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The Output Value Prediction Model of Regional Fitness and Leisure Industry

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Abstract: *The fitness and leisure industry is a part of the sports industry. The sports industry is a huge industry group, such as sports equipment manufacturing, sports events, etc. The fitness and leisure industry is an industry that caters to the public with the continuous increase of people's living income. The purpose of this paper is to study the construction and demonstration of the output value forecasting model of the regional fitness and leisure industry. And use the GM model (1, N) to make a gray forecast model for each year's GDP, and judge the rationality of the model by comparing it with the data of previous years. Forecast GDP from 2017 to 2022. By comparing and analyzing the results obtained by the two forecasting methods, it is concluded that the forecasting results of the two forecasting methods have high accuracy, and the fluctuation of the forecast error of the structure value is relatively small. However, the gray system is simpler than regression analysis. The average relative error of the output value prediction of the fitness and leisure industry in the gray system area is 2.104%. It can be seen that the gray system prediction method has great application value in structural prediction.*

Keywords: *Fitness and Leisure, Industrial Output Value, Prediction Model, Model Demonstration*

1. Introduction

The fitness and leisure industry is a sports concept with a wide coverage. It refers to the sports service industry and product industry that integrates fitness, entertainment and leisure provided by multiple social and government agencies [1]. The products of this industry are mainly provided to the public in the form of immaterial products. Including fitness rehabilitation, leisure and entertainment, skills training and other forms of service products [2]. It is an industrial form that focuses on improving people's physical and mental quality of life and promoting social harmony. Gyms and leisure centers are part of the sports industry and are an integral part of the sports industry [3]. Today, with the rapid growth of the national economy, national fitness and national health have risen to the height of national rules. According to the requirements of the medium and long-term development plan, the sports industry and the sports industry must have a comprehensive development strategy and related supporting facilities in order to fully integrate into the main market forces [4].

Foreign countries pay more attention to the research of forecasting model. Carriere T proposes a new data-driven approach that unifies the two steps of prediction and decision-making into a single function that is optimized according to a single criterion, the eigenvalues in the decision-making process. This approach allows us to bypass the use of ad hoc predictive models and can be extended to any well-defined decision-making process with inputs, outputs, and objective functions. Evaluate intermediate methods, where meta-optimization is applied to tune the predictive model as a function of the value it brings [5]. Duc-Anh developed a bioeconomic model for forecasting that explicitly incorporates forecast uncertainty. Using agricultural systems (ag-systems) production simulation software calibrated with case study information, we simulated pasture growth, herd dynamics, and annual economic returns in different climates. We then employ a regret and value function approach to quantify the potential economic value of using SCF (at current and improved levels of accuracy) in decision-making for a grazing business in northeastern Queensland, Australia [6]. The construction of the output value prediction model of the regional fitness and leisure industry is analyzed to provide theoretical support for promoting the development of the regional fitness and leisure industry in the future [7].

This paper effectively applies the grey system theory to the establishment of investment forecasting

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models. The gray system is a system in which the information is partly known and partly unknown. It solves the degree of correlation between system factors through dynamic correlation analysis, establishes differential equations based on generating numbers, reveals the nature of the development of things, and establishes a grey prediction model, which can make predictions about the development trend of things make predictions. Based on the relevant output value data, this paper analyzes the correlation and quality assurance of the regional fitness and leisure industry output value. At the same time, the concept of elasticity in economics is introduced, the calculation method of elasticity is given, and the annual production price forecast model is introduced by using the grey GM model (1.1).

2. Construction and Empirical Research on the Prediction Model of Regional Fitness and Leisure Industry Output Value

2.1 Gray System

The name of the grey system is defined in terms of color, which used to be "black" for completely unknown information and "white" for completely clear information. The reference to "grey" is somewhere in between. Therefore, the system represented by the "gray" system is called the gray system [8-9].

