Research on Algorithms of Fusion System of Artificial Intelligence University Curriculum Derivatives Based on Internet Big Data

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Abstract. With the rapid development of artificial intelligence technology and the rapid progress of big data technology, based on the theory of artificial intelligence fusion systems based on the lives of college students, and the use of advanced technology, university courses have also expanded in multiple directions. A reasonable and scientific development model of electronic technology design. Derived by using electronic data as a carrier to optimize the derivative tools of university courses and improve performance in many aspects such as learning and sports. Using the empirical formula of the Big Data Fourier algorithm, the manual verification was verified through the statistical comparison and analysis of the competitive auxiliary review system. The application of intelligent systems in the fusion system of university curriculum derivatives and artificial intelligence algorithms based on Internet big data play an active role in the fusion system of university curriculum derivatives.

Key words. Big data, Internet, deep functions, artificial intelligence, university curriculum derivatives integration system.

1. Introduction
The development strategy with the sports industry at the core of the reform is one of the tasks of the 19th National Congress of the Communist Party of China. It uses supply-side structural reform as a carrier to provide a basic platform for the optimization of the regional economic structure. The combination of artificial intelligence and the sports industry, through the setting of a scientific system, enables the orderly development of various projects in the sports industry. At the same time, under the effect of theory, relying on technology and practice, it can provide a foundation for the realization of sports intelligence data support. However, judging from the actual integration effect of artificial intelligence and the sports industry, the intelligent system has not reached a deep fit with the sports industry, which has caused the actual work to fail to meet the expected set demand when the sports project is carried out [1]. Therefore, it is necessary to analyze the problems formed by the integration of the intelligent system and the sports industry from a practical perspective, and then formulate a more precise strategy to improve the development path of the sports industry's intelligent system to accelerate the transformation of the sports industry.
2. The impact of artificial intelligence era on sports competition performance industry

Chinese traditional sports competition performance industry mainly includes television broadcasting, live watching, and webcasting. The strong rise of Tencent Sports, Sports Power, LeTV Sports, Sina and other media have brought unlimited possibilities for the development of sports competition performance industry in the competition for copyright resources. With the development of VR technology, the dissemination of sports events can integrate virtual reality technology and lifestyle, and enhance the audience's sense of experience and participation. Tencent Sports has realized an online-to-offline interactive entertainment and cross-screen interactive mode; LETV Sports has realized a panoramic viewing experience through smart devices and built a value-added mode of event operation and intelligent services [2]. The integrated development of sports competition performance and other industries can promote the development of television broadcasting, sports media, sports equipment, sports intermediary and other industries. The integrated development of sports competitions and tourism will promote the development of local transportation and catering industries. The integrated development of sports competition performances and the promotion of leisure sports goods industry to promote the promotion of sports equipment.

3. Application of Fourier big data algorithm in the integration of sports industry

3.1. Algorithm introduction

The FFT algorithm based on frequency selection divides the DFT value $X(k)$ into even sequence $X_e(k) = X(2k), k = 0 \sim N/2 - 1$ and odd sequence $X_o(k) = X(2k + 1), k = 0 \sim N/2 - 1$ and calculates them separately, thereby simplifying the amount of calculation. Suppose the length of the signal $x(n)$ is $N = 2^r$, then the number of points in $X(k)$ is also $N$, and the expression is as follows:

$$X(k) = \sum_{n=0}^{N-1} x(n)e^{-j2\pi kn/N} = \sum_{n=0}^{N/2-1} x(n)W_N^{kn} + \sum_{n=N/2}^{N-1} x(n)W_N^{kn}$$  \hspace{1cm} (1)

Let $n - N/2 = m$, then the above formula becomes

$$X(k) = \sum_{n=0}^{N/2-1} x(n)W_N^{kn} + \sum_{m=0}^{N/2-1} x(m+N/2)W_N^{k(m+N/2)}$$

$$= \sum_{n=0}^{N/2-1} \left[ x(n) + W_N^{kn} \cdot x(n+N/2) \right] W_N^{kn}$$  \hspace{1cm} (2)

