Optimization of Resource Allocation Based on Sports Information Industry Management

Xu Suzhou
Guangxi Vocational and Technical College of Transportation
Nanning, Guangxi, 530000
China
xmrgtj636359778@163.com

ABSTRACT: *The sports information industry is one of the rapidly developing industries in recent years, and it faces many challenges and problems in its development process. Among them, the rational allocation of resources is one of the important issues in managing the sports information industry. How to reasonably allocate resources and improve the management level and efficiency of the sector is an urgent problem to be solved in the current sports information industry. This article studies optimizing resource allocation based on sports information industry management. Through research on the management of the sports information industry, a resource-based optimization method for resource allocation has been proposed, aiming to improve the management level and efficiency of the sports information industry.*

Keywords: Data Mining Algorithm, Sports Information Industry,Optimization Design

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1. Introduction

With the vigorous development of the Internet era, upgrading China's sports information industry system also follows the trend [1]. The sports information industry has rapidly spread to the eyes of the world's people, and it has also quietly expanded the ideological cognition of citizens while contributing to national policy, cultural communication and so on [2]. At the same time, in the country's series of sports modes, the application of the sports information industry is very scarce, and such a huge resource can't be used by people, which is truly a pity. The sports information industry has been injected into the people's vision through an innovation and development model, which has become a feasible and efficient way at present [3].

Under big data background, the Internet and computer systems are two main forces that can't be separated [4]. The communication way of the sports information industry is based on the Internet. In this paper, the three are organically integrated to develop an innovative development model of the sports information industry based on the background of big data. By amplifying the characteristics of data information dissemination and integrating the real-time contents of scientific management into the sports information industry, the system can be split and restructured, which can provide the basis for the model research in

technical aspects [5]. Through the injection of Web pages, sports information industry software and mainstream social software, the sports information industry is integrated into people's lives. Finally, the research and construction of the innovative sports information management development model is completed [6].

2. State of the Art

While understanding the sports information industry system, it is found that the operation mode of the sports information industry system in foreign countries is worthy of our references [7]. According to the effective data, in the application of foreign sports information industries, the penetration rate of data information transmission through the Internet and other ways has been more than 90% [8]. This data shows the original intention of this study, and there are huge resources and energies behind the small window of the sports information industry. In foreign software constructions, it has ruled out the single Web server window, which a series of people-friendly social software have also replaced and so on [9]. In the server construction, data chain integration and the final form of expression, the foreign sports information and other contents are infiltrated with decentralized units, which is also penetrated into the page of mobile network tools people use. The development of sports information industry technology and sports information in the mode of big data has reached a very high level. The research of the sports information industry in China rose in the twenty-first Century, which lagged behind the Western countries for quite a few years [10]. But in the later follow-up stage, our country has shown a strong learning ability and reached considerable coverage today. While the discourse of the traditional information industry has been gradually weakened, China's sports information industry has entered the public view with its unique identity. However, in the use of sports information industry resources it still continues to uphold the traditional model, and if this model is not broken, there will be a huge loss in our country.

3. Methodology

3.1. Sports Information Processing Model

The Internet is the way of information transmission and retrieval. Using computer technology, it can carry on huge amounts of information, data acquisition, and analysis and then put them into the sports information management mode. Based on the above situation, the text information is collected and input into the system for the sports information in each stage. The information is saved separately and stored in the computer database so as to help the next work. The automatic evaluation system needs to be continuously updated. At this stage, the accumulation of information data will continue to increase with the updating. The data processing ability will also be improved to synchronise the system design with the learning ability. What's more, the next step is to process the submitted information data, and according to the accumulation of information data, the preliminary scoring is carried out. Then, according to the score of other aspects, different models are formulated according to different sports information feedback. According to the correction of the information data on the traditional model and the feedback after the optimization of the evaluation system, the data is compared as the carrier, and the specific data is shown in Table 1. On this basis, it is easy to improve the system design further.

