DEEP LEARNING ANALYSIS ON THE RESULTING IMPACTS OF WEEKLY LOAD TRAINING ON STUDENTS' BIOLOGICAL SYSTEM

ORIGINAL ARTICLE
ARTIGO ORIGINAL
ARTÍCULO ORIGINAL

ANÁLISE DO APRENDIZADO PROFUNDO NOS IMPACTOS RESULTANTES DOS TREINOS SEMANAIS DE CARGA SOBRE O SISTEMA BIOLÓGICO DOS ESTUDANTES

ANÁLISIS DE APRENDIZAJE PROFUNDO SOBRE LOS IMPACTOS RESULTANTES DE LOS ENTRENAMIENTOS SEMANALES DE CARGA EN EL SISTEMA BIOLÓGICO DE LOS ESTUDIANTES

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ABSTRACT

Introduction: The recent development of the deep learning algorithm as a new multilayer network machine learning algorithm has reduced the problem of traditional training algorithms easily falling into minimal places, becoming a recent direction in the learning field. Objective: Design and validate an artificial intelligence model for deep learning of the resulting impacts of weekly load training on students' biological system. Methods: According to the physiological and biochemical indices of athletes in the training process, this paper analyzes the actual data of athletes' training load in the annual preparation period. The characteristics of athletes' training load in the preparation period were discussed. The value, significance, composition factors, arrangement principle and method of calculation, and determination of weekly load density using the deep learning algorithm are discussed. Results: The results showed that the daily 24-hour random sampling load was moderate intensity, low and high-intensity training, and enhanced the physical-motor system and neural reactivity. Conclusion: The research shows that there can be two activities of "teaching" and "training" in physical education and sports training. The sports biology monitoring research proves to be a growth point of sports training research with great potential for expansion for future research. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Deep Learning; Physical Education and Training; Biology; Athletic Performance.

RESUMO

Introdução: O recente desenvolvimento do algoritmo de aprendizado profundo como um novo algoritmo de aprendizado de máquina de rede multicamadas reduziu o problema dos algoritmos de treinamento tradicionais, que facilmente caiam em locais mínimos, tornando-se uma direção recente no campo do aprendizado. Objetivo: Desenvolver e validar um modelo de inteligência artificial para aprendizado profundo dos impactos resultantes dos treinos semanais de carga sobre o sistema biológico dos estudantes. Métodos: De acordo com os índices fisiológicos e bioquímicos dos atletas no processo de treinamento, este artigo analisa os dados reais da carga de treinamento dos atletas no período anual de preparação. As características da carga de treinamento dos atletas no período de preparação foram discutidas. O valor, significância, fatores de composição, princípio de arranjo e método de cálculo e determinação da densidade de carga semanal usando o algoritmo de aprendizado profundo são discutidos. Resultados: Os resultados mostraram que a carga diária de 24 horas de amostragem aleatória foi de intensidade moderada, treinamento de baixa densidade e alta intensidade, e o sistema físico-motor e a reatividade neural foram aprimorados. Conclusão: A pesquisa mostra que pode haver duas atividades de "ensino" e "treinamento" na área de educação física e no treinamento esportivo. A pesquisa de monitoramento da biologia esportiva revela-se um ponto de crescimento da pesquisa de treinamento esportivo com grande potencial de expansão para pesquisas futuras. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Aprendizado Profundo; Educação Física e Treinamento; Biologia; Desempenho Atlético.*

RESUMEN

Introducción: El reciente desarrollo del algoritmo de aprendizaje profundo como un nuevo algoritmo de aprendizaje automático de red multicapa ha reducido el problema de los algoritmos de entrenamiento tradicionales, que caen fácilmente en lugares mínimos, convirtiéndose en una dirección reciente en el campo del aprendizaje. Objetivo: Desarrollar y validar un modelo de inteligencia artificial para el aprendizaje profundo de los impactos resultantes del entrenamiento de la carga semanal en el sistema biológico de los estudiantes. Métodos: De acuerdo con los índices fisiológicos y bioquímicos de los atletas en el proceso de entrenamiento, este artículo analiza los datos reales de la carga de entrenamiento de los atletas en el período de preparación anual. Se analizaron las características de la carga de entrenamiento de los atletas en el periodo de preparación. Se analizan el valor, el significado, los factores de composición, el principio de disposición y el método de cálculo y determinación de la densidad de carga semanal

mediante el algoritmo de aprendizaje profundo. Resultados: Los resultados mostraron que la carga diaria de 24 horas de muestreo aleatorio era de intensidad moderada, de baja densidad y de alta intensidad de entrenamiento, y que el sistema físico-motor y la reactividad neural mejoraban. Conclusión: La investigación muestra que puede haber dos actividades de "enseñanza" y "formación" en la educación física y el entrenamiento deportivo. La investigación sobre el seguimiento de la biología del deporte demuestra ser un punto de crecimiento de la investigación sobre el entrenamiento deportivo con un gran potencial de expansión para futuras investigaciones. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Aprendizaje Profundo; Educación y Entrenamiento Físico; Biología; Rendimiento Atlético.*

