, E_i, \ldots, E_m\right), \tag{18}$$

where $E\min_l$ refers to the lowest residual energy of path l; E_i refers to the residual energy of node i in the path.

(2) The absolute minimum residual energy ratio of the path

The ratio of the minimum residual energy of the path to the initial energy of the node refers to the absolute ratio of the minimum residual energy of the path.

$$P_{\text{absolute\_l}} = \frac{E_{\min l}}{E_{\text{init}}}. \tag{19}$$

(3) Path relative minimum residual energy ratio

The ratio of the lowest residual energy of the path to the mean value of the lowest residual energy in all possible chance paths refers to the ratio of the path with the lowest residual energy:

$$P_{\text{relaative\_l}} = \frac{nE_{\min l}}{\sum_{j=0}^{n} E\min_j}, \tag{20}$$

where n refers to all n paths from the source node to the target node, and $E\,min_j$ refers to the path minimum residual energy of the jth path.

4. Application of Digital Governance Technology

In the context of the in-depth penetration of Internet technology in the agricultural field, the integration of agricultural production, exchange, circulation, consumption, and the Internet has become a common trend. Internationally, developed countries have already matured by using the Internet to transform agriculture and promote rural and rural development. In China, which is accelerating the process of rural modernization, the Internet and modern agriculture are also deeply integrated, releasing new growth potential. Looking at the practice of developing the Internet and agriculture at home and abroad from the micro level, the innovative development practice of the Internet and agriculture is mainly manifested in three aspects: innovative application of the Internet in agricultural production; innovative application of the Internet in smart agriculture, agricultural transportation; and innovative application of the Internet in agricultural e-commerce, agricultural organization, community support for agriculture.

4.1. Innovative Application of the Internet in Agricultural Production: Smart Agriculture. The existing smart agricultural production methods are mainly based on the development of the agricultural Internet of Things, which collects,

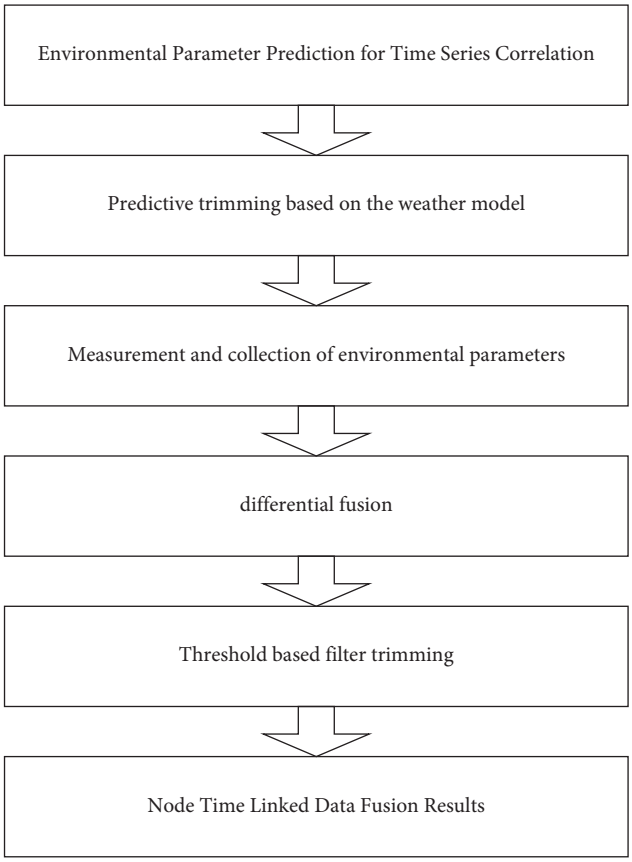

Figure 2: Flow chart of time correlation model based on environmental parameter prediction.

transmits, and processes social scene data to realize intelligent management and control of agricultural production sites. Among them, intelligent control management includes real-time monitoring, remote control, intelligent production, safety, traceability, and logistics tracking. As an extension of the agricultural Internet of Things, smart agriculture operates as shown in Figure 3: it can be divided into three links: perception layer, transmission layer, and application layer.

