Design and Application of Agricultural Economic Transaction Management Platform Based on Data Mining

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Abstract. In order to increase agricultural efficiency, increase farmers' income, improve rural environment and economic and social development, a design and application of agricultural economic transaction management platform based on data mining is proposed. In this paper, data mining technology combined with related agricultural technology is used to analyze and study the collected environmental parameters, and an optimization model of greenhouse control parameters is designed to replace experienced farmers as planting guidance for crop growth. The objective clustering of OCA is applied to RBF neural network, and the large-scale parallel distributed processing structure of neural network is used to simulate the expert reasoning process and realize the precise management of greenhouse. Taking the green shopping mall in the trading platform as the application background, this paper designs a product recommendation model by using data mining algorithm, excavates the hidden relationship between the sold products, and recommends the mining results to users in the form of popular products, which improves the purchase satisfaction of users and greatly increases the sales performance of products.

Keywords: data mining; Agricultural economy; Management platform

1 Introduction

Agricultural economic transaction management platform is an application platform based on Internet and information technology, aiming at providing comprehensive and efficient management services for agricultural economic transactions. Through data collection, integration, analysis and mining, the platform can provide all-round industry data such as market price, production and sales of agricultural products, transaction records, etc., to help users make decisions and plans. In addition, the platform can also provide transaction management, resource sharing, risk management and other functions to provide users with a better transaction and management experience. The agricultural economic transaction management platform can help all aspects of agricultural economic transactions, such as planting, picking, processing and sales of agricultural products, and unified data management and transaction management can be realized through the platform. At the same time, the platform can also help improve

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the quality of agricultural products and reduce production costs, promote the development of agricultural economy and improve farmers' income level [1].

The agricultural economic transaction management platform based on data mining can help the relevant personnel of agricultural economic transactions to conduct transactions and management more efficiently. Figure 1 shows the process flow chart of data mining. The following are some functions and features that may be included in such a platform: data collection and integration. The platform can collect all kinds of data related to agricultural economic transactions, including market prices, output and sales volume of agricultural products, transaction records, etc., and integrate these data together to provide users with comprehensive industry data. Data analysis and mining, the platform can use data mining technology to analyze the collected data, provide users with services such as forecasting and trend analysis, and help users make better decisions. Transaction management, the platform can provide transaction management functions, including order management, transaction tracking, settlement and invoicing, making the transaction process more efficient and reliable. Resource sharing, the platform can provide resource sharing functions, including planting technology, sales experience, financial management and other aspects of resource sharing, to help users learn from each other and improve. Risk management, the platform can help users identify and manage transaction risks, for example, by analyzing factors such as market supply and demand and price fluctuations to predict possible risks. Data visualization, the platform can provide data visualization functions, such as presenting data analysis results in the form of charts and reports, so that users can understand the industry and market trends more clearly. Mobile applications, the platform can develop mobile applications, so that users can use the platform anytime and anywhere, and manage and track transactions conveniently and quickly.

Because of this precious resource, agriculture also enhances the value of agricultural products and creates benefits for regional economic growth. Therefore, agriculture can also be said to be an urban industry developed in rural areas. In this research background, this paper studies the previous agricultural management model, and puts forward a new agricultural model which is based on computer modernization technology and integrates virtual and reality. Users can manage the real farm through the network and attract more users to use it. The research of this model mainly includes three parts: optimal parameter extraction mechanism, greenhouse control parameter optimization model and commodity recommendation model [2-3].