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INTRODUCTION

Although there are many kinds of activities in sports and competitive sports, sports teaching and training are the most systematic and the best means to realize the functions of school sports and competitive sports.[1] Unlike other sports activities which are full of school sports and competitive sports, physical education teaching and sports training have distinct dominance. The quantity and intensity of load can be shown by different sides, and different indexes can be used to reflect its size.[2] The evaluation indexes reflecting load quantity are number, time, distance, weight, etc. The magnitude of the load intensity is often measured by the speed, distance, height of the exercise, the weight of the unit exercise or the difficulty of the exercise.[3] The methods and indicators of these measurements apply to different sports and different exercises. Sports training and sports training practice and athletic state research, sports career and school sports and sports technology level scientific research and other members of the group are also very good.[4] At the same time, it also explains the development status and countermeasures of Chinese competitive sports, sports training and sports training practice and competitive state research. The scientific and active research topic of sports career and school sports and sports technology level is very important in the research of all sports science training research sports training.[5,6]

The theoretical study of in-depth learning focuses on the behavior of in-depth learning models and the properties of learning algorithms.[7] If the weight of the node does not satisfy the upper limit constraint in the training process, the upper limit is used to normalize the weight.[8] This greatly delays the progress of research and development, and slows down the speed of product iteration. In the context of large data of complex models, how to realize the business-effectiveness training of in-depth learning model has become an urgent problem in the field of sports load.[9,10]

The training load contains two aspects, namely, the amount of exercise and the intensity of the training load, the surface data and the physiological burden or the internal data of the training load.

MATERIALS AND METHODS

According to the different values of each sample of the best attribute, the original sample data set is divided into different subsets of data samples. The advantages of the deep learning algorithm are shown in Table 1. The deep learning algorithm identifies the layer-by-layer acceleration inference structure as shown in Figure 1.

The arrangement of weekly load density should conform to the principle of excessive recovery so as to make more effective use of the various abilities of the body and improve the training efficiency. Whether it is the interval time between two load training classes of the same nature or two load training classes of different nature, the arrangement must take into account the degree of recovery between them. The load content and load size of the latter training course must be based on the load content and load size of the previous training course. Sports training is to improve athletes' athletic ability and athletic performance. Under the guidance of the coaches, specially organized and planned sports activities. The direct influencing factors of exercise training to make the body adapt are various external stimuli. The exercise training calculation parameters are shown in Table 2 and Figure 2.

This paper finds that more and more attention has been paid to the teaching task of imparting sports knowledge to students and cultivating their lifelong sports thoughts, while the task of improving physical fitness of students has gradually become a secondary aspect of contradiction. This completely shows the position of teaching and training in physical education teaching. Physical exercises refer to various specific movements. The choice of training means is the key to load arrangement. Reasonable use of training means which accord with the basic attributes of training load can multiply the

Table 1. Advantages of Deep Learning Algorithms.

	Train	Extract
Deep Structural Characteristics	3.85	0.29
Higher input data samples	4.18	0.63

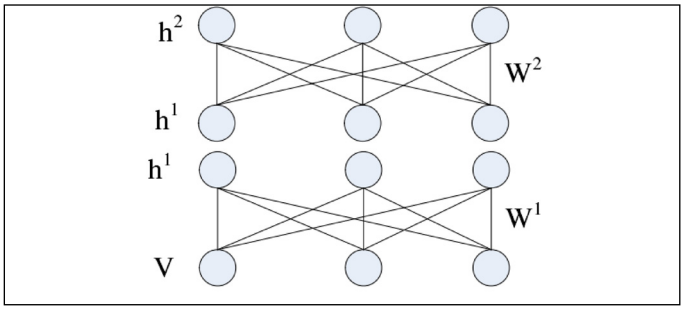

Figure 1. Deep Learning Algorithms Recognition.