It can be seen from Figure 3 that the perception layer is the key link for the agricultural IoT network system to obtain agricultural production information, which is mainly composed of wireless sensing technology, RFID technology, GPS technology, and RS technology. In the sensing layer, wireless sensors, RFID equipment, video surveillance equipment, and other information collection equipment need to be embedded in the agricultural production site through certain technical means. The above equipment will monitor and collect the data of the target site in real time according to the control instructions and transmit the acquired data to the IoT intelligent gateway through communication modules such as ZigBee nodes and CAN nodes. The transmission layer is the key link in real-time dynamic acquisition of agricultural information, which connects the perception layer and the application layer. The wireless sensor network is the most widely used in the agricultural IoT network system. Common wireless sensor network technologies mainly include WIFI network, GPRS, Bluetooth technology, and other transmission methods. The application layer is the core link of the operation of the agricultural IoT network system, which integrates information processing and decision-making. On the one hand, agricultural producers can conduct real-time monitoring of agricultural production environment information, agricultural production factor information, and animal and plant growth information through intelligent terminals and can perform automated intelligent production according to the growth conditions of animals and plants. On the other hand, consumers of agricultural products can monitor the production process of agricultural products in real time through smart terminals such as smartphones, to ensure the safety and traceability of agricultural products.

4.2. Innovative Application of the Internet in Agricultural Circulation: Agricultural e-Commerce. As the name suggests, agricultural e-commerce is a series of business activities that rely on the Internet to revolve around agricultural production and operations. The application of e-commerce in the agricultural field shortens the distance between agricultural production and consumption, breaks the time and space limitations of agricultural information transmission and exchange, and reduces the information asymmetry in agricultural production. The market scope of agricultural transactions has been expanded, the intermediate links of traditional agricultural products trade have been reduced, and the circulation efficiency of agricultural products has been improved. Both parties to the transaction can freely publish information on the supply and demand of land circulation, the land supplier can use the online database to evaluate the comprehensive value of farmland, and the demander can accurately obtain land supply information through technologies such as information retrieval. Transactions can be reached through various methods such as subcontracting, transfer, exchange, and shareholding, and a new land transfer model of online purchase and offline use has been established. "Ju Land" is more about online land circulation and deeply develops personalized services such as Internet, private custom farms, and contract farming. The agricultural e-commerce system is shown in Figure 4.

It can be seen from Figure 4 that, in the traditional agricultural financial operation, there are widespread problems such as difficulty in obtaining loans for farmers, difficulties in bank credit investigation, high operational risks, difficult management and control, and credit management costs. Internet finance and financing of new agricultural business entities have the advantage of synergy and cooperation, which eliminates the problem of information asymmetry that plagues both financing parties and reduces transaction costs.

4.3. Innovative Application of the Internet in Agricultural Operation Organizations: Community Support for Agriculture. The emergence of agricultural communities is the purposeful group behavior of the public and new farmers in the network society. The development of the Internet,

