Research on the Application of Injury Early Warning in Football Teaching Based on Big Data

Jing Wang

Hubei Engineering Iustitute

15997123099@163.com

Abstract. In the development of social and economic construction, using big data technology to predict and analyze teaching injuries can provide effective basis for education evaluation while safeguarding students' physical and mental health. Especially for football, on the basis of comprehensively implementing the Opinions of the CPC Central Committee and The State Council on Enhancing Youth Sports and Enhancing Youth Physical Fitness, the use of big data technology to predict the occurrence rules of football injuries and do a good job in daily teaching protection can reduce or avoid sports injuries as much as possible and ensure the orderly progress of practical teaching. After understanding the causes of football injury accidents, this paper designs a monitoring and warning platform with big data technology as the core according to the theory of big data technology, and defines the application value of big data technology from the perspective of long-term development, in order to provide technical support for football education in the new era.

Keywords: Big data technology; Football teaching; Injury warning; Monitoring and early warning

1. Introduction

According to the implementation of football education in various stages in China in recent years, let the students strengthen their comprehensive quality in happy football, exercise the will of sports, give full play to the spirit of team cooperation, which lays a solid foundation for the healthy growth of young people and Chinese football. Football is a tense and intense antagonistic sport that integrates physical quality, application skills and intelligence level, including running, shooting, dribbling, stopping and other basic movements. It requires the athletes to improve their physical quality and movement coordination, and has a high probability of injury in practice training. Therefore, in the modern football teaching work, It is necessary to pay attention to the study of injury accidents in football, comprehensively grasp the rules of injury occurrence, and put forward effective preventive measures as soon as possible to avoid the probability of injury accidents to the maximum extent, so as to ensure the orderly progress of practical teaching. Understanding the problems facing our football teaching in recent years, we can know that the main causes of injury accidents are reflected in the following: [1-3]On one hand, the degree of ideological attention is not high. In the football teaching class, teachers and students do not pay enough attention to the problem of football injury, do not strictly follow the scientific program step by step training, too one-sided understanding and cognition, think that sports injury is inevitable, both teachers and students are eager to succeed. On the other hand, the preparation activities are not enough. The purpose of preparation activities is to improve the excitability of students' central nervous system. However, the current preparation activities set up before physical education teaching do not achieve this purpose. Students are difficult to concentrate in class, let alone participate in the training activities organized by teachers. In the face of these problems, research scholars put forward that the use of big data technology to predict and analyze the injury phenomenon in football teaching can better complete the education management.[4-6]

In essence, big data, as a brand new technical phenomenon, has the following characteristics: First of all, the number of large data sets has risen from TB level to PB level; Secondly, the quantity and category are complex, and there are many channels to obtain data resources. The types and formats of data break through the traditional structured data scope limited at any time, including semi-structured and unstructured data information in different forms. Thirdly, the structure density is low. Taking network video as an example, the continuous monitoring screen only has 1 or 2

seconds of applicable data. Finally, the data processing speed is fast, can meet the technical needs of different situations. From the perspective of the development of big data technology, it mainly faces the following development opportunities: On the one hand, data security gets people's attention, providing opportunities for the development of information security. In the context of the era of big data, the network as the mainstream of social construction and development, with the continuous increase of data information, all fields strengthen the management of data information security, based on cloud security technology to protect data information performance, can better meet the needs of technological innovation and development in all fields; On the other hand, the era of big data has created a broader space for development, built a sound industrial chain system, and provided favorable conditions for the innovation and development of enterprises of all kinds. While bringing opportunities, big data also brings great challenges to talents, information security, technology theory and other aspects. For example, big data processing requires very high professional technology and management personnel, especially when dealing with complex large data sets, it is necessary to master a variety of technical tools and clear the whole process of data processing. Only in this way can big data technology play an important role and all information resources are perfect and scientific. From the perspective of the field of education, the application of big data technology is becoming more and more extensive, and there are more and more related research topics, especially for football teaching. Based on the big data technology to monitor the physical quality of students, timely discover the hidden safety problems, and find the best state of athletes, are the main issues discussed by the education staff. On the basis of understanding the importance of injury warning in football teaching, this paper combines big data technology to build an injury warning and monitoring system. The final experimental results show that this technology scheme plays an important role in football teaching.

