Simulation of physical education effectiveness assessment model based on constraint clustering algorithm

Zhou Zhou[a], Wei Huang[a],*

[a]Hubei Three Gorges Polytechnic, Yichang Hubei, 443000, China.

ABSTRACT

During the growth of universities, carrying out physical education (PE) courses can not only promote students' physical and psychological health, but also strengthen students' physique, which plays an important role in students' future development. To realize the effectiveness of PE classroom teaching, we must correctly understand the effectiveness of teaching, design teaching scientifically and reasonably, and use instructional assessment reasonably and objectively. Many factors of educational phenomenon can't be classified into absolutely clear categories, and any specific identity is relative, which contains differences and changes, thus showing certain uncertainty. According to the viewpoint of fuzzy mathematics, many things that people regard as the same are a fuzzy set. Combining with data mining (DM), this article constructs an assessment model of PE instructional effectiveness based on constrained clustering algorithm. For PE teaching, the construction of the assessment model of PE instructional effectiveness based on constraint clustering algorithm can further improve the monitoring quality of PE teaching, strengthen the information monitoring level and information summarizing ability of PE teaching, and ensure that the relevant information of PE instructional level can be applied to practice more accurately.

Keywords: Physical education; Instructional assessment; Constrained clustering

1. INTRODUCTION

With the continuous reform and deepening of PE curriculum, the level of PE in universities has been greatly improved, and the effectiveness of PE has been improved [1]. Instructional assessment is a stage of measuring the instructional process and results, and making value judgments by using effective technical means on the basis of teaching objectives and referring to scientific standards. Instructional assessment is the assessment of teachers' instructional effect by students, and it is the main way to assess teachers' instructional effect. Its purpose is not only to regulate, control, guide and motivate teaching, but also to have a strong orientation. It is an important part of school instructional management and the main means to assess teaching achievements. Instructional assessment is the assessment of teachers' instructional effect by students and the main way to assess teachers' instructional effect [2]. Its purpose not only plays a role in regulating, controlling, guiding and stimulating teaching, but also has a strong orientation. It is an important part of school instructional management and the main means of assessing teaching achievements [3]. With the deepening of the new round of curriculum reform, the effectiveness of classroom teaching has become a hot topic in classroom instructional assessment. How to judge whether a section of PE class is effective depends not only on the effectiveness of teachers' teaching, but also on whether students can enjoy learning, learn and apply what they have learned to practice [4].

*weih123@126.com

Classroom teaching is a planned, purposeful and cost-effective activity, and it is also the basic way of curriculum implementation. Effective classroom teaching with high quality and high efficiency is the basic premise to promote students' effective learning and the important guarantee to implement the new curriculum [5]. Various characteristics of education constitute the complexity of the state of education, which is closely accompanied by the fuzziness of educational phenomena [6]. For this reason, the quantitative assessment of educational problems is much more difficult than the measurement and statistics of physical phenomena. Every semester, the college organizes students to assess the teaching of teachers, and accumulates a large amount of data. To improve the quality of education, schools must first improve the quality of teaching, and instructional assessment is to judge whether the instructional level meets certain requirements [7]. Using cluster analysis algorithm to mine the assessment results of each semester, quantitatively assess teachers, truly reflect teachers' teaching level, and improve teachers' assessment, thus suggesting that schools should pay attention to the important research significance in improving teachers' teaching methods and instructional effects [8]. The effective implementation and growth of teaching is a practical problem that teachers are actively exploring. Whether it is the connotation or assessment standard of instructional effectiveness, or the implementation strategy of effective teaching, it has become the focus of education and teaching research [9]. Combining with DM, this article constructs an assessment model of PE instructional effectiveness based on constrained clustering algorithm.

2. METHODOLOGY

2.1 The significance of improving the effectiveness of PE classroom teaching in universities

Teaching goal is the premise foundation of classroom teaching, the programmatic requirement of carrying out some PE activities, and the core goal of teachers' teaching content. All activities in the classroom are aimed at achieving the teaching objectives. Therefore, the teaching goal of PE classroom should be clear and specific, pay attention to the growth of students' subjectivity, make the teaching goal meet students' needs and promote students' development. In the stage of PE in universities, improving the effectiveness of college PE classroom can not only improve the quality of PE, but also promote students' physical and psychological health and future development [10]. Through the interaction and communication between teachers and students, we can not only fully understand students' needs, but also make a good judgment on students' mastery of sports skills, further improve students' sports skills and level, enhance the effectiveness of PE classroom, and promote students' future development and progress.