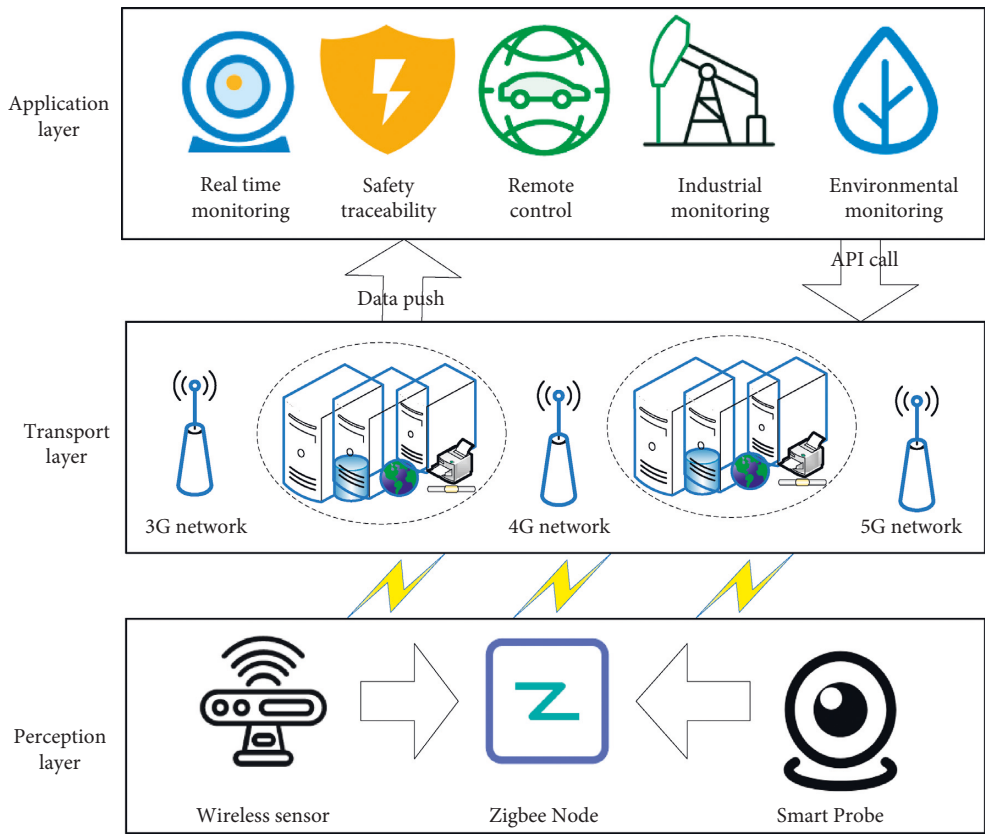

Figure 3: The general operation of smart agriculture.

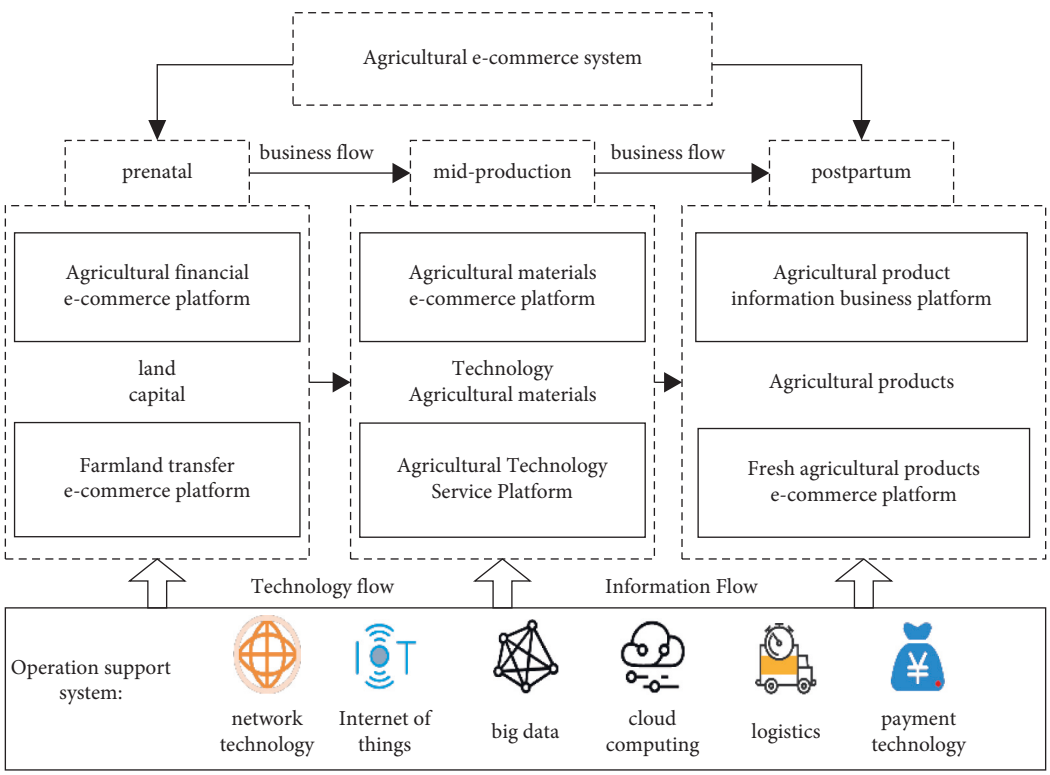

Figure 4: Schematic diagram of agricultural e-commerce system.