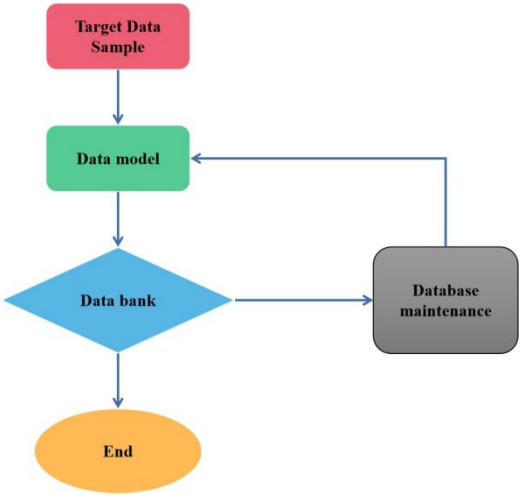

Fig. 1. Data Mining Process Diagram

2 Design of Optimal Parameter Extraction Mechanism Based on Self-updating

Self-updating of control parameters is a process of better than sub-best. The system collects the operating parameters of experienced farmers in planting nodes and establishes an expert database to guide production. By decomposing the steps of planting process and collecting the operation parameters of key nodes, the parameter database of sub-optimal planting experience nodes with self-updating ability is built. The system gives the operation parameters of each node, which can be directly used by inexperienced farmers or replaced by automatic control system, but experienced farmers can modify the parameters according to their own judgment, and the system will automatically record the changed environmental parameters. The system determines whether to update the system node parameters according to the overall planting effect of the final agricultural products, so as to ensure that a set of planting node parameters saved by the system is the best at the moment, or it can be "The next time it is changed, the iterative planting process leaves the wisdom traces of experienced farmers, and the system can replace experienced farmers to complete the planting task" [4]. The parameter optimization process based on self-updating mechanism is also the process of continuously extracting the optimal data of crop planting results. The overall process is as follows:

(1)Scoring of crop growth status: After the crops are harvested, the growth status of this batch of crops is scored by comprehensively considering the factors such as crop size, surface fineness, weight and planting cost;

(2)Extraction of optimal crop growth process data: according to the results of the scoring table in the background database, if it is judged that the scoring result of this

batch of crops is the highest at present, that is, the growth condition is optimal, all the data of this batch of crops growth process are taken out from the database;

(3)Replacement of optimal data parameters of crop planting: the system will automatically replace the existing optimal data parameters in the database with the optimal crop growth process data extracted in the previous step.

(4) Optimization of the optimal parameters of crop planting: The system continuously collects the data of the optimal crop growth process and automatically replaces the optimal data parameters in the database, so that the optimal parameters are continuously optimized.

3 Greenhouse control parameters optimization model design

The optimization model of greenhouse control parameters studied in this paper is the self-learning mechanism and inference engine of RBF neural network based on Optimal Currency Areas (OCA) objective clustering. Through the training of a large number of optimal parameters of crop growth process, the neural network is transformed into a model that conforms to crop growth, and the intelligent reasoning and judgment process is realized. Its module structure is shown in Figure 2.

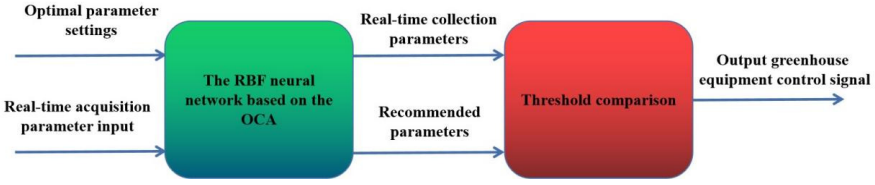

Fig. 2. Structure of greenhouse control parameter optimization module

The optimal parameters of crop growth process include five environmental variables: temperature, humidity, light intensity, CO2 concentration and growth days. Among them, the growth degree daily value is a key parameter for dividing the current growth period, and humidity control is more convenient compared to light intensity, temperature, and CO2 concentration. Therefore, when designing the network model, the four variables of temperature, light intensity, CO2 concentration and growth degree-day value are taken as the network input and humidity as the network output, which is a four-input and one-output network.

4 Design of commodity recommendation model

The product recommendation model designed in this paper is based on the analysis of a large number of users' historical orders, and excavates the hidden laws among the sold products. At the same time, through continuous interaction with users, the association rule set is updated in time. In the recommendation model, the mining of association rules and the timely updating of information are the most complicated, which are at the core of the whole recommendation model and will directly affect the quality of

recommendation results [5-6]. The frame diagram of the recommended model is shown in Figure 3.