Divide $X(k)$ into even sequence $X_e(k)$ and odd sequence $X_o(k)$ and calculate separately, then

$$X_e(k) = X(2k) = \sum_{n=0}^{N/2-1} \left[ x(n) + W_N^{kn} \cdot x(n+N/2) \right] W_N^{2kn}$$

$$= \sum_{n=0}^{N/2-1} \left[ x(n) + x(n+N/2) \right] W_N^{kn}, k = 0 \sim N/2 - 1$$  \hspace{1cm} (3)

$$X_o(k) = X(2k + 1) = \sum_{n=0}^{N/2-1} \left[ x(n) + W_N^{kn+N/2} \cdot x(n+N/2) \right] W_N^{2(k+1)n}$$

$$= \sum_{n=0}^{N/2-1} \left[ x(n) - x(n+N/2) \right] W_N^{kn}, k = 0 \sim N/2 - 1$$

Equations (1) and (2) show that $X(k)$ can be converted into the DFT calculation of two $N/2$ points. Suppose $N = 8$ is decomposed according to (3). For a signal of length $N = 2^r$, the DFT decomposition will continue until 2 points DFT. A total of $r = \log_2 N$ level decomposition is performed. Each time $N/2$ complex multiplications are required. Therefore, the total number of
complex multiplications is \((N/2)\log_2 N\). Consistent with the FFT algorithm based on time selection. That is to say, no matter which FFT algorithm is used, its operation efficiency is the same.

3.2. Intelligent recognition of gymnastics in the sports industry

According to the latest authoritative standards of the International Gymnastics Federation: 2017-2020 cycle competitive aerobics scoring rules, there are up to 10 difficult movements in the set of movements for women's and men's singles. There are a maximum of 9 difficult moves in the set of moves for mixed doubles, three-person and five-player events. With more and more ways to obtain movement data, it is relatively easy to recognize some simple movements, but the recognition of difficult movements in aerobics still faces some difficulties [3]. If 3D big data is used, the above-mentioned problems can be effectively solved, for example, the insensitivity of skeletal data to the angle of view can be used for motion feature analysis, and the use of 3D feature processing can effectively reduce the confusion caused by similar actions.

3.2.1 System architecture. The system architecture is mainly divided into 5 parts: application layer, data processing layer, communication layer, data acquisition layer and hardware layer. Among them, the hardware layer includes physical power supplies, sensors, and depth cameras for 3D data collection. The data collection layer is mainly to classify and integrate the data collected in the physical layer and simple analysis; the communication layer is to use the protocol to realize the data upload at the bottom, and the data processing layer at the high-level mainly guarantees the order and preservation of the data, and performs some reprocessing Filter out useless data; the application layer is the core of the system, which mainly calculates and processes data, uses the database for action recognition, and assists in action scoring [4]. Among them, the two layers responsible for data collection and action recognition are the focus of this article. The two layers are introduced next. Figure 1 shows a schematic diagram of the system architecture.

![Figure 1. Schematic diagram of system architecture](image-url)
3.2.2 Action collection. In order to meet the needs of motion recognition, many methods have been proposed and data collection based on different types of sensor systems: marker-based systems, laser range scanners, structured light, Microsoft Kinect sensors, multi-camera systems, etc. In order to better capture the data of human bones and joints, this article adopts the Microsoft Kinect sensor for motion data collection. Several local body part labels are defined in the article, and these labels are densely covered on the body [5]. Among them, some parts are defined to directly locate specific bone joints of interest. The other parts are used to fill in the blanks or used in combination to predict other joints. In this experiment, 31 body parts are used: LU/RU/LW/RW head, neck, L/R shoulder, LU/RU/LW/RW arm, L/R elbow joint, L/R wrist, L/R hands, LU/RU/LW/RW trunk, LU/RU/LW/RW legs, L/R knees, L/R ankles, L/R feet (left and right, up and down).