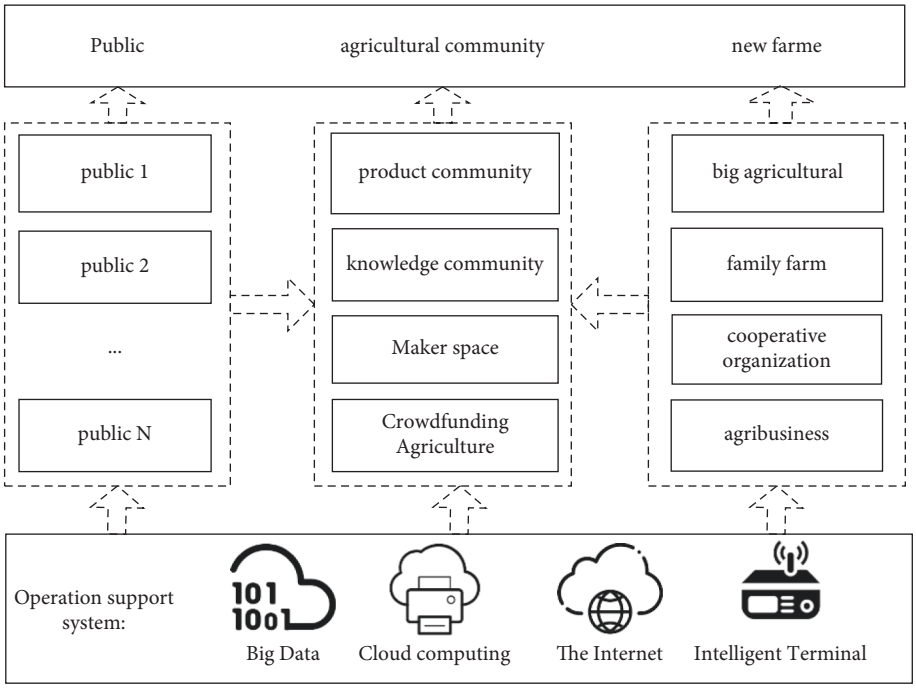

Figure 5: Schematic diagram of community-supported agriculture.

especially the emergence of the mobile Internet, a part of the fixed or mobile social, public, and new farmers, either out of a common interest in agriculture, or because of the corresponding blood, geographical and industrial relations, forms a virtual community on the Internet. An agricultural development community is gradually formed by exchanging information or interests through online and offline activities. Part of the existing agricultural community was transformed from traditional agricultural associations to the Internet, and part was formed spontaneously with the emergence of the Internet. The membership of the community is mainly composed of the general public and new farmers, who have close ties with agriculture in real-life scenarios. The emergence of agricultural communities makes the public and new farmers closely linked, and the public participate in product production, marketing, and service innovation operated by agricultural organizations. The behavior and role of the public in the market are changing from mere consumers to "producers and sellers".

At present, the innovation of community-supported agricultural development is mainly manifested in four forms: agricultural product community, agricultural knowledge community, agricultural crowd-creation space, and crowd-funded agriculture, as shown in Figure 5. Some of these innovative forms originate from a certain link of the agricultural value chain, and some originate from the innovation of the entire value chain.

4.4. Construction of "Internet +" Modern Agricultural Innovation and Development System Model. Based on the above understanding of the connotation of the system, to analyze the formation of the "Internet +" modern agricultural innovation and development mechanism, it is necessary to identify the "Internet +" modern agricultural innovation and development system and its elements based on the objective practice of the integrated development of the Internet and agriculture. And with the help of the relevant theories of mechanism design and mechanism evolution, the formation mechanism of the mechanism is grasped from a dynamic point of view. The model of the "Internet+" modern agricultural innovation development system (IAIDM, Internet + Agricultural Innovation Development System) can be summarized by the following functions:

$$\text{IAIDS} = f\{E(E1,\ E2),\ D(D1,\ D2),\ P(P1,\ P2,\ P3),\ R(R1,\ R2)\}$$

Among them, E represents the environment in which the innovation and development system operates. At a macro level, the "Internet +" modern agricultural innovation and development system is a subsystem formed by the integrated development of the social economic system and the agricultural ecosystem. The innovative development system of "Internet +" modern agriculture is affected by the external environment created by the two major systems and completes the interaction of matter, energy, and information with the two major systems during development. The external environment that plays a fundamental role in the innovation and development of "Internet +" modern agriculture can be divided into institutional environment (E1) and technology application environment (E2). D stands for driving factor, which can be divided into government force (D1) and market force (D2). P stands for participating entities, which are mainly divided into consumer-side entities (P1), supply-side entities (P2), and intermediate service entities (P3). R stands for element resources, which are mainly Internet technology elements (R1) and basic

