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Intelligent evaluation model of basketball teaching reliability based on swarm intelligence and edge computing

Ding Hang Wang[1*] and Sile Jian[2]

Abstract

Campus basketball culture is gradually affecting students' sports spirit and sports accomplishment. As for the evaluation of basketball teaching achievements, the method of specified items is generally used for testing, which is highly subjective. It's completely teacher-led, and teachers make relevant evaluations of students' basketball behavior. Teachers can't be absolutely fair and just in the evaluation, because teacher evaluation can be affected by many factors, such as teachers' mood on that day, teachers' affection for students, and so on, the traditional way of teacher basketball evaluation is easy to cause negative emotional impact on some students, so that students have negative emotions on basketball activities, and even affect their sports quality, and finally affect their health. Based on the evaluation method of basketball teaching, this paper introduced a reliability intelligent evaluation model based on swarm intelligence and edge computing and used this model to evaluate students' performance in basketball teaching classes. Moreover, this paper designed a related experiment, the experimental results showed that boys and girls in basketball level gap was more obvious. As far as dribbling skills were concerned, the highest score of boy A was 91 points, while the lowest score of girl C was 54 points. The gap was quite large. At the same time, the introduction results of the reliability intelligent evaluation model were studied by using the questionnaire survey method. As can be seen from the results of the questionnaire, the number of people who are very interested in basketball teaching activities is obviously high, and the number of people who are still not interested in the six activities is no more than 2. Through the change data of students' interests and attitudes, it was proved that the reliability intelligent evaluation model could improve the students' enthusiasm for learning basketball courses, thus improving their sports quality. This study provided a reference value for the application of swarm intelligence and edge computing in the intelligent evaluation model of basketball teaching reliability, and provided a direction for the future development of basketball teaching.

Keywords Basketball teaching, Reliability model, Swarm Intelligence, Edge calculation

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Introduction

As one of the contents of physical education teaching courses, basketball teaching has a significant impact on students' body and mind. It is different from traditional indoctrination education. Traditional indoctrination education ignores the objective laws of students' learning and understanding process and their understanding ability and knowledge level. The ready-made knowledge conclusions are instilled in students, subjectively determine the teaching process, and force students to read and memorize by rote.The existing basketball teaching is full of the taste of indoctrination teaching. In the classroom, teachers blindly pass on basketball skills and popularize basketball theory. There is no individualized teaching and no targeted plan. The evaluation method of students is also similar. Each student is an independent individual. Traditional concepts and methods have not made basketball teaching develop better, and even many students love basketball but hate the basketball classroom.In order to improve this situation, the reliability intelligent evaluation model is used to evaluate basketball teaching, and the group intelligence and edge computing technology are used to bless the data of the reliability intelligent evaluation model, effectively highlighting the main status of students, so that one key opens one lock, and the students' exercise level is correctly evaluated and guided.

The conclusions and innovations of this paper are as follows:

- It is found that the intelligent evaluation model of basketball teaching reliability based on swarm intelligence and edge computing can effectively improve students' learning passion and interest in basketball courses.
- The model can provide correct guidance for students' basketball.
- It provides text reference for the continuous development and innovation of intelligent evaluation model of basketball teaching reliability.
- Provide new ideas for the development of basketball teaching.
- To provide the future direction of basketball teaching.

As basketball teaching is becoming increasingly important in quality education, the reliability intelligent evaluation model can effectively evaluate the reliability of basketball teaching, which has attracted the attention of many scholars. Li B mentioned that basketball is one of the most popular sports in the world, and its related industries have also produced large economic benefits [1]. Griban G believed that the value of basketball as a complex tool in the students' physical education system can promote physical development and health, and can develop key skills and abilities, creativity, and psychophysiological quality [2]. Zhang J believed that the college basketball course is a basic course related to students' physical quality. Traditional physical education ignored the main role of students and restricted the development of students' subjective initiative, which led to the situation that students like basketball activities but do not like basketball courses [3]. Jiang Z discussed the influence of the leadership style and classroom atmosphere of college physical education teachers on the learning motivation of basketball courses [4]. Ziyu L I U believed that multimedia technology can stimulate students' enthusiasm for learning basketball and master basketball and its related technical level. At the same time, it can also improve students' competitive ability and make greater contributions to the basketball cause [5]. Gonzalez-Espinosa S analyzed the differences in basketball learning according to teaching methods and students' gender [6]. Ismoilovna Y F believed that basketball teaching is characterized by its remarkable role in education and health promotion, which is conducive to the overall development of students [7]. Kanat E A studied the accuracy and inaccuracy of visual tracking strategies of professional and amateur basketball players [8]. From the perspective of network reliability research, Zhang F used the failure criteria of computer networks to establish the reliability model of computer networks, and used intelligent cloud computing method to calculate the reliability state parameters of networks [9]. With the reform and innovation of education, the state pays increasingly attention to the health of students' physical quality. Diversified sports teaching facilities can make sports classes diversified, and the reliability intelligent evaluation models can help basketball teaching evaluation become diversified.

Since the evaluation function of reliability intelligent evaluation model in basketball teaching needs data as support, swarm intelligence and edge computing can accurately explore a large amount of data. Many scholars have studied how to integrate these technologies into the reliability intelligent evaluation model. Yang X S believes that the current trend is to use swarm intelligence and swarm intelligence-based algorithms to solve challenging problems [10]. Slowik A proposed the concept of swarm intelligence and mentioned some meta-heuristic algorithms belonging to swarm intelligence [11]. Wang C believed that mobile edge computing has aroused great interest as a promising method to enhance the computing power of mobile devices [12]. Sun H proposed a new algorithm to evaluate the performance of mobile edge computing systems [13].