Number gray, element gray and relative gray are the basic principles of gray system, and gray number and its function and gray equation are the basic content of gray system. The main research direction of gray system is the analysis, modeling, prediction and control of the actual gray system in our daily life [10]. In practical applications, when solving a problem, it is necessary to fully perform several other tasks at the same time, such as predicting the final valuation of stocks and futures, which first needs to be analyzed and summarized. Record the historical discussion of a period, and then formulate an accurate planning model on this basis, make scientific and accurate predictions for the future, formulate possible ideas, make effective decisions and management, and achieve the purpose of reducing losses and costs [11- 12].

(1) Cumulative generation and cumulative generation

Additive generation is an algorithm that finds the accuracy of the raw data, and a way to change the gray system from gray to white. Before designing a gray prediction model, the original process is generally analyzed and processed, and a one-time accumulation method is usually used, because the morphological law of gray values in the development process can be found through accumulation and vision, which can reduce the randomness of the original data and improve the physical data accuracy.

(2) Mean generation

When processing data before modeling, generally when removing mutation data and abnormal data caused by sudden interference factors, the original sequence data is empty, resulting in randomness and uncertainty of blank data, which affects the prediction results of the model. Therefore, it is necessary to replace the blank data with data that can actually describe the variation law of the original system sequence. Therefore, the gray system adopts the method of mean generation to replace the gaps in the old sequence and construct a new sequence.

2.2 Regression Analysis

Regression analysis is often carried out on the basis of correlation analysis. Multiple regression analysis reveals the degree of influence of several variables on a specific variable, and is used to express the different weights of the influence of several variables on a specific variable. The degree of influence of each variable on a specific variable can be determined through the multiple regression coefficient, and finally presented in the form of a functional expression, that is, the regression equation. The particular variable is called the dependent variable and is also the variable being explained. Several of these variables are called independent variables. Regression analysis expresses the statistical significance of using the dependent variable to explain the independent variable, and expresses the degree to which each dependent variable explains the independent variable.

The regression analysis is generally divided into the following steps:

(1) Import several collected structured variables into SPSS, and perform multiple regression analysis on the basis of correlation analysis to obtain regression equations. In the process of regression analysis, several statistical valueswill be obtained, such as regression coefficients, correlation

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Coefficient, Coefficient Multiplier, Regression Coefficient Multiplier. Among them, R2 represents the correlation of the obtained regression equation. The larger the value of R2, the better the interpretation effect of the obtained regression equation and the higher the degree of fitting. Since the value of R2 is affected by the number of independent variables, in the analysis process We also need to pay attention to adjusting the size of the coefficient of determination value.

(2) Carry out reliability analysis and F test on the obtained functional relation expression. The reliability of the expression is determined according to the size of the F value.

(3) The significance test is carried out on the regression coefficient of the obtained function expression, and the t test is commonly used to ensure the accuracy of the prediction.

3. Construction and Empirical Investigation and Research of Regional Fitness and Leisure Industry Output Value Forecasting Model

3.1 Data Sources and Collection

(1) Sample selection method

As an important part of the sports industry, the sports fitness and leisure industry has formed a product portfolio with multi-asset investment, high, medium and low-grade coverage, and has become a common model for many disciplines. In addition, as the national sports and fitness industry has become a national practice, fitness, leisure and fitness has become the focus of public attention and a hot spot of participation. Therefore, this study takes the development of the sports fitness and leisure industry in M City as the research object, predicts its development trend, and analyzes its key factors.

(2) Longitudinal research method

Qualitative and quantitative analysis of the materials and data from 2017 to 2021 can not only comprehensively reflect the development of sports and related industries in all aspects, but also reflect the development trend and the relationship between various factors.

(3) Data analysis method

In terms of data acquisition, this study uses the method of data analysis to collect and organize the sports and related industry survey reports and the Suzhou Statistical Yearbook from 2017 to 2021, and analyze and select the relevant data involving variable indicators in this study.