2. Methods

2.1 System Architecture

The structure of football teaching injury warning system with big data as the core is shown in Figure 1 below:[7-9]
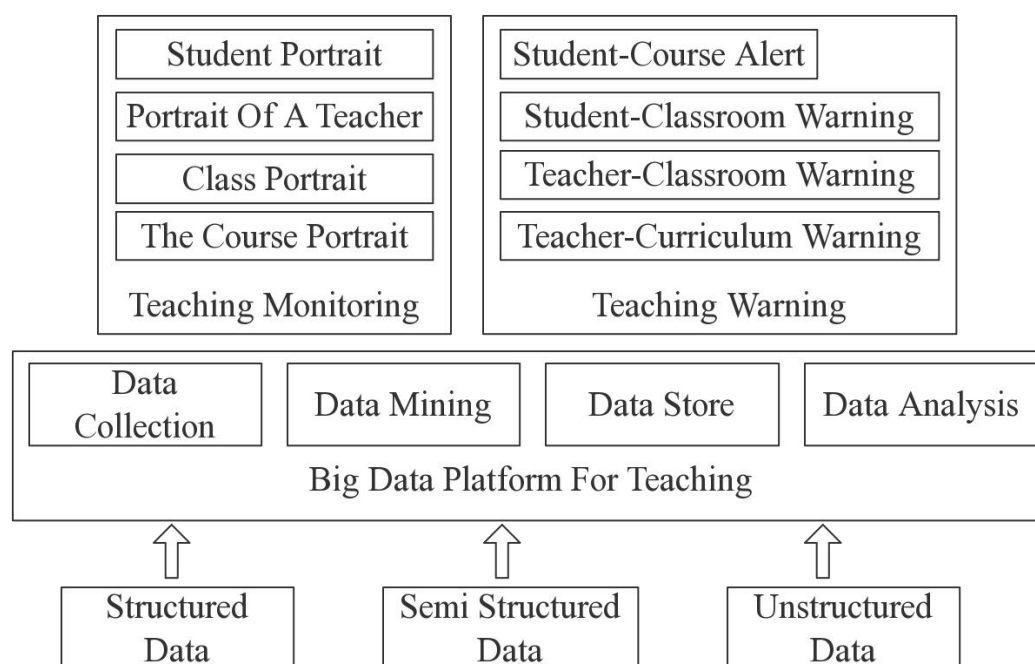

Figure 1 System architecture diagram

Based on the above analysis, we can see that the overall design contains three parts: First, it refers to the teaching big data platform, which is mainly used to collect students' behavior data and various teaching business data information during football teaching; Secondly, it refers to the teaching monitoring system. Based on the data of the processing platform, data information should be obtained according to the business requirements and monitoring requirements, and the final results should be visualized. Finally, it refers to the teaching early warning system. On the basis of monitoring data, it is necessary to mine and analyze data information according to the early warning model, and focus on finding abnormal data and timely reminding professional teachers. Since the big data platform will collect structured, semi-structured and unstructured data structures, it is necessary to fully consider the processing requirements of different data structures and scientifically store the final data processing results during the design process. 2.2 Functional Structure.[10-12]

The big data monitoring and warning platform mainly consists of three functional modules: the first is system management, which mainly manages users, data and personal models; The second is teaching monitoring, mainly monitoring all elements related to football teaching, such as classroom portrait, teacher portrait, student portrait, etc. The actual portrait is mainly presented in two aspects: on the one hand, the overall information is presented in the form of lists and charts; on the other hand, the user needs to click the corresponding records to view more specific portrait information of individuals in turn; Finally, it refers to teaching early warning. The artistic conception of students' course refers to that teachers should make clear the risk warning information of students' learning of this course before the formal class, so that effective early warning programs can be proposed as soon as possible and unnecessary safety risks can be avoided in students' football training.
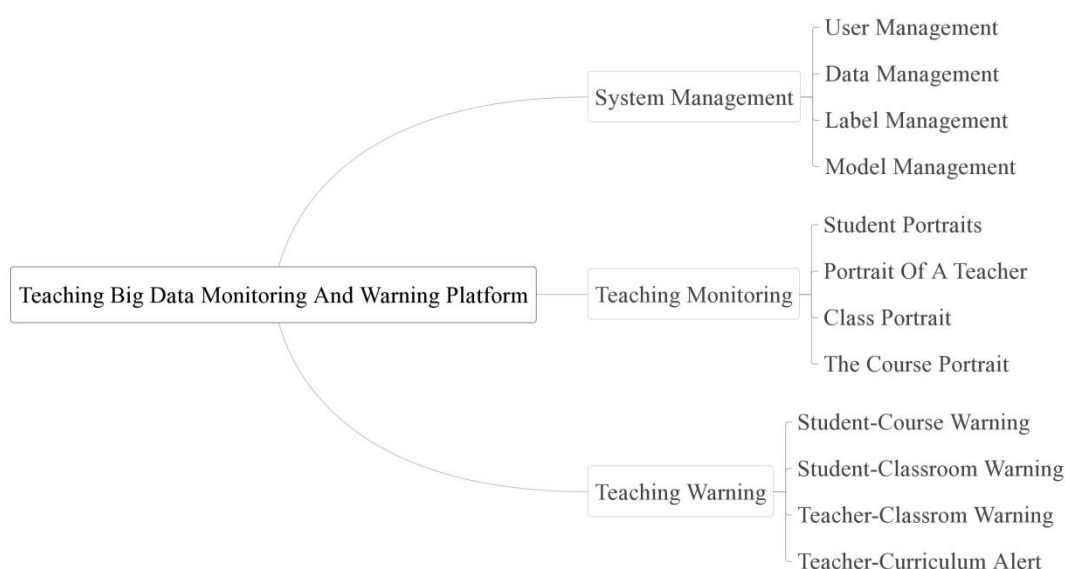
Figure 2 Functional module structure diagram of the big data monitoring and warning platform