At present, the application direction of reliability intelligent evaluation model based on swarm intelligence and edge computing is constantly expanding, but the research on its combination with basketball teaching is not in-depth. In order to reflect the impact of reliability intelligent evaluation model based on swarm intelligence and

edge computing on basketball teaching, the application research of reliability intelligent evaluation model based on swarm intelligence and edge computing in basketball teaching is urgent.

This paper studied the influence of reliability-based intelligent evaluation model on basketball teaching. This paper used swarm intelligence and edge computing to evaluate and monitor students' basketball activities. It can gradually improve the moral quality and physical and mental quality of students in the process of promoting campus basketball culture. And conducted a sample control experiment and a questionnaire survey. The results of the experimental data showed that the swarm intelligence technology can evaluate that people from higher and lower backgrounds were better at sit-ups, 800 m running tests, and dribbling, while people with higher heights were better at shooting under the basket, three-step layups and fixed point shooting. Edge computing collected a lot of data for the experiment and proved that for boys in the 155-165CM range, after a week of specific training, the scores of sit-ups, 800 m running tests and dribbling improved, especially the dribbling skills increased from 54 points to 87 points, with an improvement of 33 points. The girls whose height range is 145-155CM increased from 68 points to 82 points in sit-ups, with an improvement of 14 points. The results of the questionnaire showed that the number of people who were interested in basketball teaching activities and were very interested in basketball teaching activities was significantly high, and the number of people who were still not interested in six activities did not exceed 2. It can be seen that the reliability intelligent evaluation model based on swarm intelligence and edge computing can fully develop students' sports potential and tap students' basketball technical advantages, thus improving students' basketball technical level and playing an obvious role in promoting basketball teaching.

The paper first analyzes the current situation of basketball teaching as a whole, then describes the reliability model of basketball teaching, then analyzes the related overview of group intelligence and edge computing, and then conducts related experiments on the application of group intelligence and edge computing in the reliability model of basketball teaching, and finally summarizes the paper.

Basketball teaching

Overview of basketball teaching

Physical education is an important part of education and one of the standards to measure the quality of education. Sports play an important role in the process of building a well-off society in an all-round way. The ultimate goal of quality education is to improve the national quality, both physical and psychological quality are indispensable. With the wide spread of basketball culture, campus basketball activities have become a hot sport. Cultivating basketball interests and developing exercise habits are of great significance to promoting national fitness [14]. Basketball is a hand-centered, physical confrontation of sports. Basketball has attracted increasingly people's love and formed a basketball spirit. Basketball plays an important role in strengthening the student system and promoting the students' team cooperation ability. After basketball teaching and training, the students' the union would enhance their awareness of competition and cooperation, and their physical and mental health would develop in a better direction. The impact of basketball on students is invisible and meaningful. The positive basketball culture can not only affect the moral quality of students, but also help to increase the relationship between teachers and students and improve the classroom atmosphere. Basketball was originally invented by a physical education teacher. However, the current situation of basketball teaching is not optimistic. Old teaching concepts and methods, inadequate teaching conditions, insufficient investment in teaching facilities, inaccurate teaching evaluation methods, etc. are the problems in basketball teaching courses today. A series of problems make basketball teaching very passive. In addition, physical education teachers do not have enough technical ability to teach basketball practice classes. They do not know how to carry out and use basketball rules due to lack of attention to individual and team training [15]. In order to improve the basketball teaching class, the reliability intelligent evaluation model is used to evaluate the basketball teaching, to highlight the main position of students and promote the development of quality education.

Reliability model

The reliability model is realized through the mathematical description of the logical relationship between different units of the system. In this case, the reliability chart is a logical relationship chart displayed together with the digital model, which can indicate how each unit of the product causes the product failure, and is used to quantitatively calculate and evaluate the reliability of the object.

Common reliability models can be divided into basic type and task type. The classification of common reliability models is shown in Fig. 1.

① Series model: the failure of any unit in the composition system would lead to the paralysis of the whole system, which becomes a series system. The relationship diagram is shown in Fig. 2.

The reliability of the series system can be expressed by Formula (1):