Contrast Data	Accuracy Rate	Objectivity	Feedback Ability	Promoting Effect
Manual correction	0.91	0.85	0.96	0.85
Automatic correction	0.98	0.99	0.95	0.94
Semi manual and semi-automatic	0.98	0.97	0.99	0.92

Table 1. Automatic Evaluation and Manual Correction of Comparative Data

Under the consideration of the above factors, the targeted optimization model of the sports information industry and the feedback problem are integrated. The database based on the Internet is used to retrieve the situation automatically. In using a system processing link, management risks of sports information projects are calculated and managed through the computer. The whole design process is completed by intelligent data transmission, and manpower is the only subsidiary choice to check errors, simplify the difficulty of coding and reduce the occurrences of coding errors.

3.2. Optimization of the Sports Information Industry Based on Data Mining Algorithm

In the data mining algorithm, according to the characteristics and functions of the data, the whole model is simulated into an impact model for the sports information industry. The network structure of data transmission in sports information transmission is calculated, as shown in the following figure:

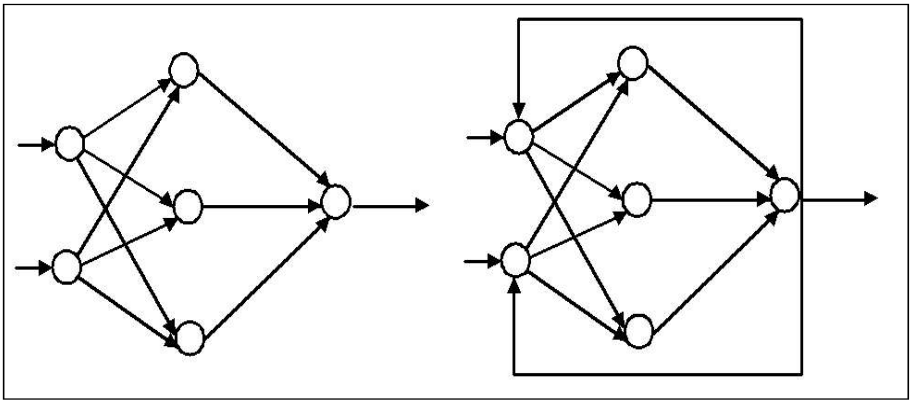

Figure .1 Schematic diagram of network structure of data mining algorithm

In the application of this algorithm, it mainly applies the hierarchy of data mining algorithms. $x_1, x_2, x_3, \cdots x_n$ is the information input of raw data, $w_{i1}, w_{i2}, w_{i3}, \cdots w_{in}$ is the weight coefficient of original data *i* and $x_1, x_2, x_3, \cdots x_n$, and y_i is the output of original data *i*. The excitation function determines the output mode, and the output relation can be described as:

$$I_t = \sum_{j=1}^{n} w_{ij} x_j - \theta_i \tag{1}$$

It is changed as: $I_t = \sum_{j=0}^{n} w_{ij} x_j$ and $w_{i0} = \text{-}\theta_i, \quad x_{i0} = 1$ (2)

The original data must have a certain amount of output after obtaining the network input. According to the biological characteristics of raw data, it is known that different raw data cells have different thresholds, which determine whether the original data is excited. Accordingly, an appropriate transformation function *f* is needed to transform the information, which is known as the excitation function. There are many forms of excitation function *f*, such as threshold function, linear function, piecewise linear function, S-type function, etc. Among them, S-type function is the most widely used, and it is taken as an example, and the S-type function (Sigmoid function) is

$$f(n) = \frac{1}{1 + \exp^{-(n+b)}} \tag{3}$$

$$f(n) = \frac{1 - \exp^{-2(n+b)}}{1 + \exp^{-(n+b)}} \tag{4}$$

The S-type function can compress any input value into (0, 1), often using the logarithmic type. It has the function of nonlinear amplification gain function, and the slope of the curve on the input point is the gain of any input: the input is negative infinity to zero, and the gain increases from 0 to the maximum; the input goes from zero to positive infinity and the gain drops from the maximum to 0. The function's output is always positive since the slope value is guaranteed to be greater than 0. It is progressive and slippery and keeps monotony, the most commonly used nonlinear and widely used transfer functions. The data mining algorithm with a three-layer structure is the most commonly used one. Next, the data mining algorithm with a three-layer structure is studied, and the data mining is a supervised data learning algorithm whose input is a collection of samples that is similar to the following one:

$$\{p_1, t_1\}, \{p_2, t_2\}, \cdots \{p_n, t_n\} \tag{5}$$

$$a^{m+1} = f^{m+1}\left(w^{m+1}a^{m} + b^{m+1}\right), m = 0,1\cdots, M-1 \tag{6}$$

