



Analysis of Sports Teaching Mode Based on Online Teaching Platform

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ABSTRACT

With the widespread application of neural networks and advanced network technology, smart phones with perfect functions have been recognized as necessities in daily life, learning, work, and leisure. However, in teaching for people's daily exercise, the old traditional teaching mode is still used, which cannot achieve good teaching results. This article proposes a new intelligent learning model that utilizes artificial neural networks to process information. We also apply this model to build an actual training ground and calculate some effective training strategies here. Our research found that students' skills, professionalism, and learning enthusiasm have significantly improved in the training ground using artificial intelligence. The effect of this model in training far exceeds the expectations of artificial intelligence.

Keywords: Online Teaching, Neural Network, Network Technology, Sports Teaching, Intelligent Learning Model

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1. Introduction

When it comes to sports, many people will immediately think of those flexible and agile figures on the court and the scene of fierce competition. As a widely popular sports require not only exquisite skills but also the application of intelligence and strategies. In the era of information technology, building an online teaching platform with neural networks can bring more possibilities to sports teaching [1]. The online teaching platform provides a new way for games teaching, overcoming the limitations of time and space in traditional teaching and realizing students' autonomous learning and personalized development. Through this platform, students can learn any

time, anywhere, and interact and communicate with coaches and other students to improve their skill levels together [2]. Neural networks are computational models that imitate the workings of the human nervous system, which is composed of multiple interconnected neurons. The core of the neural network algorithm is to optimize the weight parameters of the neural network through the back propagation algorithm [3]. The back propagation algorithm is an iterative algorithm used to train neural networks, which continuously adjusts the weight parameters of the neural network by propagating the error from the output layer to the input layer to optimize the network performance gradually. Before using neural networks, all input information needs to be processed. Then, we can evaluate each step's model and the predictive model based on the processed information and determine their deviations. Furthermore, based on the error values, we calculate the error for each neuron layer by layer, starting from the output layer until reaching the input layer. Finally, based on the error values and the optimization algorithm, the weight parameters of the neural network are updated to reduce the error gradually by repeating the above steps until the network's performance meets expectations or reaches the maximum number of iterations [4]. Regarding course settings, the online teaching platform usually includes theoretical and practical courses.

The theoretical courses mainly include basic knowledge of sports, technical movements, and tactical strategies, which can be taught through video tutorials, PPTs, and other forms; the practical courses mainly involve online simulation matches, interactive exercises, etc., where students can communicate and exchange with coaches or other students online. Regarding teaching methods, the online teaching platform mainly adopts a combination of autonomous learning and personalized guidance. Students can learn at their own time and pace, and at the same time, they can communicate and discuss with coaches and other students online to solve problems and correct errors promptly. In terms of learning effectiveness, the online teaching platform can provide various feedback and evaluation mechanisms, including online tests, assignments, simulation matches, etc., to detect students' learning effectiveness promptly and improve their skill levels. However, the online teaching platform also has shortcomings, such as the lack of face-to-face interaction and guidance and a real competitive atmosphere in the learning environment. Therefore, it needs to be continuously improved and supplemented in the actual application process to enhance the quality and effectiveness of games sports teaching.

2. Related Work

Faced with numerous students, teachers cannot consider the acceptance level of each student in a short period. Many universities have limited arrangements for games courses, with most schools only offering one semester of courses [5]. Teaching complex and diverse sports skills requires a relatively long time. Students with tight educational schedules and low acceptance cannot be adequately taken care of. Therefore, building a games intelligent education system based on neural networks is necessary. Zhen et al. discussed the application of online teaching platforms in sports teaching[6]. Through a case analysis, they pointed out that online platforms can provide learners with more convenient learning methods, rich learning resources, and interaction opportunities. In addition, online platforms can achieve personalized teaching to meet the needs of different learners. Prat et al. mainly focused on the advantages and benefits of online teaching platforms in sports teaching [7]. The research shows that online platforms can significantly improve students' interest and learning effectiveness and enhance teachers' teaching effectiveness. Online platforms also provide more interactive and feedback mechanisms, which help students deepen their understanding and mastery of sports skills. Giri et al. analyzed the application of online teaching platforms in games teaching through qualitative research methods [8]. The study found that online platforms can provide students with more flexible learning methods

and more learning resources and interaction opportunities. In addition, online platforms can achieve personalized teaching to meet the needs of different students. Wang et al. discussed the application of remote education in sports teaching [9]. The research pointed out that remote education can provide students with more convenient learning methods, learning resources, and interaction opportunities. In addition, remote education provides more interactive and feedback mechanisms, which help students deepen their understanding and mastery of sports skills. Chen et al. explored the role of online teaching platforms in games teaching through quantitative research methods [10]. The study found that online platforms can provide students with more flexible learning methods, learning resources, and interaction opportunities. In addition, online platforms can achieve personalized teaching to support students' learning needs [10]. This article briefly summarizes and analyzes existing intelligent education systems and neural network technology. By applying multiple intelligence theory, project reflection theory, and error backpropagation algorithm technology, we design an intelligent guided games system based on an online teaching platform to address the challenges of learner modeling and teaching strategy selection, providing strong support for achieving intelligent goals [11].

