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Development and Application of Sports Training Decision Support System

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Abstract: *Science and technology is an important support to promote the development of sports, and the dependence of sports training on science and technology is becoming more and more obvious. The purpose of the development and application of the sports training decision support system is to integrate the scientific the training theory and advanced training methods are applied to the management of physical education and sports training for college students, effectively exerting the auxiliary role of science and technology in sports training. This system enriches the knowledge base by generating new knowledge rules through data mining technology, selecting the corresponding model based on user input and combining with the rules in the knowledge base to step by step to produce a set of reasonable sports training programs.*

Keywords: *sports training, science and technology, system, development, application*

1. Introduction

Sports is a highly comprehensive discipline, which includes sports human science, sports humanities and social sciences, etc., and before 2000, the research field of sports application decision support system was limited to sports training, sports evaluation, sports management and other fields. Compared with the extensive research fields of sports science, the application of DSS in sports needs to be further expanded. Literature studies have shown that in recent years, scholars have conducted research on intelligent management systems, national fitness information analysis and decision support systems in the field of sports material selection. This shows that more and more scholars have realized the powerful support functions of DSS and tried to apply them to all areas of sports.

With the rapid development of computer technology and the in-depth application in all aspects, especially the development of artificial intelligence theory and data mining technology, it is for the organic integration of different aspects of college students, and the application of scientific training theories and advanced training methods sports training management has become a possibility, and the application of data mining technology in the sports training auxiliary decision support system is theoretically feasible. Through the research and analysis of existing college students' sports, training, etc., combined with the specific physical fitness and health standards of college students, this paper finds out a set of scientific and reasonable training programs. Use it to check its rationality and improve the existing decision support system.

2. Design of sports training decision support system

2.1 Selection of software development tools for sports training decision support system

(1) Tools that support interpreter generation

These tools can sometimes be directly used in a specific decision support system or decision support system generator, and become an important tool as an entity of a specific decision support system or decision support system, such as different high-level languages (COBOL, PASCAL, API, etc.) Can be used to develop various elements of a decision support system. In addition, there are window software, database management software and statistical analysis software packages.

(2) Tools to support data generation

There are data editing software, database maintenance software, dialogue editing software, etc.

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There are more advanced comprehensive, multi-functional software toolkits, such as Lotusl-2-3, Knowledge Man and the fourth-generation language MAPPER, etc., which can be used to develop application systems for decision support systems faster.

(3) General tools

1) Operating system

The operating system is the supporting environment for any application software to run normally. Choosing a better operating system environment is crucial to the development of decision support systems. Currently commonly used operating systems are MSDOS, DRDOS, UNIX, XENIX, WINDOWS, LINUX, etc.

2) Programming language

Programming language is an indispensable tool for developing application software. The design of different components of the decision support system requires a programming language with specific functions. At present, the commonly used programming languages used to develop decision support systems can be divided into the following two categories: One is problem-oriented languages with strong computing power, rich graphics functions and good traceability effects. It is used to develop decision support systems with a large number of numerical calculations, human-computer interaction and graphics imaging; the other is a symbolic processing language, which is designed for artificial intelligence. They all have search and match functions, functions and explanations. Develop functions commonly used in intelligent decision support systems.

3) Tools to support data

Such as data processing software, file processing software, data extraction system and database management system, the difference lies in some related database management systems, intelligent database management systems, etc., which can better meet the data management needs of decision support systems. Some database management systems are autonomous process language systems, which provide effective support for the integration and integrated management of data and models.

4) Support integrated tools

Such as integrated software MSCMT, communication software, interface software and conversion software, integrated tool software CTS, etc. CTS is a tool software developed on IBM-PC and compatible computers, or a generation tool and working environment that supports the development and operation of user application software systems. It can effectively complete software system and module integration, menu configuration, operation control and maintenance management. Tools that support integration and application function modules developed by users or directly applied together constitute a complete application system.

2.2 Modular design of sports training decision support system

(1) Human-computer interaction module

In this system, the role of the human-computer interaction module is to exchange information between system users (administrators and decision makers). The human-computer interaction module of this system is responsible for receiving relevant information input by users in the system, and at the same time providing the results of internal calculations in the system to users in need. There are two different types of users in this system, namely, manager users and decision maker users. Since the responsibilities and tasks of the operator and the decision user are completely different, the man-machine interface is a functional interactive unit. The system is divided into an operator user interface and a decision user interface.