In the development stage of universities, under normal circumstances, schools are mainly oriented to students' employment, to comprehensively improve students' comprehensive ability and self-accomplishment, and to ensure a good growth of students in the future. Therefore, in the growth of universities, carrying out PE teaching can strengthen students' physique, promote students' physical and psychological development, improve the overall quality and level of teaching, and enhance the effectiveness of PE. PE classroom effectiveness teaching means that PE teachers flexibly apply teaching methods and means, grasp the teaching rules, achieve the expected teaching goals and effects relatively efficiently, and promote students' maximum development in emotional attitudes and values.

In the actual PE instructional process, teachers can properly carry out some PE teaching activities, actively guide students to actively participate in teaching activities, and improve the effectiveness of PE classroom. In addition, teachers should treat students equally, respect every student, answer questions raised by students in time, guide students to think and solve problems independently, and cultivate students' autonomous learning ability [11]. In the development stage of universities, carrying out PE courses can greatly enhance students' self-confidence and enable them to have enough energy to learn and develop. Therefore, teachers should adopt some advanced teaching methods to cultivate students' self-confidence in the stage of PE teaching.

2.2 Assessment model of pe instructional effectiveness

In the stage of PE teaching, teachers should change traditional ideas, actively introduce some advanced teaching models and ideas, and at the same time, make continuous improvement and innovation on the previous teaching models according to the actual situation of students. Considering all aspects of students and carrying out targeted teaching can not only improve the effectiveness of PE teaching in an all-round way, but also promote students' future development. Compared with the teaching of other disciplines, PE requires teachers' language teaching ability and demonstration ability [12]. Teachers should choose appropriate teaching methods to improve students' enthusiasm and improve teaching efficiency. PE teachers should correctly understand the connotation of instructional effectiveness and form a scientific

and reasonable view of teaching benefits. P.E. teachers should study and practice the relevant concepts and viewpoints of instructional effectiveness, and actively learn the advanced concepts and teaching experience of effective teaching. The basic model of PE effectiveness assessment is shown in Figure 1.
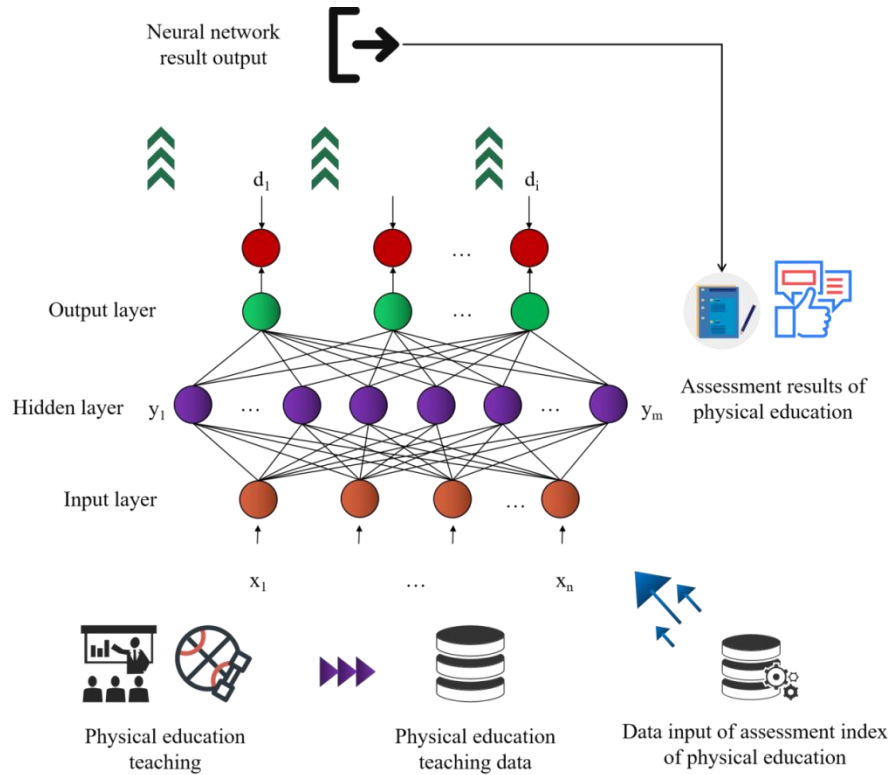