$$R_n = P_1 \cap P_2 \cdot \cap \ldots \cap P_n \tag{1}$$

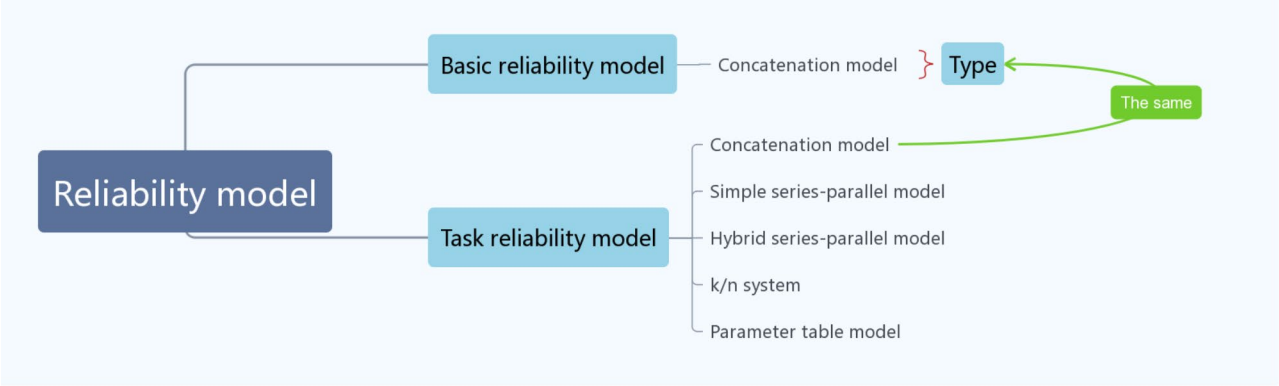


Fig. 1 Classification diagram of common reliability models

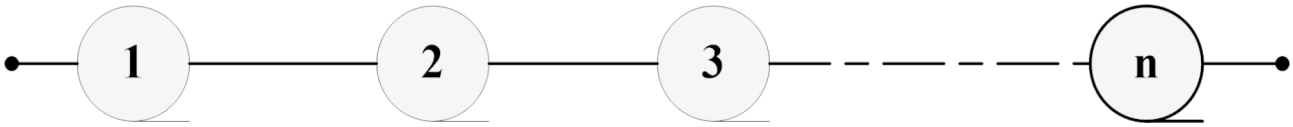


Fig. 2 Series system model

② Parallel model: when all units of the system fail, the system would be paralyzed and would not be affected by individual unit failures.

The parallel system model is shown in Fig. 3.

The reliability of the parallel system can be expressed by Formula (2):

$$R_{n(k)} = 1 - \prod_{n=1}^{i} [(1 - R_n[k])] \tag{2}$$

Since the elements of the parallel system are independent of each other, the expression formula of the system's unreliability is shown in Formula (3) and Formula (4):

$$F_n = P_1 + P_2 + \ldots + P_n \tag{3}$$

$$P_n = T_1 \cap T_2 \cdot \cap \ldots \cap T_n \tag{4}$$

Where, k, n and i respectively represent the element coefficients in the system.

Among them, T represents the faulty unit. The characteristic of the reliability model is that it can effectively evaluate the reliability of the influencing factors of products, so the reliability model can be introduced into basketball teaching to evaluate the reliability of the influencing factors of basketball teaching. The influencing factors of basketball teaching are students' interest in basketball, students' basketball level, students' gender differences, etc. However, the reliability evaluation of the reliability model needs to be based on data, and there is often no large amount of data as a support in basketball teaching, this is due to the lack of relevant technology to collect basketball data in traditional basketball teaching, so there would be inaccurate reliability. Swarm intelligence and edge computing can provide accurate data and improve the accuracy of the reliability intelligent evaluation model, thus reducing the uncertainty of influencing factors in basketball teaching and improving the quality of basketball teaching.

Group intelligence

Swarm intelligence algorithm is a subset of the field of artificial intelligence. It is increasingly popular in solving different optimization problems and has been widely used in various applications. In the past decades, many swarm intelligence algorithms have been developed, including ant colony optimization, particle swarm optimization, artificial fish swarm, bacterial foraging optimization, and artificial bee colony [16]. The most commonly used swarm intelligence algorithm is the ant colony optimization algorithm. Swarm intelligence systems typically consist of a simple group of agents or classes that interact locally with each other and with their environment. Inspiration often comes from nature, especially biological systems. Agents follow very simple rules, and although there is no central control structure to dictate how individual agents behave, they are local and to a certain extent random, the interactions between these agents lead to the emergence of agents with "intelligent" global behavior that the individuals are unaware of. Examples of swarm intelligence in natural systems include ant colonies, bee colonies, bird flocking, eagle hunting, herding, bacterial growth, fish colonies, and microbial intelligence [17].