Among them, w is the weight matrix, and m is the number of layers in the network. There is a certain deviation between the actual and expected output results. To obtain the mean square error, the following formula is established:

$$F(x) = E\left[e^2\right] = E\left[(t-a)^2\right] \tag{7}$$

Then, the approximate steepest descent method is used to update the bias values and weights:

$$W^m(k+1) = W^m(k) - as^m\left(a^{m-1}\right)^T \tag{8}$$

$$b^m(k+1) = b^m(k) - as^m \tag{9}$$

After k times of network training, the weight matrix of layer m is W, b is the bias value of layer m, a^{m-1} is the output of layer m-1, and is the error exponent of layer m, also called the sensitivity index.

To make the computational data of mining data meet our requirements, there is a need to constantly input samples and make constant adjustments so as to meet our requirements ultimately. Therefore, the calculation steps of data mining are summarized as the following seven steps. In the initialization of the computing state, the network parameters need to be initialized with a relatively small number of random numbers. In the known P learning samples, the samples are sequentially entered into the network shown in Figure 1. Firstly, the first training sample is input and used as input value of the input layer unit, and the input value is $x = x_1, x_2, x_3, \cdots x_n$.

The output of the hidden layer is obtained:

$$O_j = f\left(\sum_{i=1}^{n+1} v_{ij}x_i\right), x_n = 1, v_{i,n+1} = -\theta_j \tag{10}$$

The output of output layer is obtained:

$$y = f\left(\sum_{j=1}^{n+1} w_{ij}x_i O_j\right), O_{n+1} = 1, \quad w_{j,n+1} = -\theta_k \tag{11}$$

The error is calculated.

The error of the output layer is obtained:

$$d_{jk} = y(1-y)(y-Y) \tag{12}$$

The error of hidden layer is obtained:

$$d_{ij} = O_j(1-O_j)\sum_{k=1}^{m} d_{jk}w_{jk} \tag{13}$$

The total error of the network is:

$$E = \sqrt{\frac{1}{p}\sum_{p=1}^{p}(E_p)^2}, E_p = \frac{1}{2}(y-Y)^2 \tag{14}$$

The weights and the closed values of each layer are modified, and an improved algorithm based on gradient descent is adopted to accelerate the convergence rate of learning:

$$w_{jk}(n_0+1)=w_{jk}(n_0)+\eta\cdot d_{jk}x_j+\alpha\Delta w_{jk}(n_0)$$
$$w_{jk}=(n_0+1)=w_{jk}(n_0)+\eta\cdot d_{jk}x_j+\alpha\Delta w_{jk}(n_0) \quad (15)$$

It is necessary to check whether the network error is up to our accuracy requirement. If it is reached, it will stop; if it is not reached, step (10) is used to continue the calculation. According to the above calculation steps, the corresponding calculation path can be summed up, and the calculation formula will be input to the computer according to the calculation steps, which will be translated into the language that can be understood for calculation. In this way, data mining can be simulated by computer technology, and only by entering the data into the computer can the results we need be calculated, and it is more accurate and faster. The operation mode is shown in the following picture:

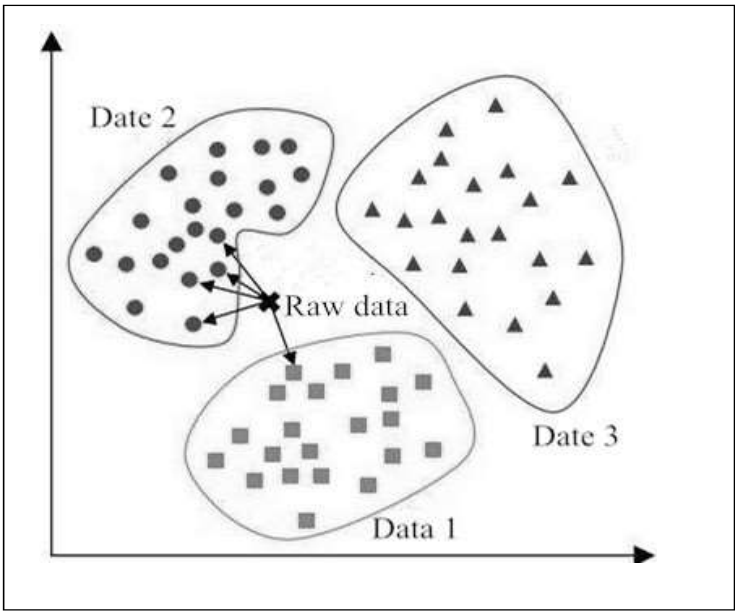

Figure 2. The operation model of data mining algorithm

In this paper, for the research on the data mining algorithm technology of the development of sports information industry, the data mining algorithm is added and the whole transmission effect is more diversified, which is also the optimization of our targeted test. With the continuous development of computer technology, its data processing ability is no longer the same, and after the ideas and principles of the whole design are cleared, it is necessary to improve the model with the corresponding data mining technology. Data information is mainly applied to the input of sports information demanded by the Internet and users, and the construction of information technology needs professional graphics processing technology to form the basic block diagram. Finally, it combines the information input source to review the information and adjust the lack of ideas in real time so as to improve the design model of the information management. The data mining algorithm not only improves the whole data transmission system but also adjusts the data of the information industry, and adding a data mining algorithm enriches the flexibility of the sports information industry.

4. Result Analysis and Discussion

After the design of the algorithm, there is a need to start the corresponding algorithm test, which is to test whether the improved data mining algorithm is superior to the original algorithm in computational performance. For the superiority test, the revised data mining algorithm in this paper and the actual data mining algorithm, as well as the data mining algorithm optimized by other

people were used to test the Camel function separately. The experiment was carried out in vc++6. 0 environment, which ran 200 times, and the population size was 100 and evolution algebra was the 20th generation. The three data mining algorithms ran the Carrel test function 200 times, and the average value of the final and optimal solutions were compared, respectively. The results are shown in Table 2.

Function	**Traditional genetic algorithm**		**Others improved genetic algorithm**		**This paper improves the genetic algorithm**	
Carrel	The final solution of the average	Optimal solution	The final solution of the average	Optimal solution	The final solution of the average	Optimal solution
	-0.960864	-1.029202	-1.031624	-1.031624	-1.03129	-1.031626

Table 2. Comparison of Three Algorithm Test Results Table

It can be seen from Table 2 that the optimal solution of the final improved algorithm in this paper is closer to the minimum of the test function, and both the mean value of the final solution and the optimal solution are better than those of the traditional data mining algorithm and other improved algorithms. Thus, the superiority of the final improved algorithm is illustrated. The convergence of the algorithm is tested, and the convergence is significant for data mining algorithms: if the convergence is too fast, it will be difficult for the algorithm to calculate the results; if the convergence is too slow, it is likely to lead to the failure of the calculation results. Therefore, convergence is a very important property, and testing it will help us adjust the algorithm's steps.

In the accuracy test, the optimal solution of the final improved algorithm in this paper is closer to the minimum of the solution, and the average value of the final solution or the optimal solution is better than that of the traditional algorithm and other improved algorithms. Thus, the superiority of the final improved algorithm is illustrated. The relevance of the algorithm is tested, and the relevance is very important for data mining algorithms: if the relevance is too fast, it will be difficult for the algorithm to calculate the results; if the relevance is too slow, it is likely to lead to the failure of the calculation results. Therefore, relevance is a very important property, and testing it will help us adjust the algorithm's steps. The accuracy of the experiment and the calculation length were statistically analyzed, and the calculation was divided into 20/40/60/80/100 tasks, respectively. The calculation time and calculation accuracy are shown in the table below.

Test algorithm	**Pilot projects**	20	40	60	80	100
Using data mining algorithms	**Time (s)**	20	41	45	50	54
	Accuracy%	100	100	100	100	100
Do not use data mining algorithms	**Time (s)**	34	75	103	121	145
	Accuracy%	100	85	74	76	62

Table 3. Calculation Time and Calculation Accuracy

With the increase of the quantity of the task, the response time of the whole online sports information processing is still not greatly improved, and the computing time is 20 seconds when there are 20 people, and in the calculation of 100 people, the calculation time is about 60s. The average time of this calculation can be achieved in the same amount of data in one second, and it can be accepted by us, and it is also within the given time range. In addition, the algorithm is not related to the self-detection

of sports information processing, so errors will not occur in the calculation but will also make self-investigation. To further test the optimization of the data mining algorithm, the task data from 100 to 400 was used to make the targeted test for the response time of the data mining algorithm. The test results are shown below:

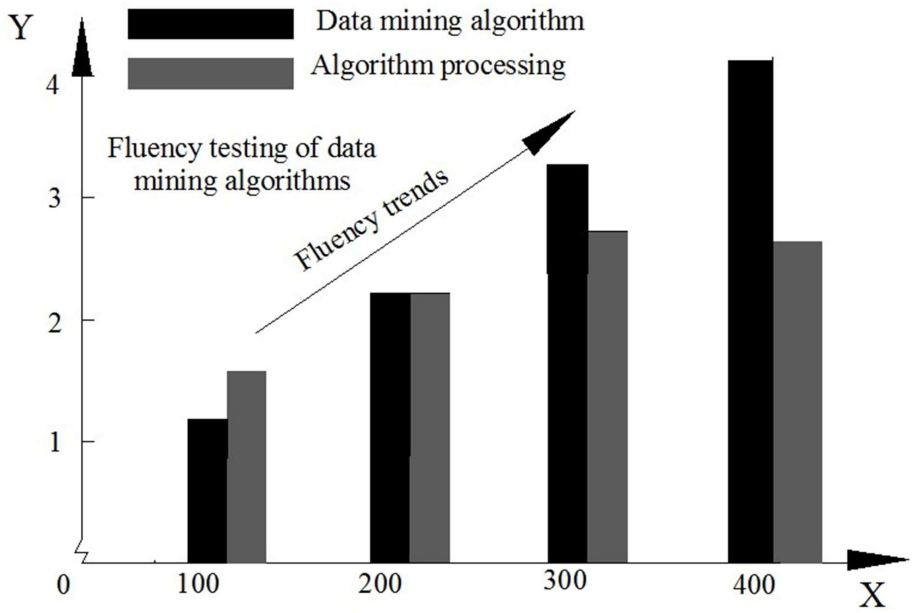

Figure 3. Optimization of processing speed for data mining algorithms

As can be seen from the picture above, with the increase of the number of information, the whole processing time fluctuates accordingly. Without adding the data processing algorithm, the entire processing function occurs a jam, and the data processing function of the platform has a big hysteresis quality; with less or easier data processing, the server runs smoothly. After adding the algorithm, it is found that the overall performance of data processing is significantly improved. With the further improvement of data mining algorithm functions and the increasing popularity of program structures, more and more software will make the data and operation focus on the calculation of server algorithms. It only needs to use the browser at the client's port, and it can solve the problem of program deployment. and for programmers, the data is expressed on the server, which is also easy to focus on processing. However, if there is a large-scale application, the optimization design for the development of the sports information industry will be further developed. The algorithm has very strong stability, security and reliability in various degrees of miscellaneous operations, and it also has a fast execution speed for various operations between large-capacity entities so that its compatibility, scalability, resource occupancy and other indicators have all reached the corresponding requirements.

5. Conclusion

With the continuous improvement and development of computer technology in China, the application range of data mining algorithms is also expanding. Therefore, the optimization design for developing the sports information industry based on a data mining algorithm was proposed. Firstly, the model of sports information dissemination was briefly described, and the intelligent information processing method was used to optimize the sports information model preliminarily. Based on the model, the data mining algorithm was added to improve the real-time performance of the data processing in the sports information industry. With the addition of data mining, the time and efficiency of data processing were optimized, and the sports information industry model was constructed using reasonable network structure components. While validating the data mining algorithm, the optimal solution was tested first. The optimal solution of the final improved algorithm was closer to the minimum of the test function. Both the average value of the final and optimal solutions were better than those of the traditional data mining algorithms and other improved algorithms. The accuracy of the experiment and the length of the calculation were statistically analyzed, and the

calculation was divided into 20/40/60/80/100 tasks respectively. With the increase of the quantity of the task, the response time of the whole online sports information processing was still not greatly improved, and the computing time was 20 seconds when there were 20 people; and in the calculation of 100 people, the calculation time was about 60s. As a result, the feasibility of the sports information industry based on algorithm processing was proved; however, in this study, the suitability of data mining algorithms was not verified.

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