Use Agent as a human-computer interaction interface, accept the tasks of the planner, and then pass it to the functional Agent, and require the planner to input necessary physical and test information; after the plan is made, the planner will be told to the planner, and it will be done according to the needs of the user A scientific explanation, so there must be a corresponding explanation mechanism inside the interface Agent. Interface Agent is composed of knowledge base, model library, communication unit, inference engine and so on. The knowledge base stores knowledge about decision makers' preferences, organization interface methods, and interface function integration. The model library stores the basic objects of the man-machine interface, and the user model is continuously adjusted and stored in the model library based on specific user habits and knowledge fields. The internal components of the

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interface Agent interact with each other through the inference engine. The main work of the inference engine is to update the knowledge base and model library in combination with the knowledge base, model library, user history records, etc., to make the man-machine interface more scientific Reasonable and user-friendly, and finally achieve the goal of realizing an intelligent user interface.

(2) Model library design

The establishment of the model library is for the decision support system to better manage and use the internal models of the system. Because during the operation of the decision support system software model, some models may be called multiple times. In order to improve the versatility of these models, the models used in the decision support system can be stored in the model library according to key modules. The basic modules in these model libraries are not directly related to each other, but when the system needs to call these units, the methods stored in the method library can be used to combine these so-called modules, so that requirements can be considered through calculations.

(3) Data set design

The data set module is composed of three sub-units: data list, data input and parameter setting. It mainly solves the early data processing problems of decision support systems and provides target data sources for data extraction. This method first collects and analyzes previous data, and then receives more complex data through specific techniques. Here, the adjustment of relevant parameters is the most important and critical, and determines the accuracy of the final decision-making basis.

In order to ensure that the data set can run normally in the system management, first export, clean and transform the data from the website; or the data from the outside. The purpose is to integrate these different types of data into one form. These data can be stored in a specific data set, or directly entered into the database management system for processing. When inputting data into the management system for processing, the system should also refer to the previously defined data set module for processing. The last is to create a data set that supports decision-making and directly analyze the data source.

(4) Data mining design

Data mining includes two modules, data processing and rule management, and is the core and core system design unit of the entire decision support system. It mainly completes the two functions of data optimization and data prediction and analysis, so as to realize data prediction. Especially the storage, sorting and organization of athletes' physical conditions, and then use the relevant database technology to complete the design of the auxiliary receiving function.

(5) Auxiliary analysis module

The module consists of two auxiliary units: data comparison and auxiliary decision-making. Its purpose is to provide timely, accurate and various forms of information for high-level decision makers or trainers to meet the needs of decision-making. Once the decision makers have obtained this information, they can first analyze the information and then vaguely match it with the knowledge base. If a highly matched knowledge can be found, the corresponding knowledge is used to make a decision; if only a partial match is possible, the matched part of the knowledge is used as a condition, and the reasoning mechanism and the rules in the knowledge base are used to continue matching until the decision can be made Or no knowledge is available so far. If there is no knowledge available, explain it accordingly. The rules and knowledge in the knowledge base are continuously added and updated as the problem is processed.

This part of the experiment proposes that the above steps are used to design a sports training decision support system based on data mining. The specific process is shown in Table 1.

Table 1. Some steps of the experiment in this article

Design of Sports Training Decision Support System Based on Data Mining	3.1	Selection of software development tools for sports training decision support system	1	Tools that support interpreter generation
			2	Tools to support data generation
			3	General tools
	3.2	Modular design of sports training decision support system	1	Human-computer interaction module
			2	Model library design
			3	Data set design
			4	Data mining design
			5	Auxiliary analysis module

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3. Experimental results and analysis

3.1 Experiment analysis

(1) Four evaluation indicators such as root mean square error (RMSE), R-square error, average absolute percentage error (MAPE), and sum square error (SSE) are used to evaluate the prediction accuracy of the prediction model. The prediction models are divided into polyline type, negative exponential type and nonlinear decay type. The evaluation index values of the prediction results of each model are shown in Table 2 and Figure 1.