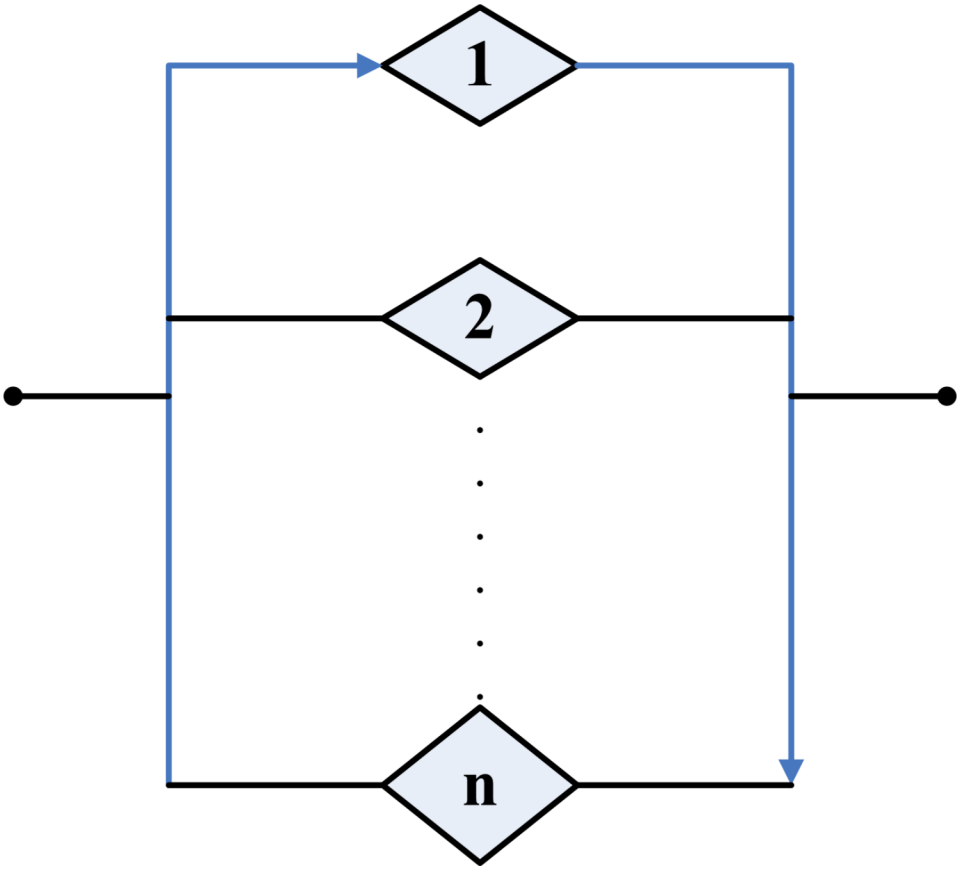


Fig. 3 Parallel system model

Ant colony optimization algorithm simulates the foraging process of an ant colonies, which has been successfully applied to many discrete optimization problems. In the process of searching for food, ant colonies usually find the shortest path from the nest to food. Ants have low IQ, but they can have high compatibility through simple communication. This phenomenon directly encourages scientists to find the best solution. Each ant randomly looks for a path and provides pheromones during the journey. Therefore, in a period of time, the number of ants with the best road time is the highest concentration of pheromones, while the returning ants follow the most concentrated route. The pheromone concentration of other aspects is low, but when most ants take the best path, they get positive feedback. Ant colony optimization algorithm is a simulation of this phenomenon.

Edge computing

Edge computing means that the network, computing, storage, and application cores are on a common platform and close to the target or data source. The technical models of edge computing are generally divided into five categories, namely, federated learning, parameter aggregation optimization, gradient compression, model segmentation, and transfer learning. Due to the popularity and application of the Internet of Things, the requirements for data security and convergence are higher, and the promotion and use of the technical model of edge computing is more important. The basic model of edge computing is shown in Fig. 4 below.

① Federated learning: federated learning technology was originally designed to protect users' privacy. Federated learning does not directly collect user terminal data, but conducts the latest simulation update at each user terminal to avoid users' privacy leakage. In particular, the federation studies the use of deep learning models on user terminals, and the use of user data training models to aggregate and update on edge servers or cloud data centers. High performance learning is also an important direction, which uses multilevel computing of the edge clouds and synchronization between edge nodes.

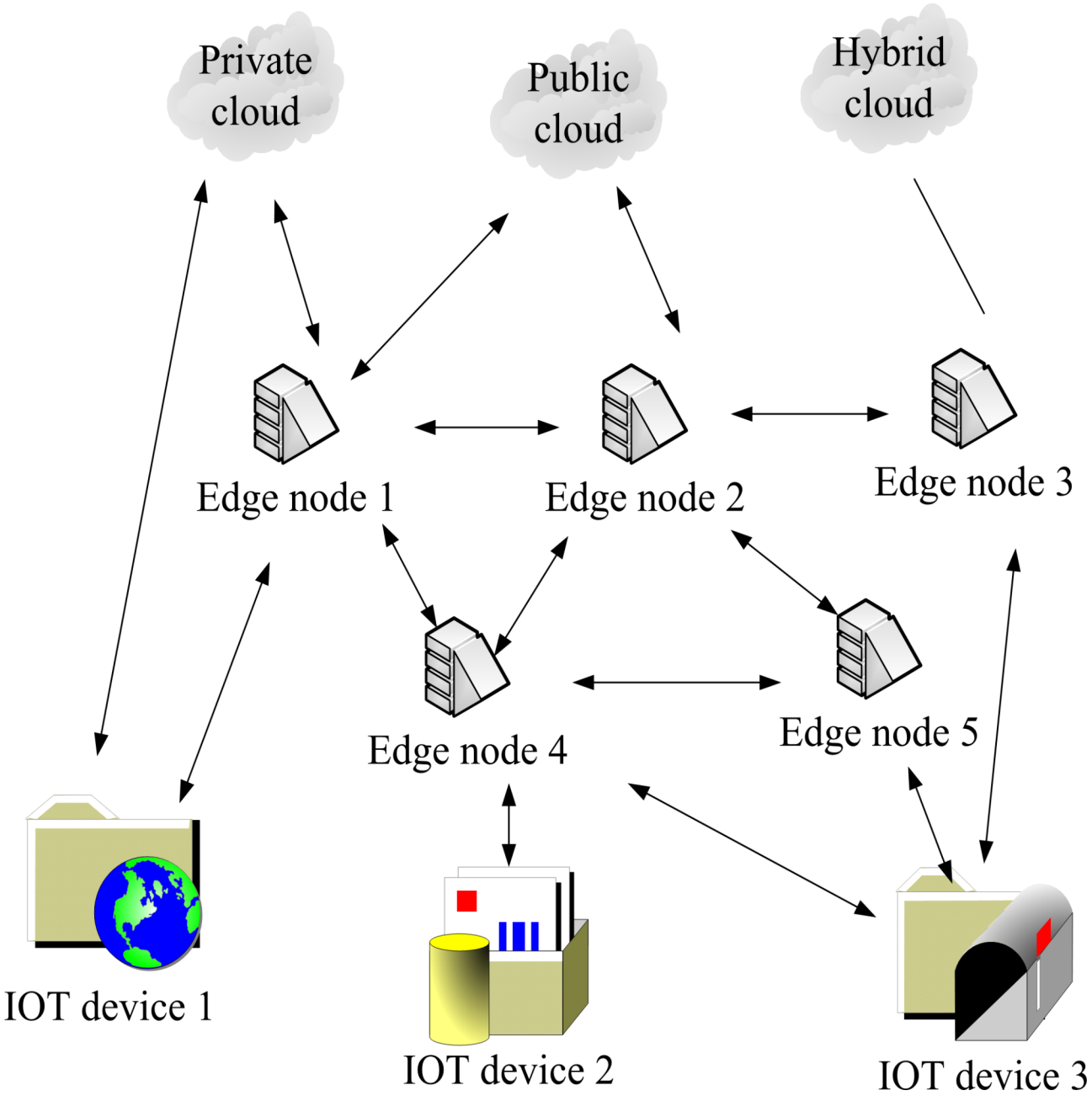


Fig. 4 Basic model of edge computing

② Parameter aggregation optimization: based on the distribution of each application, how to select the parameters for users to participate in the consolidation and how to set the frequency of consolidation would directly affect the communication cost, access model, in-depth learning, convergence performance and accurate display.