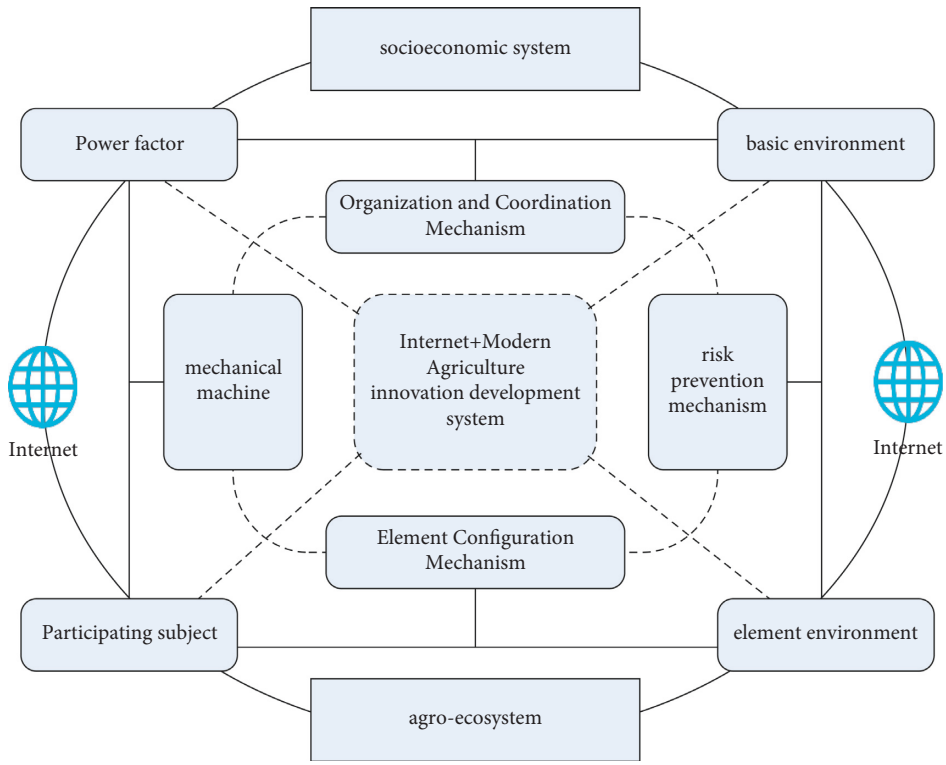

Figure 6: Static relationship between Internet + agricultural innovation and development system.

Table 1: Network simulation parameters.

Parameter	Value	Parameter	Value
Monitoring area	100 × 100	Ach	0.0013pJ/b
Sink(BS) location	(50, 50)	Asm	10pJ/b/m2
d0	100	Etx, erx	50 nJ/b
N	100	DataPacketLength	4000b
E0	0.5 J	CtrlPacketLength	100b
Pn	5nJ/b/signal	p	0.05

Table 2: Normalized data for training samples.

	2015	2016	2017	2018
X1	0.2	0.4	0.7	1
X2	0.6	0	0.3	0.5
X3	0.6	0.7	0.8	1
X4	0.01	0	0	0
X5	0	0.02	0.04.	0.08
X6	0.1	0.4	0.7	1
X7	1	0.7	0.8	0.8

Table 3: Expected output of neural network model.

years	Expected output	Risk level
2015	0001	High alert
2016	0100	Low alert
2017	0010	Moderate vigilance
2018	1000	Normal

elements of modern agricultural development (R2). The interaction and coevolution of the above variables have jointly derived four submechanisms of the "Internet +" modern agricultural innovation and development mechanism: dynamic mechanism, element aggregation mechanism, organization and coordination mechanism, and risk prevention mechanism. The static relationship of the above variables is shown in Figure 6.

