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Innovative Development Path of School Physical Education Driven by Healthy China Strategy

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SUMMARY: *The modern physical education teaching cannot satisfy the requirements of social advancement anymore. It has prevented the realization of the Health China Strategy due to its boring format of instructions and poor quality of teaching. With a focus on the current relevance of the Healthy China Strategy, the present paper presents the LacePose network as the way of collecting sports action posture data and storing the collected data in the form of a sample library and dataset. Due to the benefits of machine learning approaches to sports learning, logistic regression is chosen to create a sports action evaluation system and further develop an intelligent physical education teaching system. The model and the system are then examined and analyzed through the use of the research data of the present study. The p-value of the logistic regression algorithm is 0.7-0.95 and that of the random forest algorithm is 0.6-0.7, which confirms the efficacy of the suggested algorithm. Also, the reliability coefficient of the given system is 0.9 -0.95, which is significantly higher than that of the other two sports teaching systems. This implies that the proposed system has good performance and can offer better support in the teaching of physical education in colleges and universities. Through the search of a novel development direction of physical education, the education of physical education in colleges and universities will be able to better facilitate the execution of the Healthy China Strategy.*

KEYWORDS: *healthy China strategy; logistic regression algorithm; action evaluation model; physical education teaching system; innovative development path*

1 Introduction

China presented the Opinions on the Implementation of the Healthy China Initiative in July 2019, highlighting the urgency to define the new paradigm of health education, further spread health information, and create a viable health education system. It also promoted the vision of the Healthy China as part of the health education and health campaigns in the new era [1-3].

In the context of Healthy China, physical education practitioners in schools must perform their duties well and still find new directions in the development of school physical education. School sports must continue to promote the idea of health and educate the appropriate groups on it [4, 5]. The wide dissemination of the necessary health information offers an elementary protection against the implementation of the concept of healthy China. It is essential that students learn the sporting knowledge and skills in a holistic and systematic manner [6, 7]; on the other hand, it is also necessary to let the concept of health in the higher vocational students into their minds and hearts, to promote the students to reserve more health knowledge, to

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stimulate the love for a healthy lifestyle, and to guide the students to insist on exercising in daily life, to be fit and strong, and to be wise and talented [8-11]. School physical education should adhere to a good curriculum design, sound scientific system, and improve the teaching content [12, 13]. Conventional physical education largely centers on sports theory as well as competitive strategies, whereas development of the overall quality of students is frequently put at the back burner when it comes to the theoretical knowledge [14, 15]. Physical education must be improved in terms of imparting knowledge instruction and at the same time, it should be coordinated with mental health education and other aspects to improve the overall quality of students in the context of the Healthy China strategy. [16-18]. Meanwhile, it should convey the idea of lifelong exercise, extend individuals' health span, and improve quality of life [19, 20]. Under "Healthy China", school physical education should not emphasize too much on the mastery of sports theory and sports skills, but should shape the concept of national fitness in the internalization of health knowledge, identify and prevent public health hazards and major diseases, and create a new life with a positive and healthy attitude [21-24].

As the pace of economic growth accelerates and living conditions are constantly rising, health consciousness is slowly gaining a significant place in the sphere of general concerns. The concept of Healthy China has thus brought about a number of health promotion policies and measures. School sports as one of the most effective methods of fostering physical and mental health among students should also be developed and implemented in these strategic conditions.

The literature [25] has studied the challenges of school sports in the light of the concept of the so-called Healthy China through a literature review and logical analysis, and determined that the physical condition of students is not yet adequate, and offered some developmental strategies. Literature [26] indicated that enhancing the school physical education within the context of Healthy China is of strategic importance in fostering holistic student development, both moral, intellectual, and physical. In a similar debate, [27] observed that physical fitness of the Chinese people, particularly in school-children, has reached a very low level, largely manifested in insufficient physical exercise and obesity rate increase, which has become a public health issue, and it has therefore suggested to increase physical education to increase the level of activities of students. Literatures [28] stated that there are health issues in the population of China, such as lack of exercise, bad eating habits, and higher chances of developing diabetes and heart disease, and they also outlined how China is working towards the construction of the concept of the Healthier China, especially its efforts to improve physical activity. Literature [29] highlighted that the physical education reform and innovation in colleges and universities, according to the idea of Healthy China, should start with the transformation of the teaching models and introduction of new teaching theories, whereas the physical condition and psychological quality of the students should be taken into account. According to the ideology of Healthy China literature[30] demonstrated by conducting the interviews with teachers of physical education in China that the demands of the implementation of the new curriculum surpass the health-related perceptions of teachers and the changes that they experience, and numerous restrictions have made them worry about the continuation of the curriculum reform related to Healthy China.