Table 2. Sports training plan parameters.

	Parameter
Special campaign	36%
Special technology	41%
Special strength	23%

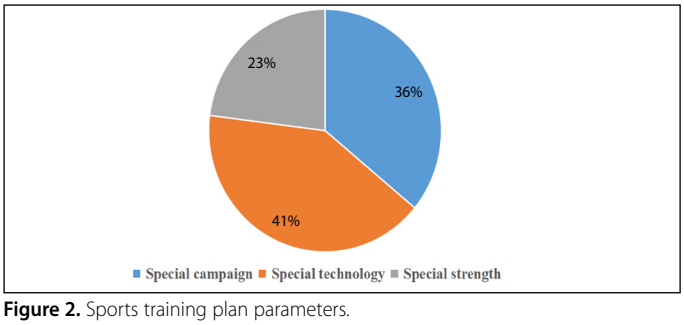

Figure 2. Sports training plan parameters.

effect of sports training with half the effort. Various training methods can not achieve high-quality training effect, on the contrary, it is not conducive to the centralized development of specific competitive ability. It is one of the basic characteristics of modern sports training that training means take the direction of specialization. Reasonable arrangement of training courses of different natures, adapting the training tasks to different functional states, and obtaining the combination, alternation, interspersing, adding and repeating of the optimal training load provides a principle method. The principle method of the weekly load density arrangement is shown in Table 3 and Figure 3. At the same time, college sports majors and public body teaching training reflect the professional skills of physical education training courses. From the intensity index of the class, the density of exercises and the adaptation and recovery of the load, different projects are also different, and it is still necessary to improve and improve the teaching methods and practice methods. The main training methods are classified as shown in Table 4 and Figure 4.

RESULT ANALYSIS AND DISCUSSION

When we conduct short-term load forecasting through in-depth learning, the training data set usually includes different types of data: when load data is used to determine the number of neurons in the last hidden layer of the deep neural network based on information. One problem is that the load data in training data are continuous value attributes, so it is difficult to calculate their information. Therefore, the continuous value attributes need to be treated as discrete data first. Linear interpolation is performed for local and global models. The aim of this technology is to make the initial model parameters not too far apart when all slaves update the local model, so we set $P < 0.01$ for this purpose. The update of all local models is based on the global model obtained from the previous iteration. The weight of the RBM gradually reaches a stable equilibrium state, and no large fluctuations occur. Similarly, the increase of the weight is mostly concentrated near the zero value, and the dynamic balance is achieved, so that the energy value of the entire RBM reaches the minimum state. Through the corresponding histogram, you can visually observe the data during the training process. Its formation mode is a process of integrating the enlightened learning mode with the epiphany learning mode. The gradual change of students' motor skills at different levels is the result of continuous breakthroughs in high-altitude points, thus showing continuous learning behavior. The parameters of the deep learning algorithm before and after the rotation are shown in Table 5 and Figure 5.

Table 3. Principle and Method of Weekly Load Density Arrangement.

	Method
Velocity load	26%
Anaerobic load	29%
Aerobic load	23%
Power load	22%

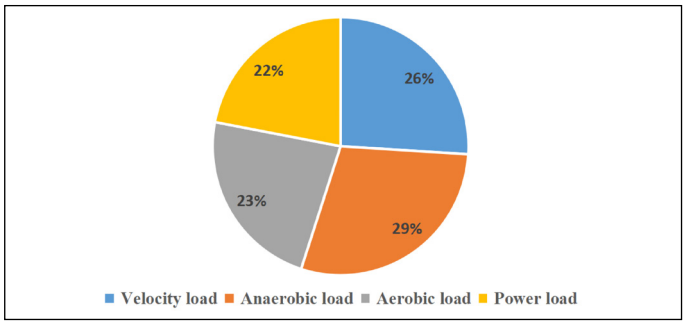

Figure 3. Principle and Method of Weekly Load Density Arrangement.

Table 4. Classification of main training means.