③ Gradient compression: for edge intelligent distributed learning, gradient parameters are often exchanged between model-based learning nodes, which means high communication costs. In order to reduce management costs, gradient compression techniques, namely, gradient sparsity and gradient quantization, can also be used as the representative. Among these factors, the basic idea of gradient sparsity is to select the partial transfer of gradient parameters and provide good model training results. The basic idea of gradient quantization is to reduce the accuracy of the values used to represent gradient parameters.

④ Model segmentation: the segmentation concept of this model is to decompose the deep neural network model into parts, some of which are used at the edge side, and others are used in the cloud, to obtain a model based

on cloud synergy. Data would not be discarded before and after segmentation, nor would it lead to loss of data accuracy. The key problem of deep neural network model segmentation is how to choose the best segmentation location, to optimize the calculation and communication costs of model formation.

⑤ Transfer learning: The concept of learning transfer starts with creating a basic model on the basic dataset, then converting the learning characteristics into a target model, and using the target dataset for training. In order to reduce the resource consumption of the network edge model, a large basic model is trained in the cloud, and then through migration learning, the local dataset is combined with computer resources to form a personalized and deployment lightweight target model.

The basic architecture of edge computing aims to move the central network components of the complete cloud platform close to the terminal on the edge. Currently, it usually refers to bringing the processing capacity of IT and cloud platforms closer to the terminal and integrating network transmission, computing, storage, and application innovation capabilities to increase the responsiveness and effectiveness of edge "small computing." In the IoT (Internet of Things), edge computing can also be simply viewed as a scenario technique that emphasizes the opposite of cloud computing.In its simplest form, edge computing involves running programs as close as feasible to the site where the data is generated. In order to meet the essential requirements of industry digitization in terms of agile connectivity, real-time services, data optimization, application intelligence, security, and privacy protection, edge intelligence services are provided nearby by a distributed open platform that integrates the core capabilities of network, computing, storage, and application.The general architecture of edge computing is shown in Fig. 5.

Experimental evaluation of basketball teaching

Application of group intelligence in the intelligent evaluation model of basketball teaching reliability

In order to reflect the group intelligence can effectively reflect the influencing factors of basketball teaching and improve the accuracy of the reliability intelligence evaluation model, this paper selected two male and two female students from a school for sampling experiments. First, the statistics of four students' six basketball activities including sit-ups, 800 m running test, shooting under the basket, three-step layup, shooting at a fixed point, and dribbling were made. The results are shown in Fig. 6 (full score system).

It can be seen from Fig. 6 that the level gap between boys and girls in six sports was obvious. Real time evaluation was carried out according to the reliability intelligent evaluation model. Due to the high endurance and meticulous characteristics of girls, girls are more dominant in sit-ups, 800 m running tests, and shooting under the basket. This is a local feature that affects the overall effect, which is a typical tandem reaction. The boys are more skilled and focused, making them better at three-step layup, fixed point shooting, and dribbling, which also belongs to the series system of reliability intelligent evaluation model. As far as dribbling skills were concerned, the highest score of boy A was 91 points, while the lowest score of girl C was 54 points. The gap was quite large. For three-step layup, the highest score of boy B was 90 points, and the lowest score of girl D was 59 points. The gap was also large. The four students selected were all of normal stature, including a boy A of 175CM, boy B of 180CM, girl C of 173CM, and girl D of 162CM. Because each student's development is different, the use of ant colony optimization algorithm and swarm intelligence technology can understand the sports level of these four students, to calculate the sports level of a wider range of students. By using the swarm intelligence ant colony optimization algorithm to evaluate the obtained data, a group of evaluation data was obtained as shown in Table 1. √ means good at this sport, and × means not good at this sport.

It can be seen from the evaluation data in Table 1 that, relatively speaking, people with lower height are better at sit-ups, 800 m running tests, and dribbling, while people with higher height are better at shooting under the basket, there-step lay-ups and fixed point shooting.

Application of edge computing in the intelligent evaluation model of basketball teaching reliability

In order to explore whether the data obtained by the swarm intelligence ant colony optimization algorithm is accurate, another experimental class of students was trained for a week. The students in the experimental class were divided according to the height range in Table 1, and the progress of the students before and after the experiment was compared (Average score). Due to the large amount of data collection, edge computing technology was used to collect and classify data sources. Data results obtained: the comparison chart of sit-ups, 800 m running test and dribbling is shown in Fig. 7; the results of shooting under the basket, three-step layup and fixed point shooting are shown in Fig. 8.