Figure 1. Basic model of PE instructional effectiveness assessment

The effectiveness of PE classroom can be realized from several aspects, such as teaching concept, teaching design and instructional assessment, so as to improve the instructional effect and ensure the orderly growth of PE. k sample points are randomly selected from the sample set, and they are taken as the center of the cluster. Then, according to the distance between each sample and the k centroids, it is divided into the nearest clusters, and then the centroids of each cluster are recalculated:

$$d(x, C_i) = \sqrt{\sum_{j=1}^{m} (x_j - C_{ij})^2} \tag{1}$$

x is the data object, C_i is the i cluster center, and m is the dimension of the data object. x_j, C_{ij} are the j attribute values of x and C_i. Calculate the sum of squares of errors of the whole data set:

$$S = \sum_{i=1}^{k} \sum_{x \in C_i} |d(x, C_i)|^2 \tag{2}$$

If the state equation of the student body in the model is:

$$\dot{x}_i = u_i (x_i \in R) \tag{3}$$

The mathematical expression of the continuous consistency protocol is:

$$u_i = \sum_{i \in N} a_{ij} (x_j - x_i) \tag{4}$$

If the state equation of the agent in the system is:

$$\dot{x}_i(k+l) = x_i(k) + u_i(k)$$

(5)

Then a discrete consistency protocol is adopted:

$$u_i = \varepsilon \sum_{j \in N_i} a_{ij}\left(x_j(k) - x_i(k)\right)$$

(6)

When clustering data objects, if the value of a certain data object on a certain attribute is vacant, the average value of other data objects on this attribute can be used to fill the vacant data. The premise of ensuring the effectiveness of teaching is that PE teachers should fully study the teaching contents according to the teaching objectives and make scientific and reasonable teaching designs. Only by fully studying the teaching content, reasonably designing the instructional process, and selecting suitable teaching methods and organizational forms, can we reasonably arrange the teaching progress and realize the optimization of teaching activities. PE instructional assessment should proceed from reality, pay attention to students' individual differences, make rational use of instructional assessment, and carry out diversified and multi-level assessment from the aspects of cognition, emotion, ability, innovative consciousness and cooperative spirit, so as to realize a instructional assessment system that combines teacher assessment with students' self-assessment, mutual assessment and other assessment.

3. RESULT ANALYSIS AND DISCUSSION

In the stage of P.E. teaching in universities, the lack of advanced P.E. teaching mode is not only detripsychological to the improvement and progress of students' P.E. level, but also has a great influence on the improvement of students' comprehensive ability and self-accomplishment, which restricts the students' good development in the future, and also affects the further improvement of P.E. instructional effect and level. PE is not a step-by-step skill course with simple technical action essentials, but the promotion of all-round education quality aiming at improving students' comprehensive quality. In the actual PE instructional process, many teachers often focus on the basic posture of PE and PE techniques in the selection of PE content, without taking into account the feelings of students, resulting in students' boredom with PE students in the actual PE study, which is not conducive to the improvement of the effectiveness of PE classroom in universities [13]. Assessment should be developpsychological, emphasizing the assessment of instructional process. It should not only pay attention to students' actual performance, but also respect students' individual differences, attach importance to the future growth of all students, and promote all students' active development at the existing level. Figure 2 shows the results of testing the stability of different assessment models of PE instructional effectiveness.
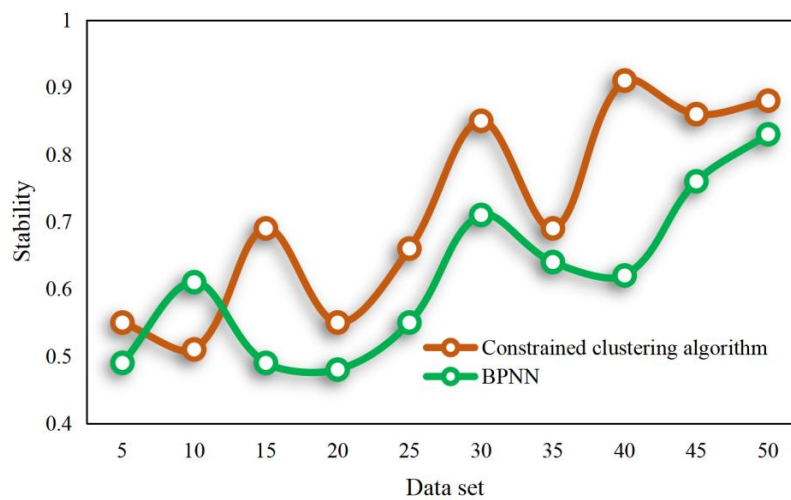