3. Building an Online Teaching Platform Based on Neural Networks

3.1 Neural Network Algorithm

Through computer technology, people can construct complex neural networks that contain many artificial neurons and effectively connect them. Specific learning algorithms determine the weights connecting each neuron, and the structure has specific functions. Neural networks consist of multiple neurons that interact complexly [12,13]. The relationships between these neurons are nonlinear and have high-dimensional features, including parallelism, distribution, adaptability, self-organization, and self-learning capabilities. Although the individual functionality of a single neuron is limited, neural networks composed of multiple neurons can produce highly complex and diverse behaviors and outcomes. Neural controllers have been widely used in automation [14]. In recent years, control systems have made significant achievements in the industrial, aviation, and robotics fields. However, only some have ventured into the field of intelligent games teaching, which is closely related to people's lives. Intelligent games teaching is just a controller without thinking, meaning it cannot think and decide on the system's control scheme based on the environment. The self-learning and adaptive characteristics of neural networks provide a solution to this. The algorithm of the neural network is shown in formula (1).

$$G(x, y) = \exp\left(-\frac{x^2 + y^2}{2\sigma^2}\right) \quad (1)$$

3.2 Mathematical Morphology Algorithm

Mathematical morphology uses set algebra theory to analyze and process based on geometric features. The mathematical morphology method mainly uses erosion and dilation operations to extract morphological boundaries [15,16]. More accurate boundaries can be obtained by combining the contraction effect of computed shrinkage and the expansion effect of computed dilation with specific logical operations. The fitness function is determined using the between-class variance method, as shown in formula (2). A random number is generated within the interval, and the individual corresponding to the region to which the random number belongs is selected. It can be seen that the higher the fit of the individual, the higher the probability of being selected. The likelihood of an individual being selected is shown in formula (3). These intelligent games teaching system extracts user data from the database as input to train the neural network. In other words, it uses the self-learning and

adaptive characteristics of the neural network to learn about the user's lifestyle. Then, based on real-time training data, it provides personalized recommendations for online teaching platforms. Therefore, the intelligent games teaching system, with the introduction of an online platform, can tailor games teaching strategies based on the user's habits, freeing the user from tedious traditional teaching. Since the system understands the user's habits in real-time and then formulates control plans, it can quickly adapt to changes in user behaviour or habits.

$$f(t) = \sigma(t)^2 = w_1(t) * w_2(t) * (u_1(t)) - u_1(t)^2 \quad (2)$$

$$Q = \frac{1}{2a^2 r^{-1}} \left(\frac{2b^2}{a^2 r^{-1}} t - L \right)^{-1} \left[a^2 r^{-1} L^2 + 2(1 - a^2) L \right] \quad (3)$$

3.3 Games Teaching

Games teachers create teaching videos on the teaching platform based on the teaching plan and the actual situation of the students, focusing on key and complex issues. They require students to engage in pre-class self-study and set up thematic discussion sessions where students can raise questions encountered during self-study and receive timely answers. Students in the experimental group utilize fragmented time for self-directed learning online, completing the preview tasks assigned by the games teacher [17,18]. They can also dynamically use the platform's big data to monitor their learning progress. For games, students' learning objectives are more practical, direct, and purposeful. We aim to improve our games skills through a series of learning experiences. We will focus on how to use this sport to enhance our competitiveness. We will strive to make our team members familiar with this sport's details, including its rules, requirements, and competition processes. We will also continue to contribute to society. By utilizing the resources of online classrooms, we can help students master games skills more effectively and foster their love for this sport, thus improving their overall health. Furthermore, we can encourage them to challenge themselves and cultivate perseverance bravely. The teaching process is shown in Figure 1.

4. Experimental Design and Analysis

4.1 Experimental Design

The games teacher summarizes the students' pre-class self-directed learning and designs the lesson plans and equipment preparation accordingly. For example, in the experimental group, before the classroom teaching begins, the teacher prepares explicitly for the common problem of students in the self-directed learning stage, such as the inability to control the shuttlecock hitting and landing points effectively, and focuses on explaining and demonstrating these aspects during the class. During the online classroom teaching process, the teacher pays attention to setting up teaching scenarios and fully utilizes the group cooperative learning model to cultivate students' communication, cooperation, problem analysis, and problem-solving abilities. At the end of the course, the teacher can help students summarize and reflect on the games skills they have learned and provide them with targeted video exercises.