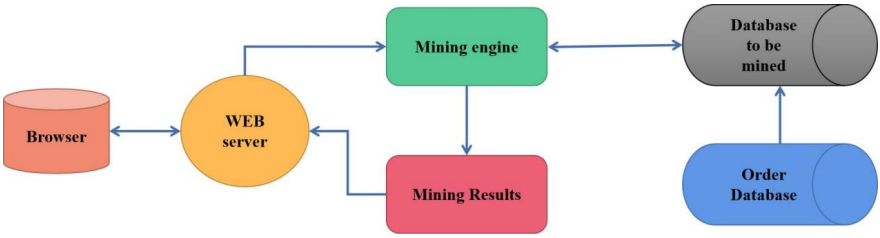

Fig. 3. Frame diagram of commodity recommendation model

The browser is in the interactive layer in the product recommendation model, and it transmits the user's request information to the WEB server in the form of parameters [7]. The WEB server analyzes the information transmitted by the browser and then forwards it to the mining engine based on association rules, and the mining engine starts to work. In most cases, the original data in the order database does not meet the mining conditions, so it is necessary to preprocess it, remove the data that does not meet the mining conditions from the database, and then extract the data that meets the conditions and save it in the database for mining. The mining engine is the core module in the whole recommendation model, that is, the recommendation module. It will mine the order data according to certain association rules, send the results produced after data mining to the WEB server in the form of product recommendation list, and then pass them to the browser through the WEB server. Finally, the browser will show the product recommendation results to users for them to choose, which will improve their purchase satisfaction, thus greatly increasing the sales performance of goods [8-10].

4.1 Implementation of Product Recommendation Model

The product recommendation model designed in this article mainly includes three modules: input module, recommendation module, and output module. The input module provides a good interactive interface for users to collect their Consumer behaviour and interests; The recommendation module uses association rule algorithms to analyze the data in user purchase orders and mine recommendation results; The output module presents the mined recommendation results to users in the form of a list, and its product recommendation model structure is shown in Figure 4:

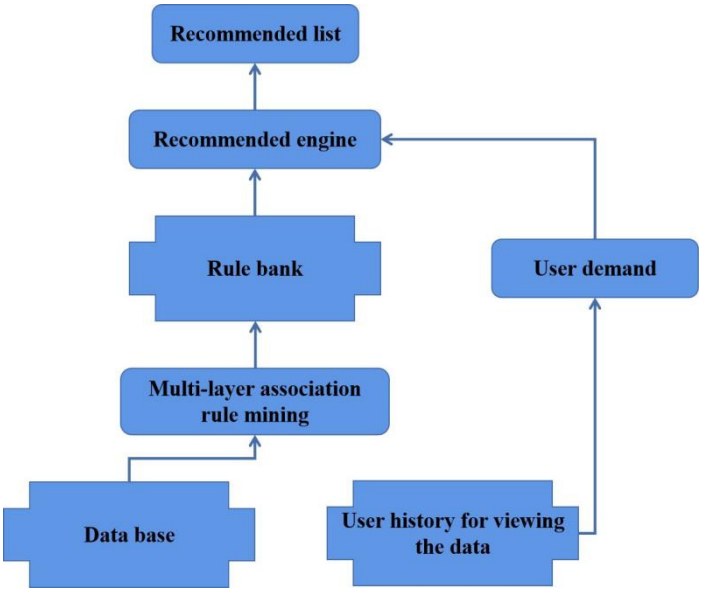

Fig. 4. Commodity Recommended model structure

5 Conclusion

In this paper, an agricultural economic transaction management platform based on data mining is designed, which combines virtual farm with real farm, and users can manage real-time online farm only by browser. Through the analysis of crop growth process parameters, the improved RBF neural network is used to realize the optimization model of greenhouse control parameters. In order to realize the related sales of commodities in the trading platform, a commodity recommendation model based on data mining algorithm is proposed. This model mainly analyzes users' commodity orders, digs out users' interest preferences, and shows the results to users in the form of hot commodities to realize the related sales of commodities.

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