	Train	Promote
General endurance	9.12	10.16
Specific endurance	9.23	10.62

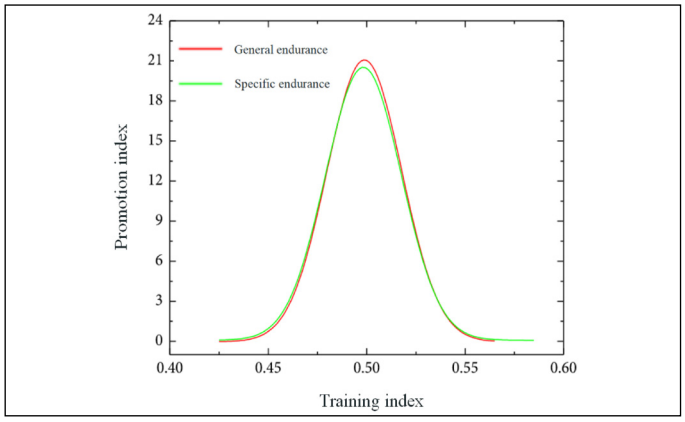

Figure 4. Classification of main training means.

The deep neural algorithm can be used to model the unknown data distribution of any deep learning network, and determine that when the overall energy of the network reaches the minimum, the network parameters are required.

$$c\left(j_1,k\right)=c\left(j_1,k-1\right)+t_{j_1k},k=2,\cdots,m \quad (1)$$

Continuous iterative sampling using conditional probability:

$$c_{\max}=c\left(j_n,m\right) \quad (2)$$

Initialize the Visual Layer nodes and alternately sample them as follows:

$$a_i=(\tau_{\mathrm{i}}-\tau_{i-1})/(\rho_i\,\mathrm{h_i}) \quad (3)$$

Then the updated formula for the y TH iteration is:

$$\Delta y=M(t_0+\Delta t)-M(t_0) \quad (4)$$

Table 5. Parameters of deep learning algorithm before and after factor rotation.

	Produce
Initial eigenvalue	32%
Extract Square Sum Loading	29%
Cyclic Square Sum Loading	39%

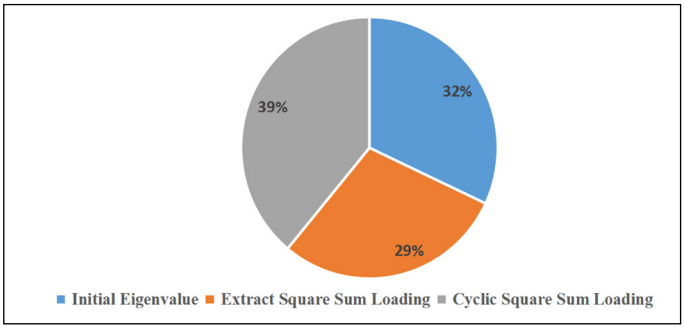

Figure 5. Parameters of deep learning algorithm before and after factor rotation.

Deriving the quadratic function and making it 0, you can get the following formula:

$$Q = 2 \times \frac{\Delta w}{M} \times N \times e \tag{5}$$

The similarity calculation can be calculated by the following formula:

$$T = \frac{Q}{I} = 2 \times \frac{\Delta w}{MI} \times N \times e \tag{6}$$

$$D_k(x,y) = \begin{cases} 255 & \left|P_k(x,y) - B_k(x,y)\right| > T_h \\ 0 & else \end{cases} \tag{7}$$

Due to the bidirectional dependence of each moment, it is similarly available:

$$I_k(x,y) = \left|P_k(x,y) - P_{k-1}(x,y)\right| \tag{8}$$

The input to the entrance at this moment is:

$$D_k(x,y) = \left|f_{k-1}(x,y) - f_k(x,y)\right| \tag{9}$$

Memory element status updated to:

$$B_k(x,y) = \left|f_k(x,y) - B(x,y)\right| \tag{10}$$

Combine with the label of the output sequence to get the loss function of the sequence:

$$T_k(x,y) = D_k(x,y) + B_k(x,y) \tag{11}$$

Therefore, the forward propagation process is as follows:

$$R_k(x,y) = \begin{cases} 1, \text{target}, & if\ T_k(x,y) > Th \\ 0, \text{background}, & if\ T_k(x,y) \le Th \end{cases} \tag{12}$$

And competitive sports training provides corresponding teaching technology, technical theory and training methods for school physical education teaching. This makes the content and form of school sports can not be distinguished from competitive sports, even in today's increasingly significant functional differences between competitive sports and school sports. The four games are divided into five stages and one training period. The periodic training mode of the form "multi-cycle" cycle adjusts the athlete's best competitive state to the competition period. The relationship between the training preparation phase and the training state is shown in Figure 6. In contrast, the research on the relationship between high-level sports teams in China's colleges and universities and the study of physical fitness training and sports skill teaching needs to be strengthened.