3.2 Grey Forecast of Output Value

The regularity of GDP is strong, showing an upward trend, but there is an inflection point in the middle, and the increase is unstable. According to the number generation theory in the grey system, the regularity of numbers can be enhanced and the accuracy of analysis can be improved. Assuming that the number column composed of the gross domestic product of each year is x, the whitening differential equation can be established:

$$\frac{dX^{(1)}}{dt} + aX^{(1)} = u \tag{1}$$

The value of the $X^{(1)}$ sequence at each time k can be obtained from the above formula.

In the next step, $X^{(1)}$ is accumulated and subtracted to return the gross production value of each year. The return rule is:

$$X^{(0)}(k) = X^{(1)}(k) - X^{(1)}(k-1) \tag{2}$$

In this way, the output value of each year can be obtained.

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4.Construction and Empirical Analysis and Research of Regional Fitness and Leisure Industry Output Value Forecasting Model

4.1 Comparison of Model Return Value and True Value

The following two parts are considered, one is the comparison of the model return with the original data, and the other is the forecast value analysis. That is, the division of the time axis. If the current time is 0, the previous year is a negative time and the next year is a positive time. This article will predict the output price based on the judgment of the model based on historical data.

Record the numerical and actual values obtained from the forecast model from 2017 to 2022, and report the associated error values, as shown in Table 1.

Table 1: Comparison of model return value and true value

Years	True value	Production value forecast
2017	862.24	883.36
2018	911.12	936.14
2019	1044.65	1064.28
2020	1148.07	1168.50
2021	1278.63	1299.72

Plot its data as follows:

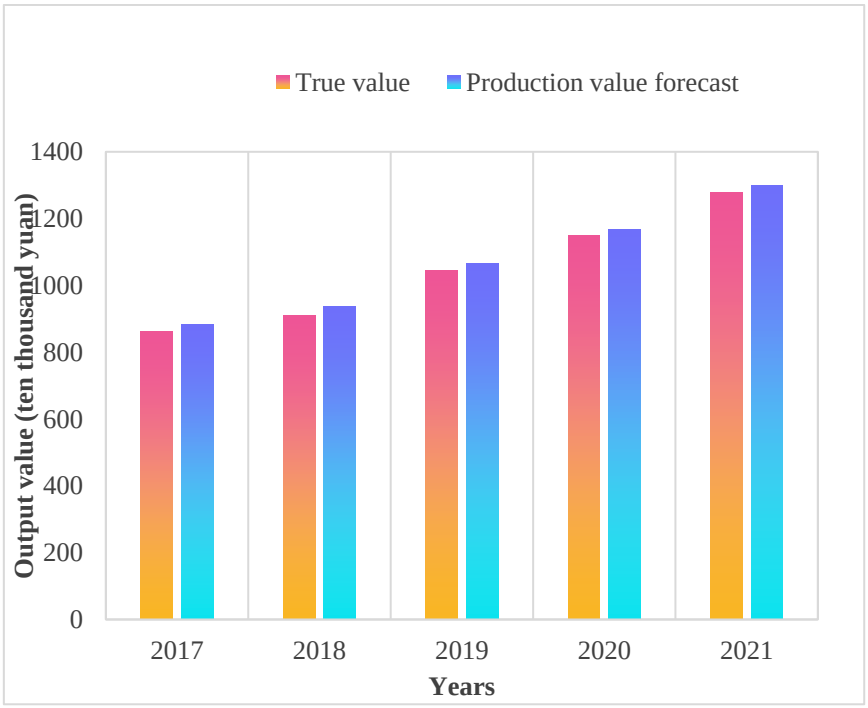

Figure 1: Data Comparison Chart

Comparing the data from 2017 to 2022, it seems that except for 2017 and 2018, the difference is very small, as shown in Figure 1. Overall, the price error around the current time is small, and the forecast accuracy is relatively satisfactory. Therefore, we can trust the predicted price for 2022 and take the second step.

In this way, on the basis of the short-term production price forecast, the long-term forecast of the output value is realized. The forecast results show that by 2023, the annual output value can be generally increased compared with the current output value, which is generally consistent with my country's national economic development goals, so it has high credibility.