Students should actively engage in interactive communication with the games teacher during the class to enhance their teaching effectiveness. Additionally, after the class, students should actively participate in group cooperative learning activities, provide feedback to each other, promptly correct any erroneous technical move

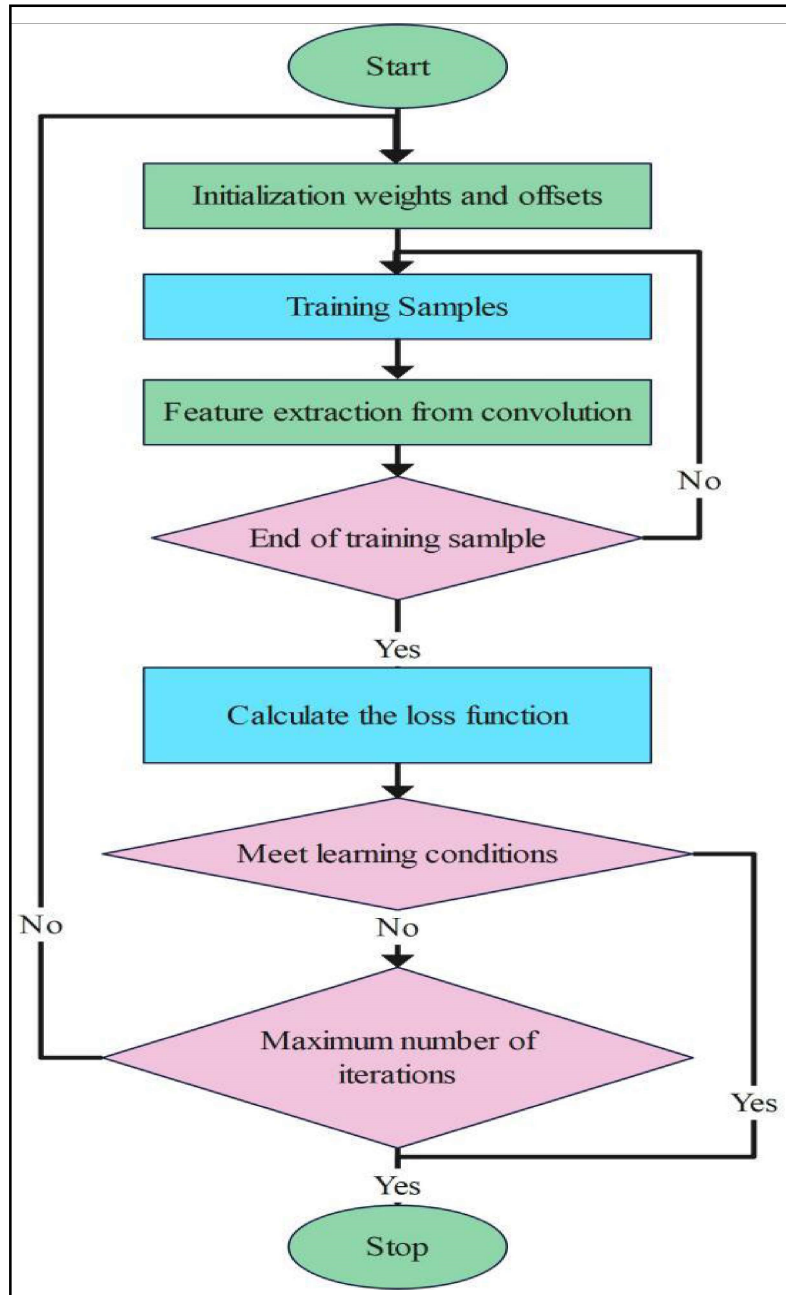


Figure 1. Smart Games Teaching Process

ments, and develop a sense of collaboration. Using the teaching platform, games teachers can assign homework to students after class and require them to complete it within a specified time to help them consolidate their knowledge and skills in games. After students submit their homework, the teacher can provide feedback online, pointing out any deficiencies in their technical movements, to help them solidify their games skills. Moreover, games teachers can also upload relevant games teaching resources, such as match videos and knowledge links, to meet students' learning and improvement needs. When evaluating and providing feedback to each other, promptly correct any erroneous technical movements, and develop a sense of collaboration. Using the teaching platform, games teachers can assign homework to students after class and require them to complete it within a specified

