

Construction and Research of Agricultural Product Price Prediction Model Based on Intelligent Algorithm

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Abstract: In order to solve the problem of price prediction of agricultural products, a price prediction model based on intelligent algorithm is established. Through the construction of grey prediction model and neural network algorithm model, it is used in the work of agricultural product price prediction, and the experimental results are obtained and analyzed. The research shows that both the grey prediction model and the neural network algorithm model meet the needs of agricultural product price prediction, which are reasonable, reliable and practical, and worthy of promotion and application.

1. Introduction

Under the market economy, forecasting the price of agricultural products plays an important role and has practical significance. By reasonably predicting the price of agricultural products, we can scientifically and reasonably adjust the production of agricultural products, accurately grasp the market dynamics, and scientifically determine the supply of agricultural products, which is conducive to meeting people's consumption demand for agricultural products and promoting the development of agricultural products and the improvement of market competitiveness. The common forecasting methods of agricultural product price include qualitative forecasting method and quantitative forecasting method, which have their own characteristics and advantages. However, practice has proved that the quantitative forecasting method is more objective, scientific and fair. Quantitative prediction methods include traditional methods and intelligent algorithms. According to the experience of experts, traditional methods have achieved results, but they have obvious limitations and subjectivity, which to some extent reduces the accuracy of price prediction. The intelligent algorithm can break through the limitations of traditional methods and deal with complex problems more scientifically. It is a new method for agricultural product price prediction. In practical work, grey prediction model and neural network algorithm model are two common methods of intelligent algorithm, and the prediction effect is good. Compared with the traditional methods, the two methods are more convenient, accurate and the comprehensive effect is more obvious. When these two methods are applied, if the price of agricultural products contains multiple influencing factors, there may be more complex problems in the research, and the application of intelligent algorithm can make the complex problems more simple, which is conducive to improving the accuracy of price prediction, so its application has become more and more widely used. Based on the demand of agricultural product price forecasting, this paper takes the grey forecasting model and neural network algorithm model as examples to discuss the application of these two models, and proves that these two methods have good effect in agricultural product price forecasting, which is worth popularizing and applying.

2. Construction of agricultural product price prediction model based on intelligent algorithm

By using intelligent algorithm, the grey prediction model and neural network algorithm model are constructed, and then experimental research is carried out.

2.1 Construction of grey prediction model

In the process of using the grey prediction model, the prediction value is the closest to the real value. It is necessary to fit the time series with stability to ensure the accuracy of the prediction result.

In the process of building the grey prediction model, the following steps are strictly followed: ensure the time series is stable, find out a better prediction model, then fit the model, carry out hypothesis test, evaluate the prediction model, and then predict the model that has passed the test.

After the completion of the above work, the next step is to build a grey prediction model. In the process of agricultural product price prediction, the application of grey prediction method has become more and more extensive, the essence of which is the forecasting grey prediction system method. The grey theory is solved by GM (1,1) model group. First, setting the time series and getting the differential equation corresponding to GM (1,1) model by accumulating the generated series. Then setting the parameter vector and using the least square method to solve it. By solving the differential equation, we can get the price prediction model of agricultural products. In order to ensure the accuracy and reliability of the model, it is necessary to test the model. The main contents of grey prediction test include residual test, correlation test and posterior variance test. After checking the prediction model of agricultural products, the sequence diagram of time sequence can be generated, and the original time sequence can be compared with the prediction time sequence.

2.2 Construction of neural network algorithm model

Checking the data as required, in order to ensure the accuracy of the prediction results, it is necessary to remove the abnormal data and supplement the data appropriately. If the collected price, production, sales volume and other data are incomplete, it is necessary to supplement the vacant data to provide reference and basis for carrying out research and analysis and accurately predicting agricultural product prices. The Premnmx function is also used to normalize the collected data, including agricultural product prices, production, and sales. After processing, the data can be made consistent, and the value of each index is controlled within the range of (-1, 1). This is helpful to reduce the difference between different data, avoid large errors in input or output data, and affect the accuracy of agricultural product price prediction results.

