Development and Research of University Sports Teaching Information Management System Based on Data Mining Technology

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Abstract

In an information society, data mining technology is applied to university sports teaching to promote to form university sports information management system and increase university sports teaching efficiency. This paper summarized the data mining technology and stated concrete content of data mining technology. Meanwhile it also analyzed current situation of university sports teaching management, expounded the importance of data mining technology to university sports teaching, and then put forward the construction method for university sports teaching management system, and made discussions on construction of sports data mining system, mastering of construction method, sports database design and other aspects so as to promote the construction of sports teaching information management system and development of sports teaching.

Keywords: Data Mining Technology, University Sports Teaching, Information Management System.

1. RESEARCH BACKGROUND

1.1 Research overview

University sports teaching is the basis of university teaching and it can not only enrich students’ extra-curricular life but also lead students to exercise to enhance physical fitness (Wu, 2017), therefore, university sports teaching is very important in school daily teaching. As information technology develops in depth, the universities have enter information technology age and various information technologies are applied to university teaching management, promoting the university to gradually change to information campus. And sports teaching is also covered in the construction of information campus. During the process of sports teaching, it will generate a great deal of information in teaching activities because of complex students structure and sufficient course contents, so the universities shall use data mining technology at the time of reform of sports teaching to help the construction of sports teaching information management system (Pan, 2017). Teachers can timely mine data and find out valuable information through application of sports information management system in sports teaching, which can provide teachers with accurate teaching information data and help teachers to better carry out sports teaching. Present research literatures mainly focus on the use of data mining technology and sports information management system and mainly explain the process of construction of sports teaching information management system via data mining technology (Wang and Gao, 2017). Research on these academic contents provides the scholars with way of thinking on the research on data mining technology and sports teaching information management system.

1.2 Research purpose

This paper is to build the information management system for university sports teaching taking concrete content of data mining technology as entry point and combining information technology. There is obvious difference between university sports teaching and teaching of other aspects and the former is mainly to enhance physical fitness and cultivate students’ competition spirit (Lv and Du, 2016). Application of data mining technology can overall mine students’ data information, integrate sports teaching information, reasonably arrange teaching contents to students and improve sports teaching efficiency. Completely apply data mining technology, build sports teaching platform, promote university sports teaching to gradually change to information-based teaching and improve sports teaching level during this process.
2. OVERVIEW OF DATA MINING TECHNOLOGY

Various data technologies rapidly develop in information age and data mining technology becomes the development emphasis (Wang and Gu, 2016). Data mining technology means the extraction of mass raw data via technology. The data have characteristics of fuzziness, imperfection and random selectivity (Li and Feng, 2015). Data mining technology can mine deep, inscrutable and valuable information in data during the data extraction process. Data mining technology gradually forms its unique information technological characteristics, namely, applicability, development and precise application during its development process. Meanwhile, data mining technology has specific operation process and data mining shall be carried out according to its process (Guo, 2015). Firstly, set data collection target and correct related raw data according to data target scope. Secondly, select and process data via data platform and transform information data via system and mine data by data mining technology. Lastly, integrate data information, analyze data information and select proper information and then form corresponding data knowledge. (Figure 1 is data mining technology data information flow)