It can be seen from the comparison in Fig. 7 that for boys in the 155-165CM range, after a week of specific training, the scores of sit-ups, 800 m running tests, and dribbling have improved, especially the dribbling skills have increased from 54 points to 87 points, with an improvement of 33 points. The girls whose height range is 145-155CM increased from 68 points to 82 points in sit-ups, with an improvement of 14 points. Girls in the 156-165CM range improved from 66 points to 80 points

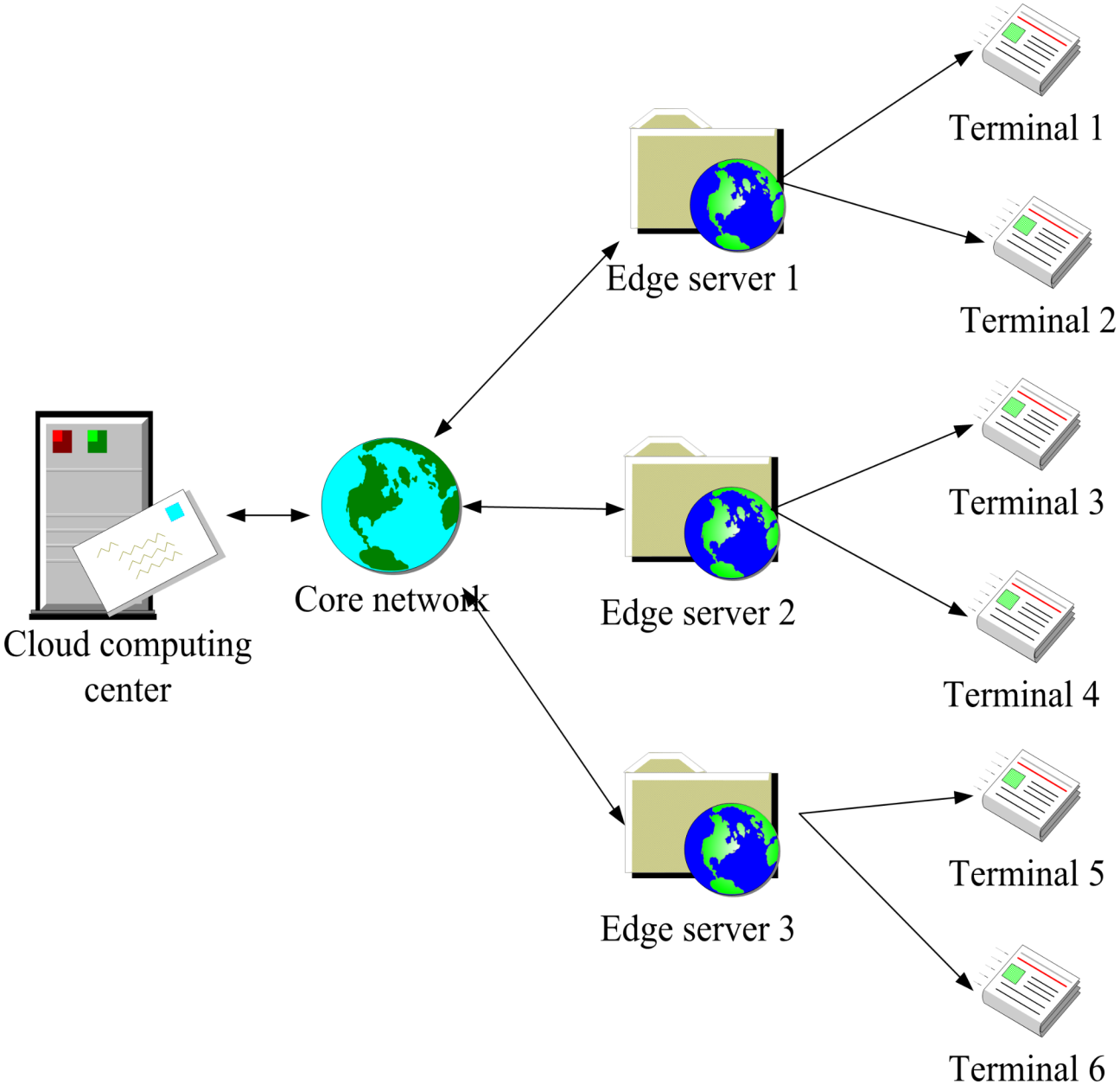


Fig. 5 General architecture diagram of edge computing

on the 800 m running test. The average score of the students in each height range increased in the three sports.

It can be seen from the comparison in Fig. 8 that after a week of specific training, the average scores of the three sports skills of shooting under the basket, three-step layup and fixed point shooting of students in three height ranges have improved. The body whose height range is 166-175CM, has increased from 76 points to 90 points in the three-step layup, with a significant improvement of 14 points.

Questionnaire

Questionnaire reliability

In this study, a questionnaire survey was conducted among 48 students in the experimental class. In order to ensure the authenticity and credibility of the questionnaire, 48 questionnaires were distributed and 48 were recovered in this survey. The recovery rate was 100%. There was no invalid questionnaire with many missing questions. Therefore, 48 valid questionnaires were finally included in the statistics. The questionnaire results were analyzed by Statistical Product and Service Solutions (SPSS) software, and Clonebach coefficient A was

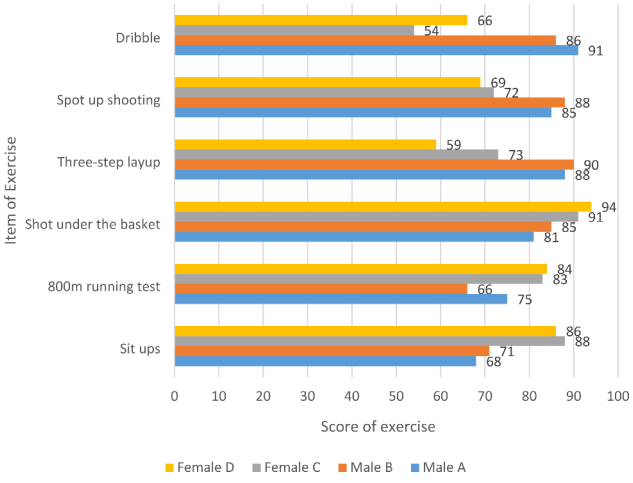
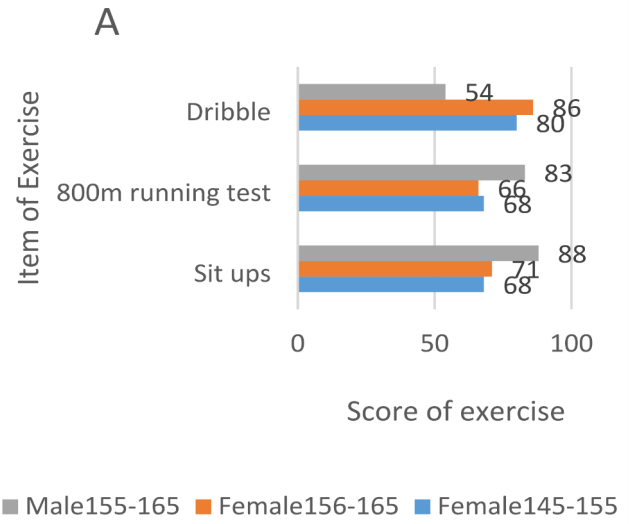