The simulation environment adopts MATLAB, and the range of the grouping algorithm under large-scale network conditions is simulated and compared at first. To compare the efficiency of the algorithm for this task with existing algorithms, Table 1 lists the main parameters of the model.

Among them, N is the number of nodes, Eo is the initial energy value of the node, Ex is the power consumption of data fusion, Ach and Asn are the power consumption of data transmission, Ex and Erx are the power consumption of uploading and downloading, and p is the probability grouping of the AODV algorithm. The index data from 2015 to 2018 are selected as the training sample of the model, and the corresponding normalized data and expected output are shown in Tables 2 and 3. After determining the input value and the expected output, it can directly call the trainingda function for training.

5. Simulation Results and Discussion Analysis of Digital Technology

MWOR algorithms with different weight ratios for different parameters will affect the performance of the algorithm. The residual weight ratios (defined as ratios a and (b) of the network lifetime performance and node energy under various data association conditions are shown in Figure 7.

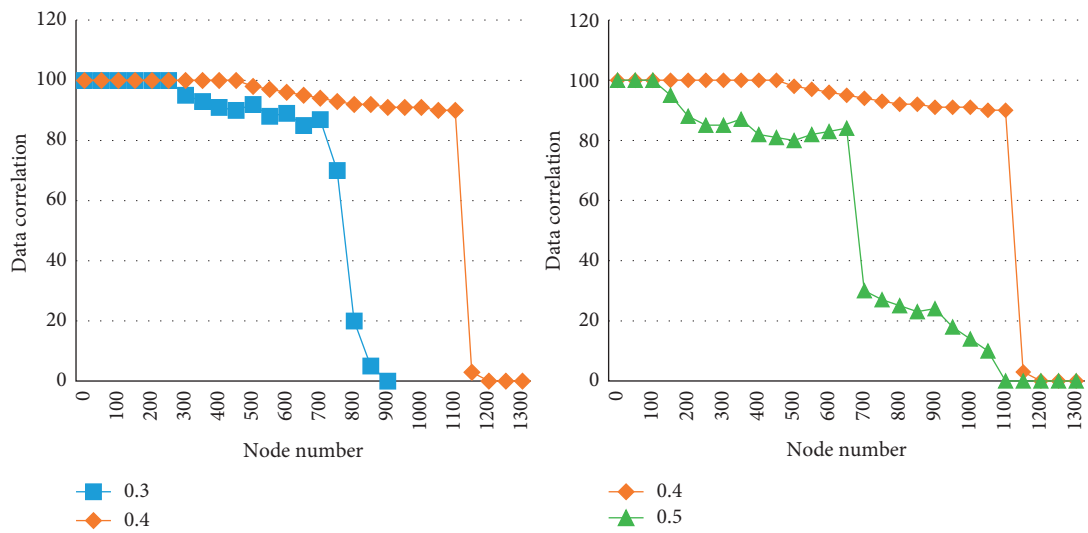

Figure 7: Comparison of the number of surviving nodes affected by different weights.