Literature [31] examined the role of university physical education in promoting students' lifelong exercise behavior and the moderating effect of the "Healthy China" strategy. It concluded that factors such as physical education curricula and faculty strength are closely related to students' participation in exercise, and that the "Healthy China" strategy further strengthens these relationships. Literature [32] investigated the current situation of physical education teaching, pointed out problems such as unclear teaching objectives and inflexible teaching methods, and then proposed strategies for addressing them from the perspective of "Healthy China." Literature [33] discussed the limitations of traditional teaching methods in cultivating students' physical fitness and developed an innovative model combining "learning, practicing, and applying," showing that this approach provides a feasible path for fostering students' lifelong motor skills and sound personalities. Based on previous studies, [34] explored the role of physical activity in improving students' physical health, together with the current situation and dilemmas of physical activity in colleges and universities, in order to seek implementation strategies that promote college students' health and support both theoretical exploration and practical innovation. Literature [35] combined school sports development models in developed countries with the requirements of "Healthy China" to provide suggestions for the reform of school sports in China, indicating that the realization of "Healthy China" requires greater attention to physical education as well as improvements in the evaluation system and policy support for physical education. Under the concept of "Healthy China," literature [36] examined problems in the development of the sports rehabilitation industry and proposed reform measures to address them, aiming to provide a reference for the future growth of this industry. Literature [37] emphasized the urgent need to reform badminton teaching in college sports. Although badminton teaching in colleges and universities has received wide attention in the context of social development and educational reform, many problems still remain, and that study further explored possible paths for innovative development.

This paper aims to solve the current problems of teaching physical education in colleges and universities by introducing a logistic regression-based approach to machine learning in order to create an intelligent model of sports action assessment, and test its feasibility using model testing and analysis. With this, the model is also used as the technical base to the design of an intelligent physical education teaching system, which allows it to offer more robust assistance to sports teaching in higher education establishments. The research combines evaluation index information and questionnaire outcomes to do an extensive research on the model and the system and based on the results of this analysis offers three new directions in the development of physical education that will help universities and colleges promote the realization of the Healthy China policy at a lower level.

2 A Movement Assessment Model for Smart Sports

With the results obtained from the movement assessment model, physical education teachers can guide their students' physical training accordingly and exercise their skills and bodies in a purposeful manner. The model in this paper can scientifically guide the categories of sports and exercise needed by the youth groups to improve their physical fitness, physical form and physical function, and then effectively improve their physical condition, obtain better physical fitness, make more contributions to the country, and always carry out the strategy of Healthy China.

2.1 BlazePose network

Firstly, the features of the input image are extracted by the convolutional network in the middle, then the features are input to the heat map network on the left to predict the heat maps of all the joints, and finally the coordinates of all the joints are obtained by the coordinate regression network on the right side. The BlazePose network uses hopping connections between the different layers, which is capable of fusing the abstract features extracted by the different layers of the network with the edge features. In addition, the gradient from the right regression network cannot be back-propagated back to the left heat map network during parameter updating, which not only improves the prediction accuracy of the heat map part, but also the prediction accuracy of the regression part.