**Figure 1. Data Mining Technology Data Information Flow**

Clear the data mining object and prepare for data mining when use data mining technology for data mining. Data mining technology forms three ways during its development process (Zhu and Luo, 2015). The first way is data tree and tree structure is as the basis of data model during its operation process. In tree structure, each tree branch represents a data attribute and overall tree mode is data information set. Tree data information mode mostly transfers information from top to bottom. Data tree mode can be applied in most range of data mining technology, and process mass data information to constitute data set. Data information of data tree is easily comprehensible and fairly accurate (Duan, 2014). Data tree mode is widely applied in data mining technology and has unique operation mode during its use process. Firstly, use KI1 algorithm and this algorithm is time-consuming but it has an application scope. Its operational formula is \( I(d_1, d_2, d_3, ..., d_v) = \sum_{\beta=1}^{\beta} r_{\beta} \log(\beta) \), where, \( r_{\beta} \) means data sample and \( \log_2 \) is binary coding calculated by formula. Secondly, use VB compute mode and its operational formula is \( gainratio(e, u) = \frac{gain(e, u)}{split(e, u)} \), where, \( split(e, u) = -\sum_{i=1}^{n} \frac{e_i}{e} \log_2 \left( \frac{e_i}{e} \right) \). The two operational methods are main operational methods of data tree. Applying them in data tree can greatly improve computational efficiency of data tree. The second way is nervous system network and it can be divided into different network types, such as continuous type and random type, according to different network properties during its operation process. Nervous system network can process and store information separately and rapidly collect and retrieve information data when it is used for data mining (Li, 2014). The third way is genetic operational method. This way is put forward based on biological evolution and it is optimal algorithm of data mining technology. During the process of collection and integration of raw data,
compared with data tree, the information connects to each other more frequent and the precision is also increasing.

3. DEVELOPMENT STATUS OF UNIVERSITY SPORTS TEACHING INFORMATION MANAGEMENT

3.1 Problems of sports teaching information management

With constant development of information technology, this technology is also applied in many fields to promote the development of the field and innovate its development modes (Zhang, 2013). Basis on it, the university sports also combines with information technology, mainly focusing on designing sports teaching activities, applying multimedia technology to develop the teaching, watching sports knowledge theory and other aspects and mainly aiming at the reform of university sports teaching, to improve the efficiency of university sports teaching and enrich sports teaching methods. But information technology is not applied to sports teaching information management. Hence, sports teaching cannot effectively collect sports data information during its implementation process and information sources are relatively decentralized. University sports teaching information is sporadic and effective information management is difficult. Additionally, sports teaching information system of some universities has poor information analysis ability and cannot provide corresponding information decision support for sports teaching management, affecting the sports teaching activities. University sports teaching has wrong cognition of sports management. Actually, sports management is to process related sports information and its sports function is gradually improved with development of university education. University sports teaching function is also increasing and its social function is becoming clear during this process. Extended scope of university sports management reflects that related information is also increasing. But in practice, university sports management still uses manual management and combines simple computer management technology. As sports management information increases gradually, wrong information processing happens easily during the process of sports management, shown in two aspects, firstly, information administrator faces massive information data at the time of information processing and cannot process and integrate information timely, so the efficiency is too low. And management information is still saved by traditional way and easily damaged and unavailable; secondly, it is unavailable to timely look up information according to information characteristics when browsing related sports management information, which affects the sports management work. And no corresponding management system is made and no normative management process is formed during the process of sports information management.

3.2 Development trend of sports information management

University education management has entered the information campus age under the background of informatization; university departments have realized office automation and management informatization during the management process because of demand for informatization office, which help the formation of sports teaching information management system and promote such system to combine with university management network system. Under this circumstance, the reform demand of university sports teaching information management is increasing, and with growing university scale, for reasonable arrangement and scientific allocation of teaching resources and improvement of teaching effect, university sports management also needs information management. What’s more, university sports teaching information management can help the university to better study the sports scientific research and coordinate the communication between sports management department and other management departments of the university. It can collect sports management data information more accurate, enrich data information contents and carry out decision analysis of sports teaching information by data mining technology and thus promote the development of university sports teaching.

4. CONSTRUCTION METHOD OF UNIVERSITY SPORTS TEACHING INFORMATION MANAGEMENT SYSTEM BASED ON DATA MINING TECHNOLOGY

4.1 Build sports data mining system and make the mining process

Data mining technology is of great significance and meets social development needs. In the course of information globalization, a great deal of data information is generated, so processing, collection and utilization of data information has become the development key in information age (Jiang and Xu, 2012). Data mining technology can effectively mine data information, sort out valuable data information from massive data
information and create effective and rapid data information resource library during the process of data exploration. Data mining technology is combined with university sports teaching in this process and university sports teaching builds the data information search engine by data mining technology to collect comprehensive and multi-angle data information by data mining (Li, 2012). Hence, university sports data mining system is formed and gradually builds up its own mining process (Figure 2 is data mining process of university sports information management) in the course of construction. Firstly, integrate university data information, mine information via data resource library, and then upload to use port of sports information media to thus obtain corresponding sports management information and promote smooth implementation of sports management.