Figure 2. Stability of different assessment models of PE instructional effectiveness

It can be seen that the fluctuation of this system is the smallest, while that of the other two systems is larger. In the judgment matrix with consistency, the desired weight is obtained by normalizing each column. However, for the judgment matrix with non-consistency, the result obtained by normalizing each column is only approximate to the corresponding weight.

When the distance between the data acquisition terminal and the data base station exceeds the maximum transmission distance of the wireless module, the data between the data acquisition terminal and the data base station can be forwarded through the data transfer node, which plays an important role in improving the wireless network. To test the performance of the system, the experiment was conducted again, and the real-time results of data processed by different systems are shown in Figure 3.
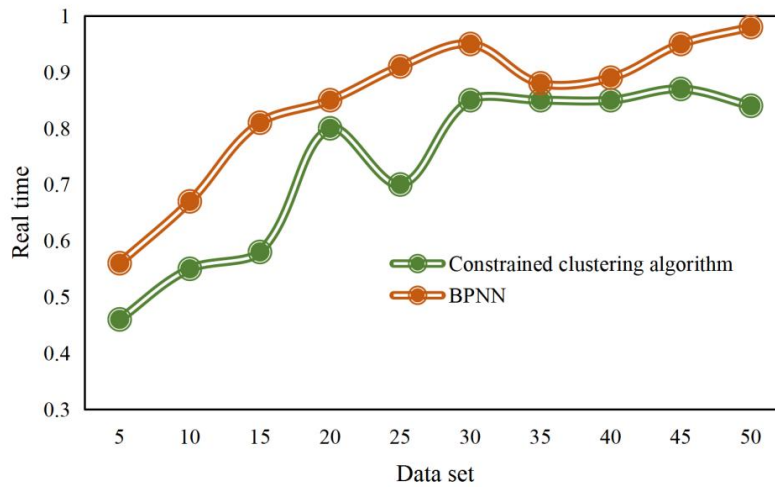

Figure 3. Comparison of real-time processing data by the system

From the data, it can be concluded that the real-time processing data of the PE assessment model constructed in this article has obvious advantages among the three methods. This result verifies the timeliness of this system.

Test samples are respectively input into two assessment models for testing, and the scatter diagram of the predicted value and the actual value of the test samples by using BPNN model is shown in Figure 4. The scatter diagram of the predicted value and the actual value of the test sample tested by using the constrained clustering algorithm assessment model is shown in Figure 5. The dots on the graph indicate the ratio of the predicted value to the actual value.
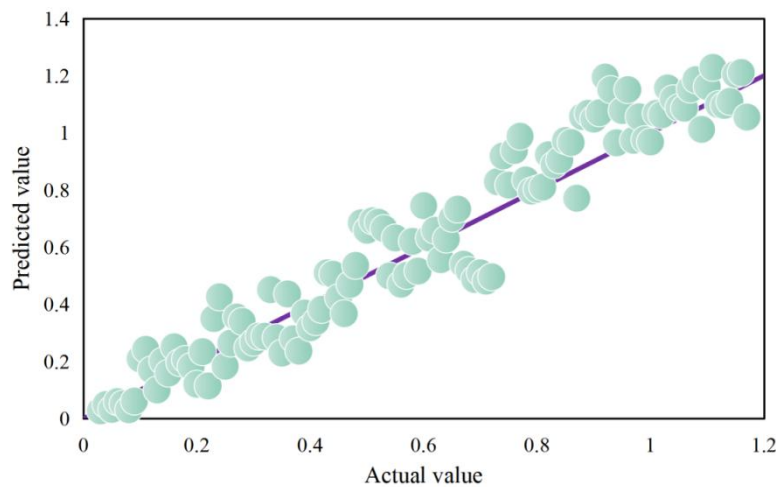