3.3. Algorithm system test results
Based on the MSR Action 3D data set that supplements the difficult aerobics exercises (Group A, Group B, Group C, Group D), this paper conducts system testing and performance analysis, and uses Kinect to extract movement data. Extract bone joint features and local pattern features from the data, and use two-layer, three-layer, and four-layer Fourier spatiotemporal pyramid technology to denoise the two features respectively, and then perform feature fusion and based on the denoised features. Classification and recognition of support vector machines. The test results are shown in Table 1, where A-, B-, C-, D- represent the special deduction actions of each group of difficult actions, and A, B, C, and D represent the lowest completed standard actions of each group of difficult actions. Figure 2 shows the system test result diagram.

| Difficulty group | Two-layer recognition rate/% | Three-layer recognition rate/% | Four-layer recognition rate/% |
|------------------|-----------------------------|-------------------------------|-------------------------------|
| AA               | 78.6                        | 85.2                          | 96                            |
|                  | 79.1                        | 88.7                          | 98.1                          |
| BB               | 78.9                        | 86.3                          | 96.8                          |
|                  | 80                          | 90.4                          | 99                            |
| CC               | 78.8                        | 86                            | 95.9                          |
|                  | 78.9                        | 89                            | 98.4                          |
| DD               | 79.1                        | 84.6                          | 95.1                          |
|                  | 79.8                        | 89.9                          | 99.1                          |

Figure 2. System test result diagram
It can be seen from the test results that the system design proposed in the article has a higher rate of action recognition. It shows that the feature data processing method that combines the bone features with the depth features can effectively improve the recognition accuracy, and it also shows that the classification method based on support vector machine has a better action classification effect. It can also be seen from the table that as the number of pyramid layers increases, the recognition accuracy is greatly improved, and the system selects a three-layer pyramid for data processing in comprehensive consideration.

4. Further application analysis of artificial intelligence in the integration of sports industry

4.1. Data integration and reconstruction
Nowadays, a large number of sports apps are widely used, no matter where users are walking, they can pick up smart devices to browse various sports events, stadiums, and sports fitness information for consumption. Consumer body monitoring data, interest orientation, social area, and action trajectory have formed a large amount of data. Strengthen the scientific analysis of leisure consumer data. Through the data, leisure athletes can not only exercise scientifically, but also adjust the amount of exercise, items, and parts according to their own conditions at any time, so as to promote the development of the industry to cater to the needs of consumers, so that more people can participate in leisure sports activities [6]. The accumulation and mining of user data in various leisure and sports industries can obtain more efficient demand matching capabilities, and consumers can extend their services wherever they are, so as to meet the immediate needs of consumers in different scenarios.

4.2. Strengthening industrial integration and development
According to the development of smart technology, the leisure sports industry cooperates with entertainment, culture, tourism and other multi-industry fields to build a diversified leisure sports format. For example, the integration of e-sports and national education has developed a variety of games with patriotic education as the main body; the integration of e-sports and tourism to develop games with tourist attractions as the background; the combination of e-sports and the automobile industry has developed a simulated driving system. Sports performances not only bring good economic benefits to the main industry, but also promote the development of transportation, catering, accommodation and other related industries.

4.3. Provide a development platform for smart sports through smart devices
The research and development of virtual reality exchange technology can construct a realistic data simulation scene through the computer network platform. When the user operates the device, the current operating state can be accurately analysed through the platform, and the application of the virtualized scene can be effectively ensuring that users’ own thinking is truly mapped to sports activities. In this way, the data measured by the device truly reflects the various consumptions of the user in actual sports. For example, when performing mountaineering training, users can simulate in a virtual scene [7]. The construction of this type of simulation scene is to map the data and information of the mountaineering scene, and then use the model to provide users with visualization services, and to provide users with sensors provide sports equipment. When the user exercises in the virtual scene, he can transform and measure his body parameters in real time. In this way, users can more intuitively understand their own physical state, have a comprehensive understanding of their own body, and provide basic guarantee for the development of subsequent sports work.

5. Conclusion
With the rapid development of the artificial intelligence industry, the use of advanced electronic technology to integrate artificial intelligence and the sports industry has effectively promoted the rapid development of both. In the actual integration process, the artificial intelligence system should be used to integrate the two data, effectively breaking the traditional sports industry development model, and
laying the foundation for building a development platform. When building a development platform, real scenarios should be simulated to effectively obtain real feedback from users, and provide a basic guarantee for the subsequent integration of the two. At the same time, smart technology should be used to build diversified sports formats and promote the transformation of sports. With this as a foundation, the development efficiency of both will be greatly improved and contribute to the economic development of our country.

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