4.2 Comparison of the Two Models

Regression analysis is a traditional prediction method with high reliability. The prediction method in this paper is also a highly accurate prediction method for structure prediction. The accuracy

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comparison of the two prediction methods is shown in Figure 2:

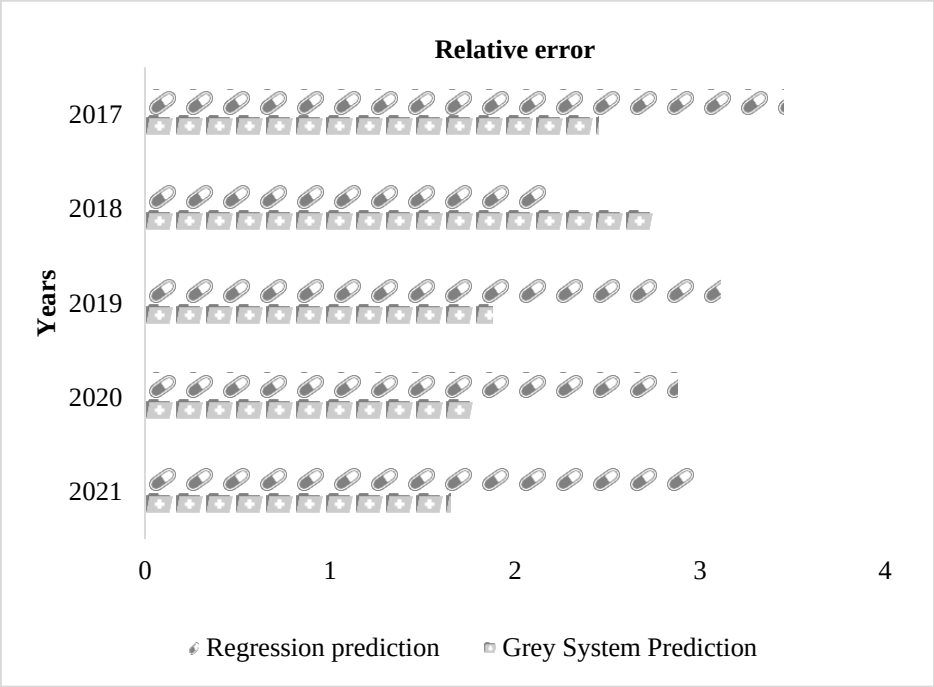

Figure 2: Comparison of prediction accuracy

It can be seen from the figure that the average relative error of the regression analysis method for the prediction of the output value structure of the fitness and leisure industry in M province is 2.932%, and the average relative error of the gray system method for the prediction of the output value structure of the fitness and leisure industry in M province is 2.104%, and the prediction accuracy Both methods are very high, and the error fluctuations of the two methods for the prediction of the structural values of various industries are very small. It can be seen that the predictions of the two methods for various industries are relatively ideal, and the prediction results are credible. However, for the prediction of the output value structure, the regression analysis is to first predict the output value, and then convert it into a structural prediction, while the gray system prediction method directly predicts the output value structure, which is simpler than the gray system analysis.

5. Conclusions

Sports is a service from the original meaning, it is to satisfy people's spiritual life, so the sports industry itself is also a service industry, so the fitness and leisure industry is a part of the sports industry, which is inseparable. The output value structure of fitness and leisure in my country is an important indicator to reflect whether the industrial structure is reasonable, and its prediction provides an important basis for the optimization and rational adjustment of my country's industrial structure. This paper uses two methods to predict the output value structure of fitness and leisure industry in M province, one is the more traditional regression analysis method, and the other is the gray system forecasting method. And compared and analyzed the two kinds of forecasting results, the conclusion is that the two forecasting methods have good effect and high accuracy, the errors of forecasting the structure of various industries are relatively balanced, and the forecasting results are reliable.

Acknowledgements

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