time to help them consolidate their knowledge and skills in games. After students submit their homework, the teacher can provide feedback online, pointing out any deficiencies in their technical movements, to help them solidify their games skills. Moreover, games teachers can also upload relevant games teaching resources, such as match videos and knowledge links, to meet students' learning and improvement needs. When evaluating and providing feedback to students, teachers can also refer to the records of student attendance, task completion, and homework completion in the big data of the games teaching platform. After class, students should promptly complete and submit the post-class assignments given by the teacher and adjust their technical movements according to the teacher's feedback. When encountering difficult-to-solve problems, students can seek help from the teacher or other classmates online, continuously improving their communication and technical skills. The teaching situation of students in a certain class was subjected to a group experiment. One group used traditional games teaching, and the other group used the neural network-based online teaching platform. Through in-depth exploration and the integration of the latest research results, we aim to provide strong support for developing university games courses and create a brand-new games course that meets the student's needs.

4.2 Experimental Analysis

Through the experiment, we found that the serving ability and forehand hitting of the experimental group students were significantly better than those of the control group. There was a notable difference in serving technique between the two groups ($P < 0.05$), and a significant difference in forehand hitting technique ($P < 0.01$). This indicates that this teaching mode has significantly improved the games skill level of the experimental group students. Whether in games serving technique or forehand hitting technique, the key to skill development lies in correct motion conditioning. The students in the experimental group, influenced by the teaching mode, had a significant advantage in proper motion conditioning, resulting in their technical actions being smooth and their hitting points accurate.

Using the online teaching platform significantly improved students' motion skills. Compared to the traditional teaching mode, it more accurately helps students master these skills and cultivates their dynamics and thinking habits. After three weeks of training with different teaching methods, we conducted a statistical analysis of the changes in the games skill levels of the students in the class. The changes in games skill levels are shown in Figure 2. From the graph, we can see significant differences in students' games skill levels after training with different teaching methods. The students in the experimental group showed a significant improvement in games skills after the classes. However, the improvement in test scores and the reproduction of games skill test scores in the control group were not as significant. This result demonstrates a certain difference between the smart games teaching method and the traditional teaching method. The smart teaching method has a greater advantage in consolidating and ensuring students grasp knowledge firmly.

After the teaching, we surveyed on the students' understanding of games, as shown in Figure 3. According to the survey results, 31.53% of students were very familiar with games knowledge, 28.97% were quite familiar, and 39.5% believed that improving games skills and improving the teacher-student relationship was crucial. Furthermore, in the survey on the need for continued use, the percentages of strong agreement and relative agreement were 72.61%, 91.07%, and 78.19%, respectively, while the number of rejections was 0. From this example, we can see that many students believe that the smart teaching mode can help them improve interpersonal relationships and enhance their abilities. Regarding satisfaction with continued use, this teaching method can be considered acceptable and recognized.