According to the characteristics of low iteration times of deep learning algorithm, we can get better results in 63 iteration training times. Therefore, we can deduce the depth of the proposed accelerated inference strategy to generate more effective model parameters, accelerate the modification of model parameters, and then achieve better results in a shorter time of classification. That is to say, when arranging the training plan, we must consider the timing of applying different kinds of load content, and at the same time, we must consider the varying degree of training load. Therefore, sports activities are inherent in order to promote the development of the human body and meet the needs of activities, while social functions are the product of social progress. Its purpose is to use sports activities to shape people and adapt them to the needs of social development. The difference between sports social function and natural function is that it can control the mode and scope of sports activities through human activities to meet the needs of society. At the same time, reduce the intensity and frequency of general endurance training courses shorter than the special distance, and ensure that the weekly load structure with reasonable matching of training and recovery will have a more ideal effect on the development of athletes' special competitive ability.

CONCLUSION

In this paper, we use large-scale data to train the complex deep learning algorithm with high efficiency and weekly load in physical education teaching and training. On this basis, the logic, in different periods of comparative analysis, is conducive to the development of Chinese sports training thoroughly grasp the effective integration of analytical methods. It is more effective to minimize the gap between the predicted value and the target value by modifying the recognition weights step by step, and then to modify all the identified values as a whole. It can make the whole predicted value more precise and approximate the target value and get more credible recognition. Thus, the

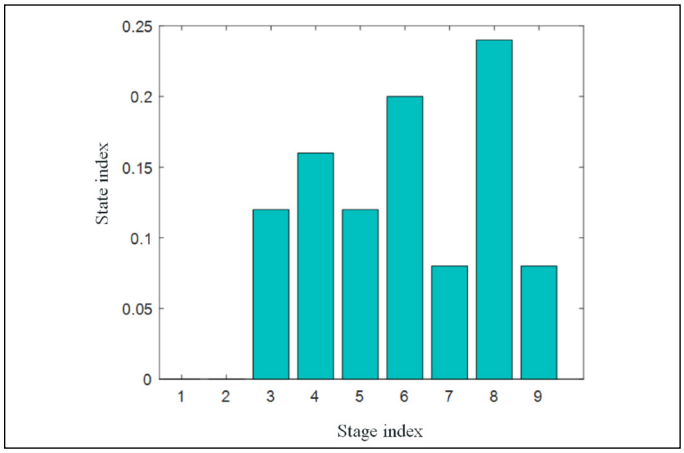

Figure 6. The Relation between the Preparatory Stage of Sports Training and the Change of Training State.

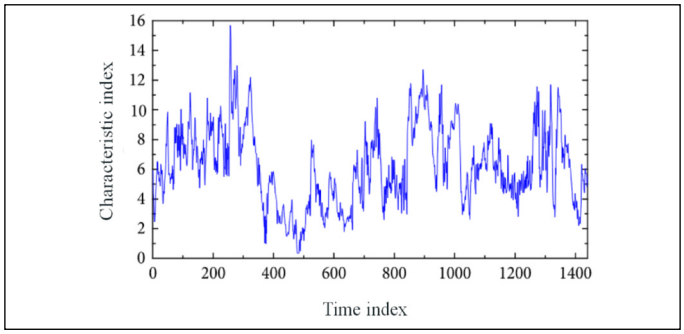

Figure 7. Characteristic Analysis of Training Load in Preparatory Period.

learning process is accelerated and the depth Boltzmann machine with more data characteristics is obtained, which improves the accuracy of classification data sets and shortens the classification time. The general endurance training load is reduced and the strength is weakened, while the outstanding equal or super-special distance class load intensity special endurance training week, the total load is gradually increased and the load intensity is gradually decreasing, highlighting the class load intensity. Its epistemology re-recognizes the composition of physical education and sports training, affirms the coexistence of teaching and training in physical education and sports training, and points out the purpose of physical education and sports training. The difference in tasks is reflected in the primary and secondary status of teaching and training. At the time of convergence, care should be taken to interleave the load contents of different natures that can be accommodated and have relatively short recovery times. Adhere to the biological evaluation criteria, and advocate the application of the principles of multi-human motion, such as the principle of excess load and the principle of adaptability.

All authors declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: The author has completed the writing of the article or the critical review of its knowledge content. This paper can be used as the final draft of the manuscript. Every author has made an important contribution to this manuscript. Each author has made important personal contributions to this manuscript. JP: writing; JX: performing surgery.

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