Fig. 6 Score chart of six basketball events



Figs. 7 A comparison of sit-ups, 800 m running tests and dribbling
A. Data results of sit-ups, 800 m running tests and dribbling before training.
B. Data results of sit-ups, 800 m running test and dribbling training.

selected as the reliability coefficient. The questionnaire of this study was divided into two parts: text questionnaire and form questionnaire. In Table 2, the clonal batch coefficients A of the text questionnaire and the form questionnaire were 0.87 and 0.89, respectively. Both were greater than 0.85, which indicated that the reliability of the questionnaire was good. The content of the survey is the students' interest in the basketball classes. It is hoped that it can fully and truly reflect the change of students' attitude after the introduction of the reliability intelligent evaluation model into the sports basketball class.

Six of them refer to the sit-ups studied in this study, the 800 m running test, shooting under the basket, three-step layups, spot-up, and dribbling.

Questionnaire results

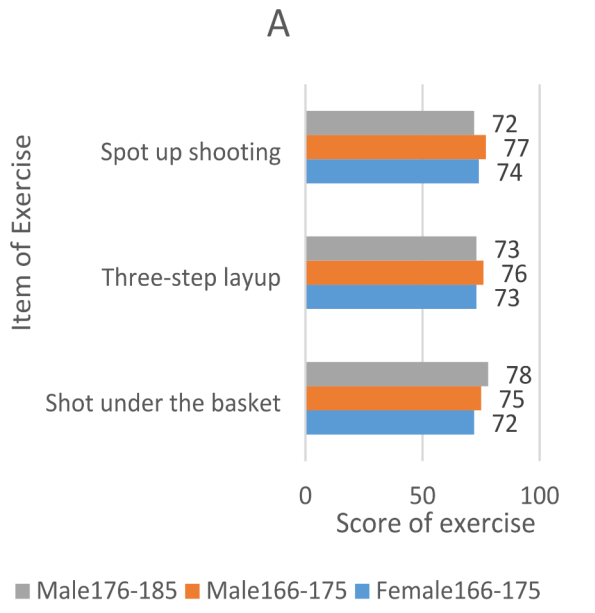
This study made statistics on the changes of six activities in basketball teaching. The survey results obtained from the questionnaire are shown in Fig. 9 (multiple choices are allowed).

Since no questionnaire survey was conducted on the students of the experimental class before the introduction of the reliability intelligent evaluation model, it was impossible to compare the results of the two questionnaires. However, from the questionnaire results, it can be seen that the number of people who were interested in and very interested in basketball teaching activities was clearly high, and the number of people who were still not interested in six activities did not exceed 2 at most. It can be seen that after the introduction of the reliability intelligence evaluation model based on swarm intelligence and edge computing into basketball teaching classes, students' interest in basketball teaching has increased significantly, which helps to mobilize students' enthusiasm for basketball lessons. The assessment method is correct, and the training program is targeted, which helps to improve the classroom atmosphere.

It can be proved that swarm intelligence technology can effectively analyze the correct data and get the approximate level interval of different types of students according to the randomness of students' sports level, so as to help teachers find students' strengths and weaknesses in a timely manner. This is convenient to improve the shortcomings and enhance the advantages, to explore the shortcut of basketball teaching and avoid blind training. Edge computing can effectively approach data sources and quickly integrate a large amount of data. It can improve the security of data and screen the shortcut of swarm intelligence discovery, thus improving the accuracy of reliability intelligent evaluation model. Accurate

Table 1 Whether men and women of different heights are good at basketball activities

Height Items	Sit ups	800 m running test	Shot under the basket	Three-step layup	Spot up shooting	Dribble
Female145-155	√	√	×	×	×	√
Female156-165	√	√	√	×	×	√
Female166-175	×	×	√	√	√	×
Male155-165	√	√	×	×	×	√
Male166-175	×	×	√	√	×	√
Male176-185	×	×	√	√	√	√



Figs. 8 A comparison of basket shots, three-step layups, and spot-up shots
A. Data results before basket shooting, three-step layup and fixed-point shooting training.
B. Data results after basket shooting, three-step layup and fixed-point shooting training.

Table 2 Questionnaire reliability table

Reliability Statistics			
Number of Items	6	Cronbach's Alpha	
		Text Questionnaire	Form Questionnaire
		0.87	0.89

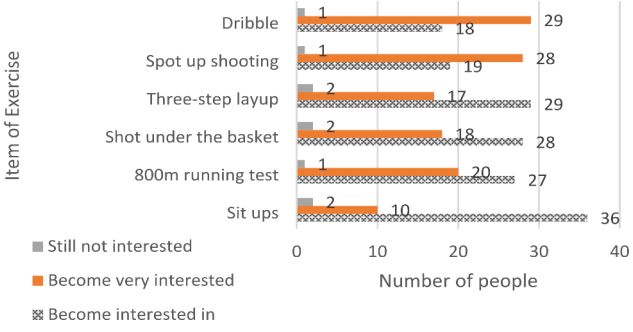


Fig. 9 Basketball teaching six activities interest change chart

data can help teachers better guide students' basketball teaching, to develop different training programs according to the characteristics of different students, which can provide a solid and powerful basis for scientific basketball teaching.