2.2 Physical Portrait

The student portrait module will show the learning characteristics of students in football teaching from five dimensions: first, learning style; Second, learning outcomes; Third, learn strengths; Fourth, learn the basics; Fifth, academic performance. All dimensions will be scored according to corresponding indicators, and popular labels will be used to show students' learning characteristics respectively. The relationship between various features is shown in Figure 3 below:[13-15]
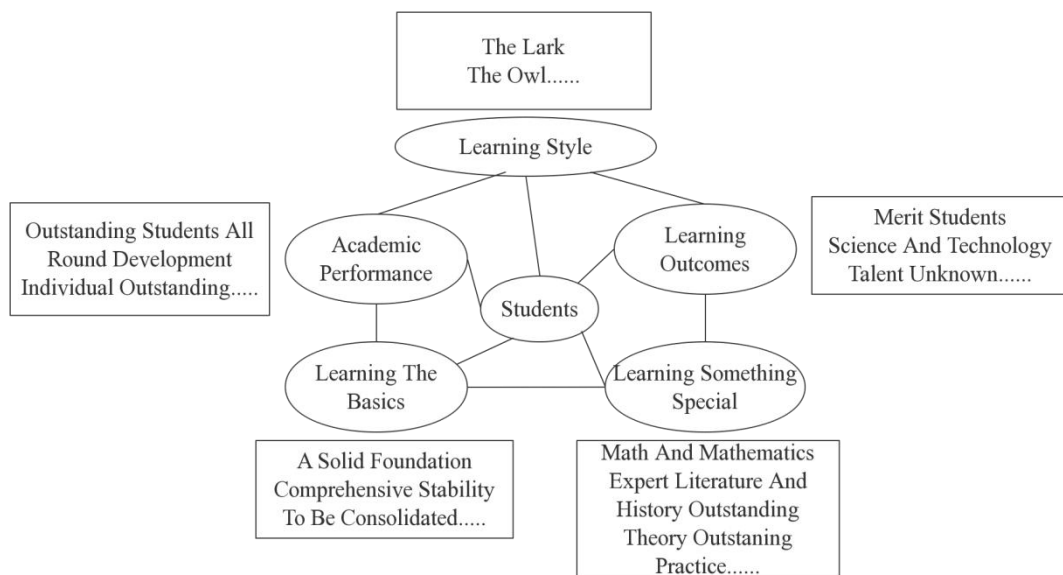
FIG. 3 Relational structure diagram of students' learning characteristics

The portrait of the teacher will also show the characteristics of the teacher from five dimensions: first, the learning results; Second, teaching achievements; Third, the number of courses; Fourth, student evaluation; Fifth, student achievement. Each dimension has a clear index score, and easy-to-understand labels are used to express teachers' teaching ability respectively. The relationship between various features is shown in Figure 4 below:

FIG. 4 Relation structure diagram of teachers' teaching ability

2.3 System Warning

The information provided by the early warning module is divided into two parts. On the one hand, it refers to the early warning object and on the other hand, it refers to the early warning result. In football classroom teaching, big data technology is used to warn the injury situation, and the research object mainly refers to teachers and students. Therefore, data processing model should be built according to the early warning information, in which the predicted value represents the weighted sum of various variables. The specific formula is shown as follows:

$$y = \sum_{i=1}^{n} a_i x_i$$

In the above formula, y represents the calculated prediction score, xi represents the i th variable, and ai represents the coefficient or weight of the variable xi. This prediction model is easy to be expressed and applied in the model library. It only needs to record the coefficient and variable value to complete the operation. From the perspective of practical application, this model includes two production methods, one is multiple linear regression method, the other is comprehensive index weighting method.