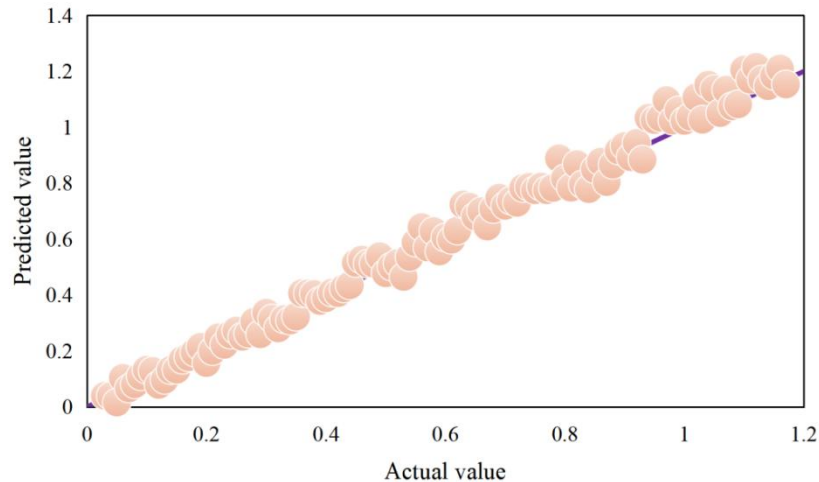Figure 4. Scatter diagram of actual value and predicted value of BPNN

Figure 5. Scatter diagram of actual value and predicted value of constrained clustering algorithm

For college PE teaching, if we want to build a instructional effectiveness assessment model based on big data, we need to comprehensively promote the wide application of big data itself in PE teaching, further ensure the normal management of data collection, and realize the whole process management and multi-level analysis of college PE teaching practice and instructional process. PE classroom teaching focuses on students' sports participation and physical activities, and pays attention to the learning and practical application of sports skills. Through classroom teaching, students should not only learn sports skills, but also enable them to apply their sports skills to their usual exercises, and at the same time, they can lead a group of students to participate in physical exercises together, which is the realization of the so-called lifelong sports goal. In the stage of PE teaching, teachers should change traditional ideas, actively introduce some advanced teaching models and ideas, and at the same time, make continuous improvement and innovation on the previous teaching models according to the actual situation of students. Considering all aspects of students and carrying out targeted teaching can not only improve the effectiveness of PE teaching in an all-round way, but also promote students' future development.

4. CONCLUSIONS

With the deepening of the new round of curriculum reform, the effectiveness of classroom teaching has become a hot topic in the assessment of classroom teaching. How to judge whether a section of PE class is effective depends not only on the effectiveness of teachers' teaching, but also on whether students can enjoy learning, learn and apply what they have learned to practice. To improve the quality of education, schools should first improve the quality of teaching, and instructional assessment is to judge whether the instructional level meets certain requirements. Combining with DM, this article constructs an assessment model of PE instructional effectiveness based on constrained clustering algorithm. For college PE teaching, if we want to build a instructional effectiveness assessment model based on big data, we need to comprehensively promote the wide application of big data itself in PE teaching, further ensure the normal management of data collection, and realize the whole process management and multi-level analysis of college PE teaching practice and instructional process. Constrained clustering algorithm-based assessment model for the effectiveness of PE teaching can further improve the monitoring quality of PE teaching, enhance the information monitoring level and information summarizing ability of PE teaching, and ensure that the relevant information of PE instructional level can be applied to practice more accurately.

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