Conclusions

The application of swarm intelligence and edge computing in the intelligent evaluation model of basketball teaching reliability is of great significance. It can be seen from the experimental data that swarm intelligence, ant colony optimization algorithm, and edge computing are important and inevitable trends to integrate into the intelligent evaluation model of basketball teaching reliability in the future. They contribute to the improvement of basketball teaching level, the compensation of traditional basketball teaching deficiencies, and the establishment of a more standard and reliable sports basketball classroom. It is undeniable that basketball teaching is further towards the direction of concrete construction. However, as the Internet of Things technology is still gradually improving, the price of swarm intelligence and edge computing technology is generally high, so it can not be widely used in basketball teaching. Even if it can prove the efficiency and convenience of swarm intelligence and edge computing technology, it cannot deny its disadvantages in the high price. Most colleges and universities would still choose the traditional sports basketball teaching mode when they are unable to bear the high price. Secondly, in terms of experimental data collection, this paper only selected students from an experimental class in a school as experimental data and did not consider the situation of basketball teaching in other schools. The experimental data volume is small, and the students in the experimental class have not been surveyed before the introduction of the reliability intelligent evaluation model, so the reliability of the experimental results is not high. Finally, in order to deeply analyze the influence of swarm intelligence and edge computing in the intelligent evaluation model of basketball teaching reliability, and make the research results more authentic and representative, in the follow-up research, the research results would be improved from these perspectives. In the future, according to these problems, the application of swarm intelligence and edge computing in the intelligent evaluation model of basketball teaching reliability will be further explored and studied.

Authors' contributions

DingHang Wang designed the experiments, collected data for experimental comparison usage, ran the experiments for the performance study, and wrote the first draft of the paper. Sile Jian critically reviewed the method and contributed to structuring the paper.

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Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Ethical approval
Not applicable.

Competing interests
There is no potential conflict of interest in our paper and all authors have seen the manuscript and approved to submit to your journal. We confirm that the content of the manuscript has not been published or submitted for publication elsewhere.

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References

1. Li B, Xu X (2021) Application of artificial intelligence in basketball sport. J Educ Health Sport 11(7):54–67
2. Griban G, Prontenko K, Kostyuk Y (2018) Formation of middle school pupil movements in basketball. J Phys Educ Sport 18(1):304–309
3. Zhang J, Zhang W (2019) A network digital teaching mode of basketball based on ecological learning space. Int J Emerg Technol Learn (iJET) 14(17):59–72
4. Jiang Z, Jia ZR (2018) Effects of Physical Education teachers' leadership styles and classroom climate on learning motivation for a basketball courses. Eurasia J Math Sci Technol Educ 14(4):1351–1357
5. Ziyu LIU (2021) Application of college basketball training teaching based on sports video analysis under network multimedia. Solid State Technology 64(1):170–181
6. Gonzalez-Espinosa S, Mancha-Triguero D, García-Santos D (2019) Difference in learning basketball according to gender and teaching methodology. Revista de Psicologia del Deporte 28(3):86–92
7. Ismoilovna YF, Azamovich AM, Umidovich AB, METHODS OF EDUCATION OF ENDURANCE, IN BASKETBALL PLAYERS OF SENIOR SCHOOL AGE. INTERNATIONAL JOURNAL OF SOCIAL SCIENCE & INTERDISCIPLINARY RESEARCH (2022), ISSN:2277–3630, Impact factor: 7.429, 11(10): 105–109
8. Kanat EA, Şimşek D (2021) The'Quiet Eye'and motor performance in basketball free throw shooting. Phys Educ students 25(2):103–109
9. Zhang F (2019) Research on reliability analysis of computer network based on intelligent cloud computing method. Int J Comput Appl 41(4):283–288
10. Yang XS, Deb S, Zhao YX (2018) Swarm intelligence: past, present, and future. Soft Comput 22(18):5923–5933
11. Slowik A, Kwasnicka H (2017) Nature inspired methods and their industry applications—Swarm intelligence algorithms. IEEE Trans Industr Inf 14(3):1004–1015
12. Wang C, Yu FR, Liang C (2017) Joint computation, offloading, and interference management in wireless cellular networks with mobile edge computing. IEEE Trans Veh Technol 66(8):7432–7445
13. Sun H, Zhou F, Hu RQ (2019) Joint offloading and computation energy efficiency maximization in a mobile edge computing system. IEEE Trans Veh Technol 68(3):3052–3056
14. Chau KY, Law KMY, Tang YM (2021) Impact of self-directed learning and educational technology readiness on synchronous E-learning. J Organizational End User Comput (JOEUC) 33(6):1–20
15. Girma MG, Solomon W (2018) Technical problems in teaching basketball practical session: the case of Grade 11 in Alamura Preparatory School. J Phys Educ Sport Manage 9(4):30–42
16. Tang J, Liu G, Pan Q (2021) A review on representative swarm intelligence algorithms for solving optimization problems: applications and trends. IEEE/CAA J Automatica Sinica 8(10):1627–1643
17. Chen H, Fan DL, Fang L et al (2020) Particle swarm optimization algorithm with mutation operator for particle filter noise reduction in mechanical fault diagnosis. Int J Pattern recognit Artif Intell 34(10):2058012

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