2.4 Hardware Architecture

The football teaching injury warning system with big data technology as the core can choose HADOOP cluster, database server and data mining server to form the hardware architecture. HADOOP cluster can obtain large amounts of data information from behavior log server and database server, and analyze semi-structured or unstructured data based on distributed processing program. The final result can be passed directly to the data mining server. At the same time, the data mining server can also directly collect data, mining and analyzing structured data information, and finally input the results into the web server. Based on the hardware architecture analysis shown in Figure 5 below, it can be seen that the monitoring system will run through unified identity authentication, integrated operation of teaching platform, educational administration system, information portal, etc., which will facilitate the joint login authentication of managers, teachers and students, and feedback information through SMS, email, wechat and other ways.
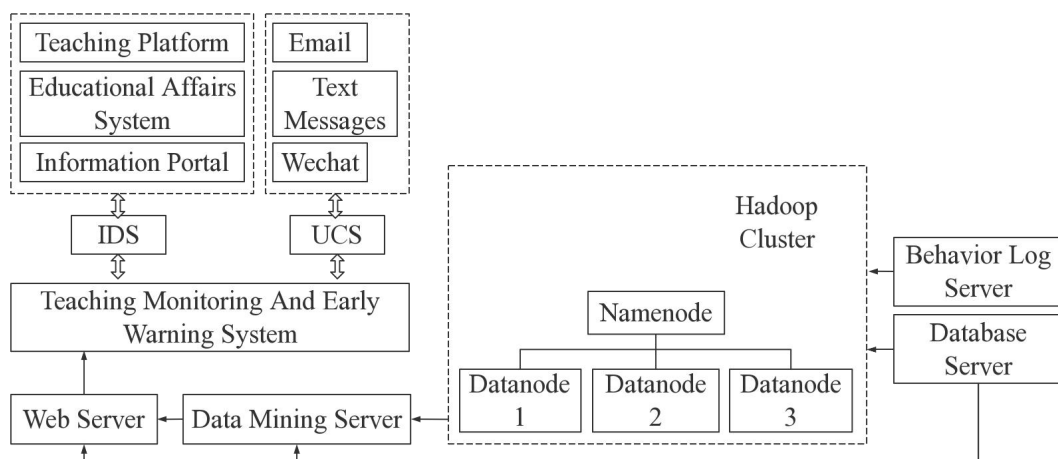

Figure 5 Hardware architecture diagram

3.　Result analysis

According to the system content of the above components, this paper selects the data information collected by football teaching in a certain place for multiple linear regression analysis. The final results show that the prediction model will be timely fed back to the system users and managers after the problems are found. By checking the relevant warning information, effective solutions can be formulated as soon as possible to avoid the impact of unscientific training plans on students' physical and mental health. From the perspective of practical application, the construction of injury warning system with big data technology in football teaching can not only improve the classroom teaching effect, but also reduce the teaching pressure of managers and professional teachers, and ensure that the practical teaching management is more scientific and standardized. With the continuous improvement of social economy and scientific and technological level, the application of big data and artificial intelligence in football teaching is more and more extensive. In addition to warning of injury, it can also record and analyze the game process of football projects. For example, big data and artificial intelligence technology can be used to identify the sports behavior during the game and build the winning ratio model with the game result as the core. This can not only master the influence of different environmental factors through the analysis of competition performance,

but also provide an effective reference for subsequent competition training. Therefore, at present, the education field has gradually strengthened the research on the theory of big data technology. The application direction and specific structure of the injury warning system in football teaching will be discussed according to the practical teaching content system, in order to reduce the probability of safety accidents and guide students to grow up fully and healthily.

Conclusion

To sum up, in the innovation and development of modern education, the construction of injury warning system in football teaching based on big data technology can not only help professional teachers quickly adjust practical teaching plans, but also avoid safety problems in the learning and training process of students. Therefore, football teaching should, on the basis of changing the traditional concept, pay attention to the construction of intelligent and digital education environment, strengthen the training of professional and technical talents, and actively introduce advanced hardware equipment and software technology, so as to accurately predict the hidden risks in the football teaching process and quickly develop effective teaching management measures.

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