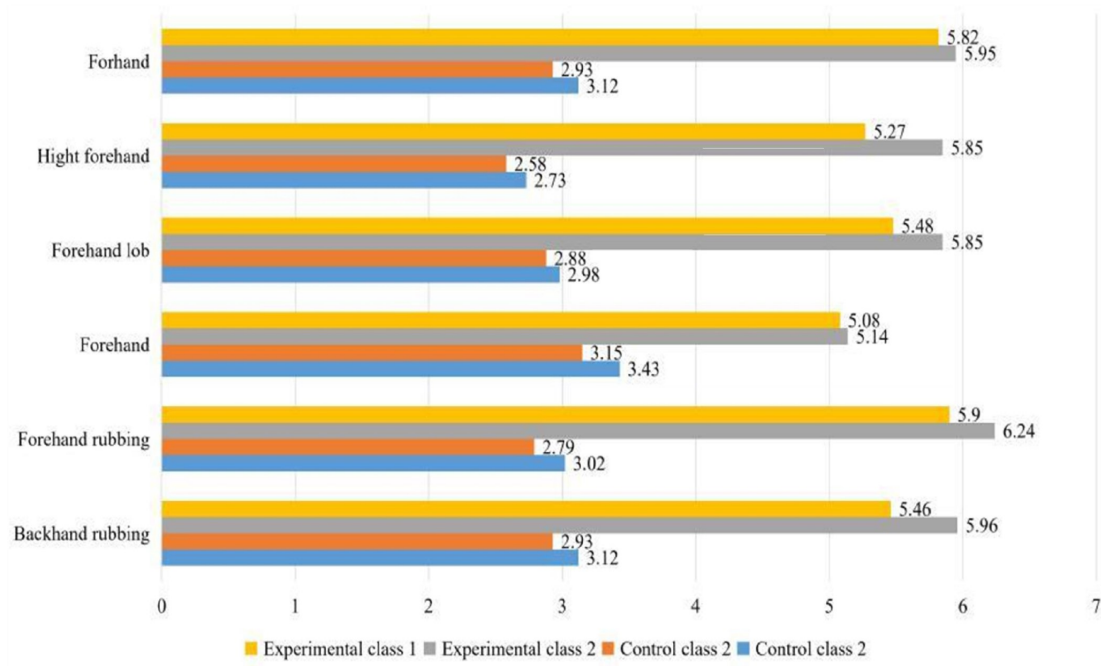


Figure 2. Skill differences among students after training

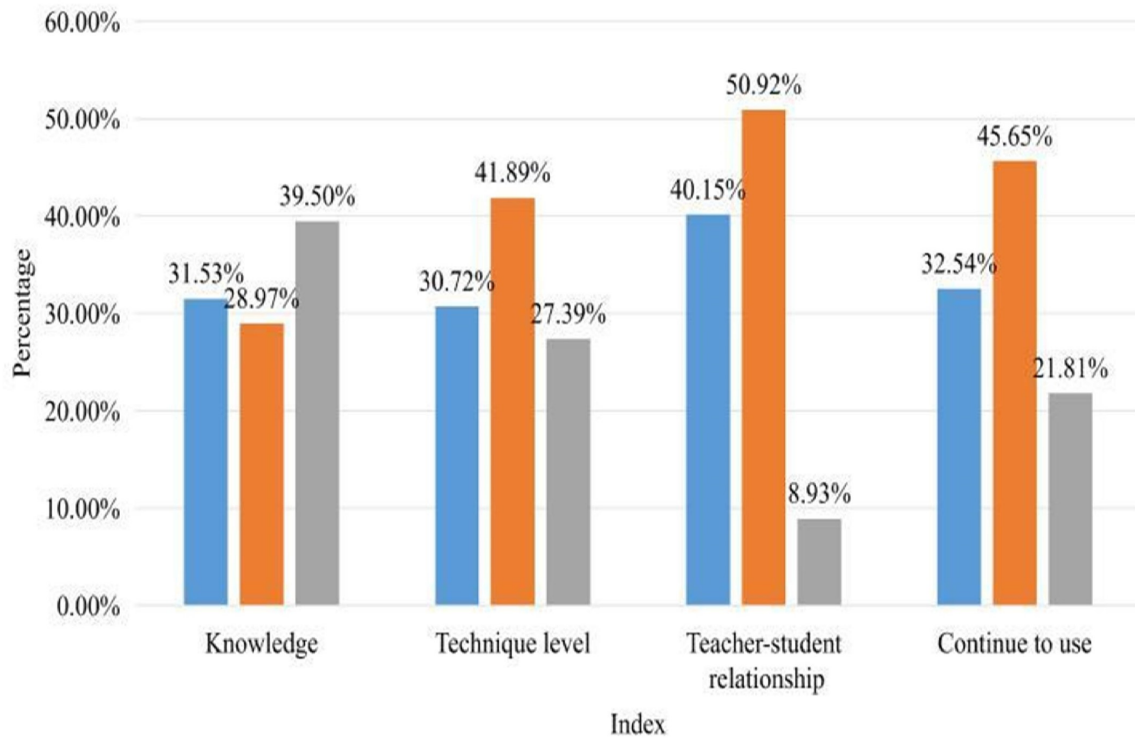


Figure 3. Student Evaluation Effect

In summary, whether it is the traditional teaching mode or the online teaching mode, there is no significant difference in improving students' physical fitness. However, both modes have good utility in improving students' games passing grades. On the other hand, the online teaching mode has a very noticeable effect on strengthening students' mastery of games techniques. Finally, the online teaching platform's teaching mode has a very significant utility in improving students' interest, participation, and recognition in university games teaching. This also suggests that this teaching mode can be applied in university games teaching.

5. Conclusions

Using advanced internet technology, we have developed a brand-new smart educational experience. This experience not only significantly improves the effectiveness of our classroom teaching but also leaves our students highly satisfied with our courses. Moreover, this novel teaching mode has received widespread acclaim. Compared to traditional teaching methods, this new approach performs exceptionally well. It actively engages students and promotes the development of their technical and knowledge abilities. However, this article also has certain limitations. Due to time constraints, the implementation of the intelligent games teaching method based on neural networks in this study still has some shortcomings. Therefore, we should expand the scope of experimentation and conduct more comprehensive and systematic research to enhance its effectiveness. In the future, we will explore applying this technology to teaching in other disciplines.

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