**Figure 2. Data Mining Process of University Sports Information Management**

University sports data mining system adopts not only data mining technology but also statistics, artificial intelligence and other technologies in the course of construction. Meanwhile its functional area shall be planned in this course to promote the popularity of this system.

University sports data mining system mainly has five data functions, i.e., information forecasting analysis, information connection analysis, information integration, information concept analysis and information deviation retrieval (Han, 2016). Its function planning fully reflects data information details and users’ information needs. And sports information is divided into levels to mine related sports knowledge in sports data information to thus forecast certain sports information in advance and increase the accuracy of sports management information decision. Data mining technology means the process of mining of target information from database, data source and massive data information and conversion to knowledge. So, sports data information management system shall form clear data mining process during the process of construction of data mining technology, set data collection, reduction, evaluation and other data mining steps and check data information via algorithm of data mining technology to form accurate data information flow and feed back to data users. Data resource library model \( M(Q) = (V_1, V_2, V_3, \ldots, V_b) \) is built, where, \( V_b: V_2 \rightarrow V_3 \) is the mapping of two pieces of data information and \( M_1 = (M^{\delta}, M^X, M^D) \), \( M_2 = (M^{\delta^1}, M^{X^1}, M^{D^1}) \) are two sports information data management nodes. Make \( L = \{l_1, l_2, l_3, \ldots, l_n\} \) as sports data vector trait and put into formula \( M(Q) = (V_1, V_2, V_3, \ldots, V_b) \) to reflect university sports data management information.

### 4.2 Plan construction idea and master construction method

Firstly, clarify the construction idea and target of university sports information system during the construction process. The system is mainly to improve the efficiency of sports teaching management and promote the smooth implementation of sports teaching information management (Li and Li, 2013). So, sports efficient sports teaching information management system is built based on data mining technology and data system model planning is made to build sub-models with different functions through mastering concrete content of data.
mining technology during its construction process. Make a plan for sub-model construction in advance to reduce the construction risk and increase sub-model construction success rate. Meanwhile, the sports information sub-models can help the university sports information management system to make better use of data mining technology to complete the information needs of sports management and assist the sports manager in making information decision. During the process of construction of sports teaching information management system, divide sub-models by data mining technology into office automation model, physical education information model, teaching arrangement model of physical education teachers, sports performance evaluation model and other sub-models (Figure 3 is basic system model of university sports teaching information management), promoting the work efficiency of sports teaching information management system and easily using this system.

Figure 3. Basic System Model of University Sports Teaching Information Management

Sports performance evaluation model of the system can be used in sports teaching to evaluate students’ sports performance. Set \( y \) is mean sports performance, transfer operator \( o(w) \) mines sports information, put it into formula \( y_i^p(w_{m+1}) = \frac{y_i^p(w_{m+1})+u(q)y_i^p(w_m)}{2} \) to query trust value, execute operation \( y_i^p(w_{m+1}) = \frac{y_i^p(w_{m+1})+u(q)y_i^p(w_m)}{2} \) under \( y \) mean sports performance, set \( d_y = \{d_{y+1}, d_{y+2}, ..., d_{y+n}\} \) and obtain the model \( d(y) = \frac{2}{1+w}, \sigma = 1,2,3 \). If the students’ sports performance is in this range, it is qualified.

5. CONCLUSION

Application of data mining technology in university sports teaching work has promoted information data development of university sports teaching management. Data mining technology assists the universities in building sports teaching information management system and conducting informationized sports teaching by virtue of its own characteristics, improving sports teaching efficiency and promoting university sports teaching development.

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