After completing these tasks and consulting the literature, the agricultural product price impact factor can be determined. For reference to the predicted agricultural products, reference documents should be consulted to determine the price impact factor. Organizing the information into an expert consultation opinion form, and using Delphi method to consult the expert opinion, and finally determining the agricultural product price impact factor. Then determining the weight, which is the key indicator in the evaluation. Therefore, the weight composition must be scientific and reasonable to improve the accuracy and reliability of the assessment. The questionnaire survey and scoring method were used to determine the weights, 1 point in the very subtotal, 2 points in the very subtotal, 3 points in general, 4 points in the very subtotal, and 5 points in the very subtotal.

Finally, a neural network model is constructed to predict the prices of agricultural products. And establishing evaluation criteria for the forecast price of agricultural products to verify the accuracy and reliability of the model.

3. The application of agricultural product price prediction model based on Intelligent Algorithm

After building the model, we take pork and rose as examples to predict the price of agricultural products. Then getting the experimental data, building the experimental platform and determining the factors that affect the price of agricultural products.

3.1 The application of grey prediction model in forecasting the price of agricultural products

After the establishment of the grey prediction model, the pork price in Nanchang city is taken as an example to predict. Firstly, the stability of the data was tested. Taking Nanchang pork price as

the prediction object, the monthly average price was used to carry out the research. The data source was Nanchang pork price daily statistical website, which was used as the monthly average price data of Nanchang pork after weighted calculation. The time series includes observation value, start time, end time, period, etc. data can only be analyzed, modeled and drawn after being converted into time series objects.

Through the modeling analysis, we can see that the pork price in Nanchang is stochastic and unstable, and the overall price is rising, which reaches the highest in March 2020, and then has a downward trend. Then the R language is used to predict the price of pork in Nanchang City, the model selection and model evaluation are carried out, and the residual value is obtained by cat () function. The test results show that the residual of the model does not pass the significance test.

Then the evaluation model is applied to predict the price of pork. According to the prediction results, the average price of pork in Nanchang will be basically stable in the next six months, and there will be no significant change.

3.2 The application of neural network algorithm model in forecasting agricultural product price

Taking roses as an example, a neural network algorithm model is used to predict its price. The input data is the price factor that affects the roses, and a general price prediction model is constructed to predict the prices of agricultural products. For some unreasonable data, it should be removed before research and analysis, to avoid these data affecting the accuracy of price prediction.

Consulting the literature, it can be concluded that the supply, transaction, demand, production, quality grade, etc., are the main factors that affect the price of roses. For example, some scholars believe that supply volume and transaction volume are important influencing factors. Some scholars believe that the supply, demand, production cost, quality level, the planned profit of suppliers and wholesalers, the number of people at the auction site, and the buyer's participation in the auction strategy will affect the price of fresh cut roses. Some scholars have found through research that the production cost, suppliers and wholesalers profit, and will not directly affect the price of fresh cut roses. In addition, some scholars believe that the number of people at the auction site will not directly affect the price of fresh cut roses. Supply, demand, quality grade, production costs, before and after holidays, etc. will affect the price of fresh cut roses.

Therefore, on the premise of collating and analyzing these documents, according to these influencing factors, the Delphi method is used to conduct expert opinion consultation, and finally determine the price influencing factors of roses: supply, demand and quality grade.

4. Experimental results and analysis of agricultural product price prediction model based on intelligent algorithm

In the price prediction and research, the clustering analysis algorithm is usually used in the past, although it can achieve some results, the accuracy is also relatively high. However, this method has some limitations. It can only classify the prediction objects, and it is difficult to predict the real price of rose flowers accurately and concretely, and it is also lack of persuasion in application.

Therefore, through the application of neural network algorithm model, the rose price can be predicted more accurately. The results show that the accuracy of this method is over 92%, this method has good effect and high accuracy. It not only shows the advantages of the model accurately, but also helps to better predict the rose price, and provides reference and basis for management decision-making, which is of great significance.

5. Conclusion

How to effectively solve the problem and reasonably predict the price of agricultural products is an important work that cannot be ignored. Intelligent algorithm brings opportunities and possibilities to solve these problems. Through the research and analysis of the application of grey prediction model and neural network algorithm model in the price prediction of agricultural

products, the results show that the two models and prediction methods are feasible, reasonable and practical, and worthy of promotion and application. Therefore, in the actual work, it is necessary to operate strictly according to the requirements, build a reasonable prediction model, obtain accurate data, and then carry out research and analysis carefully to accurately predict the price of agricultural products.

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