Table 2. Comparison of evaluation indicators of various prediction models

Evaluation index	Polyline type	Negative exponential type	Non-linear decay type
RMSE	0.845	0.782	0.932
R2	1.017	0.996	0.947
MAPE	1.126	1.204	0.965
SSE	0.752	0.891	0.639

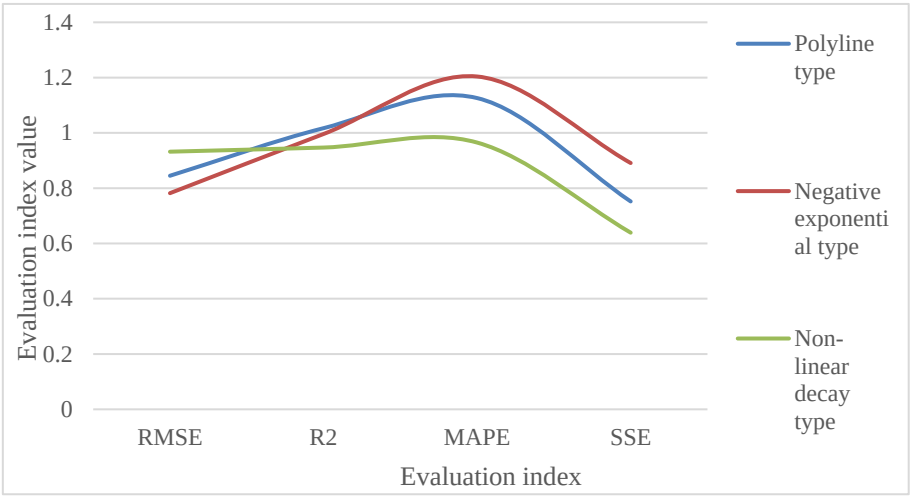

Figure 1. Comparison of evaluation indicators of various prediction models

It is known that the Root Mean Square Error (RMSE), Mean Absolute Percent Error (MAPE), and Sum of Square Error (SSE) should be as small as possible, and the R-squared error should be close to 1. It can be seen from the chart that the value of the negative exponential type is smaller than the value of the polyline type, and the value of the polyline type is smaller than the value corresponding to the nonlinear decay type, so the prediction effect error of the negative exponential prediction model is smaller; the negative exponential prediction model The R-squared error value is closer to 1 than the corresponding value of the broken line type and the nonlinear decay type, so the negative exponential prediction model has a better prediction effect on the effectiveness of the sports training method, and its prediction result matches the actual value to a higher degree.

(2) According to the prediction model and decision tree algorithm of the method part of this article, the Analysis node is used to evaluate the accuracy of the model. The prediction accuracy of the training set and test set of the prediction sample is shown in Table 3 and Figure 2.

Table 3. Forecast accuracy

Forecast result	Training set accuracy	Test set accuracy	Accuracy of all samples
Prediction model	87.42%	89.35%	90.73%
Decision tree algorithm	90.16%	92.46%	93.14%

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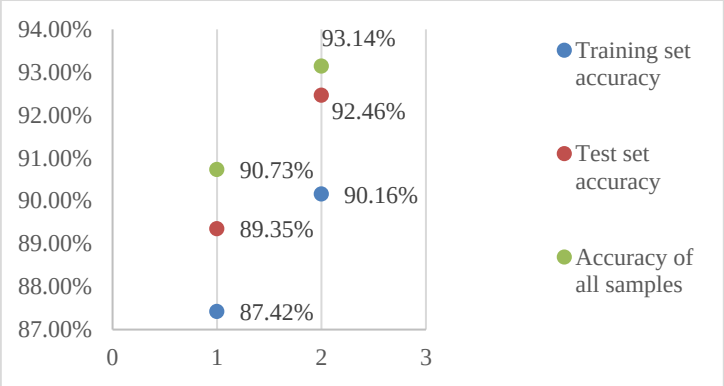

Figure 2. Forecast accuracy

The chart results show that the prediction accuracy of the three models is very high, the results of the training set and the test set are similar, and there is no overfitting in the training set.

4. Conclusion

The innovation of this system is the application of data mining technology to the decision support system in the field of sports training. A large amount of experimental data is used to construct a data warehouse to form a multidimensional data set of college students' physical fitness. The multidimensional data set is analyzed through data mining technology. Generate new knowledge rules to enrich the knowledge base to ensure the accuracy of decision-making. The input data is handed over to the problem solving module for processing, and a scientific and reasonable sports training program is gradually generated by calling the rules in the knowledge base to realize the organic integration of sports, training, and management. The scheme produced by the system is tested in actual physical education, and the system is evaluated and perfected according to its effect, and the operation effect is good.

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