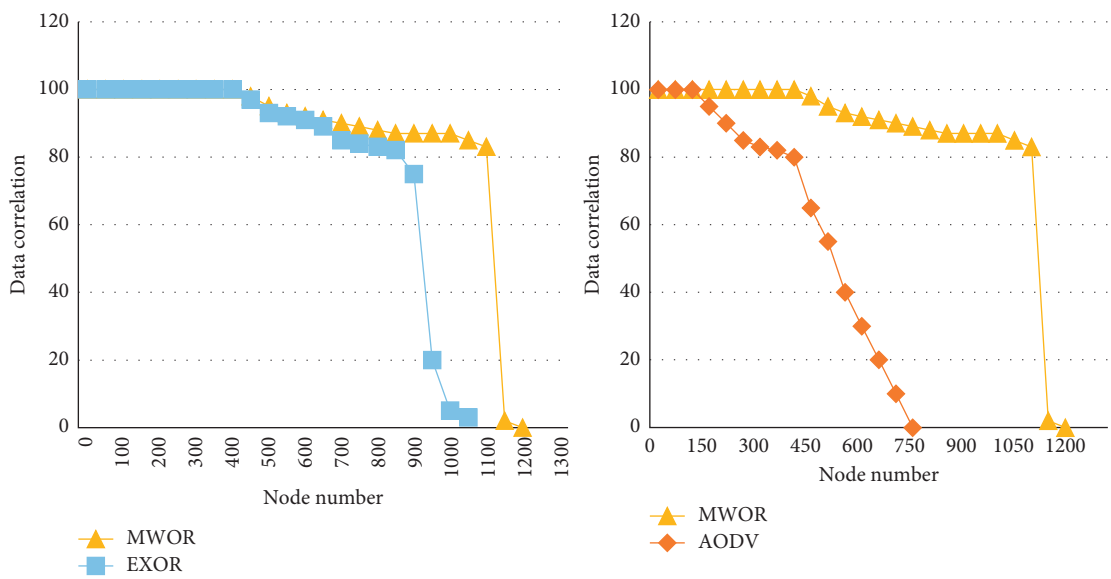

Figure 8: Comparison of the number of surviving nodes in different algorithms.

From Figure 7, we can see that a weight ratio of 0.4 prolongs the lifetime of the network. Therefore, in the following simulations, the weight ratio of data correlation to the remaining node energy is chosen to be 0.4. The comparison of the number of surviving nodes in different algorithms is shown in Figure 8.

From Figure 8, when the system runs for about 200 laps, the dead nodes of the AODV algorithm reach 10% of the number of network nodes, and when the system reaches 700 laps, the number of dead nodes of the AODV algorithm reaches 90%. The dead nodes of the MWOR algorithm reach 10% of the number of network nodes around 500 rounds, while about 20% of the nodes in the ExOR algorithm are still alive around 900 rounds until all nodes die around 1000 rounds. The MWOR algorithm in this paper is that 90% of the nodes are still alive after 1000 rounds. For the first dead knot, the performance of the MWORExOR algorithm is similar, but the network lifetime of the MWOR algorithm is 10% longer than the node downtime. The average residual energy comparison of nodes is shown in Figure 9.

This task evaluates the energy efficiency and load of routing algorithms by varying the average remaining node energy. Relative to the slope of the average residual energy curve, the MWOR algorithm has the smallest slope, the ExOR algorithm has the largest slope, and the AODV has the largest slope. The reason for the analysis is that the data-dependent compression introduced by MWOR reduces the amount of data transmission and reduces the average power consumption. The average node power consumption of the AODV algorithm is the highest. This is mainly due to the need to activate application-level protocols every time a path is discovered. The algorithm does not consider binding instability factors in routing selection, and the average

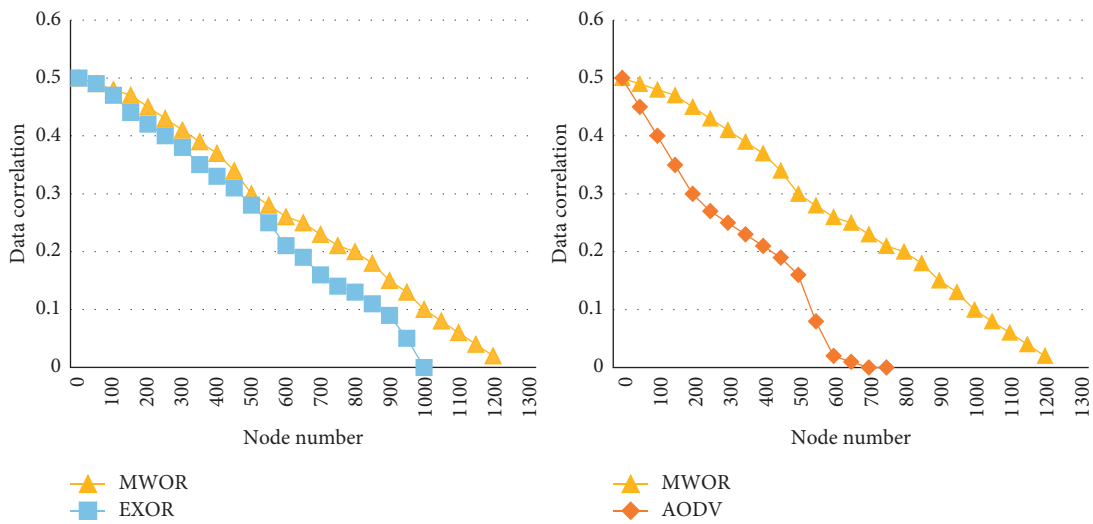

Figure 9: Average residual energy of nodes with different algorithms.

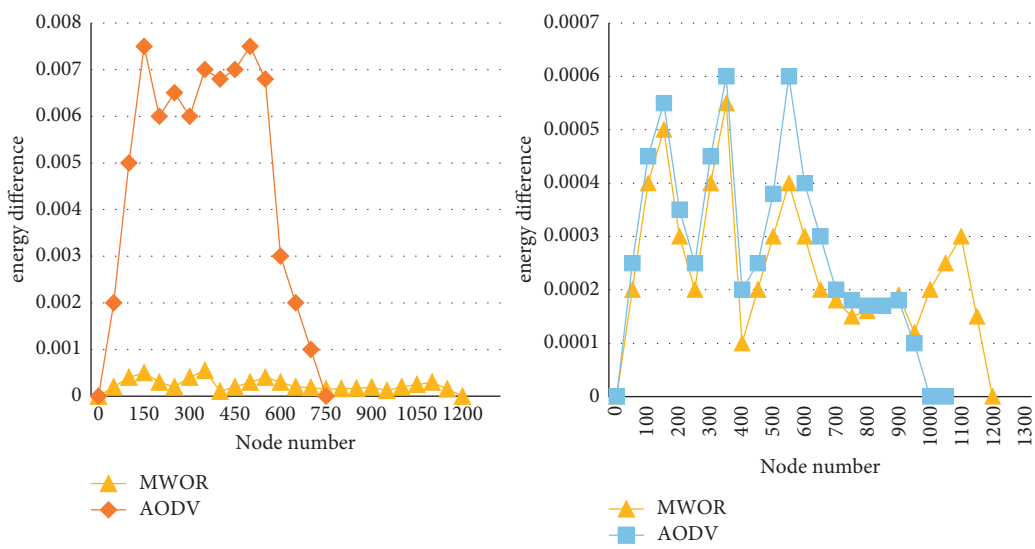

Figure 10: The residual energy variance of different algorithm nodes.

transmission energy consumption is unstable due to environmental interference.

The average energy consumption of a node only represents the total level of energy consumption, and the energy balance between nodes is also an important indicator to be considered when researching routing algorithms. The results show that the AODV algorithm is relatively ineffective because it does not solve the energy balance problem between nodes. MWOR effectively balances the power consumption between nodes by selecting a weighted path with energy awareness and achieves a better energy balance. The residual energy variance of different algorithm nodes is shown in Figure 10.

As shown in Figure 10, the AODV algorithm has the lowest energy balance for grid node energy fluctuations. When the network starts up, the power difference between nodes increases rapidly, and after 100 rounds, dead knots continue to appear, the energy fluctuation fluctuates irregularly around the larger value, and the fluctuation rapidly decreases to zero before all nodes die. ExOR shows that the power consumption is balanced, but the energy balance of the whole grid is slightly worse than M due to the different core energy consumption of the far and near ends. It can be seen that the energy balance of ExOR and MWOR is comparable to that of AODV and is clearly superior.

6. Conclusions

The research on methods such as knowledge collection, extraction, association mining, and personalized information recommendation of agricultural data groups has important practical significance for realizing the effective use of agricultural big data and is the core technology for establishing modern digital agriculture. In view of the application characteristics of agricultural data in the process of perception, acquisition, analysis, and service, this paper has

carried out a series of researches on crowd intelligence perception and mining push technology of agricultural big data. This paper studies the efficient collection method of the Internet of Things in the complex agricultural environment and the vertical extraction method of the agricultural field in the complex Internet data, which provides a data source basis for agricultural big data resources. Aiming at the problems of multisource, heterogeneity, and low data quality, data cleaning and mining technology based on association analysis is studied to improve the availability of data, and a model is established according to users' behavioral interests to achieve accurate information services. The method proposed in this paper solves some practical problems in the collection, analysis, and service of agricultural big data, makes up for some deficiencies of the existing technology, and provides a theoretical and technical basis for the construction of the agricultural big data cloud service platform.

Data Availability

The data underlying the results presented in the study are available within the manuscript.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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