2.2 Constructing the attitude sample library

First of all, each type of action in the original data set is divided into qualified and unqualified according to the degree of completion of the standard, and the specific action evaluation criteria are as follows: when the athlete does action 1, action 2, action 3 and action 4, the height of the leg is mainly used as an evaluation criterion, and the thighs lifted to the height of the approximate level are qualified, otherwise they are unqualified; when the athlete does action 5, the height of the squatting height is used as an evaluation criterion, and the body squats until the thighs are parallel to the ground are qualified, otherwise they are unqualified. When the athlete does movement 5, the height of deep squat is mainly used as the assessment standard, and the body squats until the thighs are parallel to the ground is qualified, otherwise it is unqualified. According to this criterion, the dataset was divided into 30 postures, with posture 1 as the qualified grade for movement 1, posture 2 as the unqualified grade for movement 1, and so on. Then 200 pictures are selected as key frames from each posture, and a total of 6000 key frames are selected to form the posture sample library, of which the number of training set is 4200 and the number of testing set is 1800, and the samples in the training set are annotated with the posture categories. Then the joint point information of the sample images needs to be extracted. For each sample image, the 3D coordinates of 40 joint points of the human body are extracted by BlazePose network, and then these joint point coordinates are normalized. Since some joint points have less influence on classification in sports training movements, such as the joint points of the head and hands of the human body do not change significantly during the movement process, this paper discards these joint points, leaving a total of 30 joint points in the shoulders, elbows, wrists, hips, knees and ankles.

2.3 Mathematical modeling

Once the posture sample library is built and the joint-coordinate data of each sample image has been transformed to a corresponding feature vector, it is necessary to come up with a suitable classification model that will classify these sample feature vectors in such a way that the final aim of sports movement evaluation can be accomplished.

Logistic regression is improved from linear regression, for the sample data $x=\left(x_1, x_2, \ldots, x_n\right)$ with n features, the expression of its linear regression model is:

$$y=\theta_0+\theta_1 x_1+\cdots+\theta_n x_n \tag{1}$$

where $\theta_i (i=0,1,2 \ldots n)$ denotes different weighting coefficients. The output y of linear regression has a value domain of $(-\infty,+\infty)$, and in classification tasks, the number of categories is usually limited, so linear regression is not applicable to classification problems.

Instead, logistic regression adds a Sigmoid function to linear regression, which maps the output of linear regression to between 0 and 1 [38]. Then the expression of the logistic function is shown in equation (2):

$$h(y)=\frac{1}{1+e^{-y}} \tag{2}$$

Substituting equation (1) into equation (2) yields the objective function of the logistic regression model as:

$$h_\theta(x) = \frac{1}{1+e^{-\theta^T x}} \tag{3}$$

Equation (3) can be transformed into:

$$\theta^T x = \ln\frac{h_\theta(x)}{1-h_\theta(x)} \tag{4}$$

According to Eq. (4), let $h_\theta(x)$ represent the probability that sample x belongs to class 1, while $1-h_\theta(x)$ represents the probability that x belongs to class 0; the ratio of the two is referred to as the "odds." Once the mathematical expression of the logistic regression model has been formulated, the parameter θ needs to be estimated. Based on the above analysis, the probability that sample x is classified as 1 can be expressed as follows:

$$P(y \mid x;\theta) = \left(h_\theta(x)\right)^y \left(1-h_\theta(x)\right)^{1-y} \tag{5}$$

where y has the value of 0 or 1. The iterative update expression for the parameter θ is next derived by maximum likelihood estimation (MLE). The likelihood function is first taken for Eq. (5), and then the resulting formula is taken logarithmically to obtain the log-likelihood function, as shown in Eq. (6):

$$l(\theta) = \sum_{i=1}^{m} y(i)\log h_\theta\left(x^{(i)}\right) + \left(1-y^{(i)}\right)\log\left(1-h_\theta\left(x^{(i)}\right)\right) \tag{6}$$

The log-likelihood function is then inverted and then averaged to obtain the loss function, as shown in equation (7):

$$J(\theta) = -\frac{1}{m} l(\theta) \tag{7}$$

From equation (7), the value of θ that corresponds to the minimum value of the loss function is the required optimal solution, so the gradient descent (GD) method can be used to find the minimum value of the loss function by first assigning a value to θ, and then continuously updating the value of θ according to equation (8). The expression for the update of parameter θ is shown in equation (8):

$$\theta_j := \theta_j - \alpha\frac{\partial}{\partial\theta_j} J(\theta) \tag{8}$$

where θ_j is the weight coefficient, $J(\theta)$ is the loss function, and α denotes the learning rate, which controls the magnitude of parameter updating of the loss function each time along the gradient direction. Then the loss function $J(\theta)$ is biased against θ as shown in equation (9):

$$\frac{\partial}{\partial\theta_j} J(\theta) = \frac{1}{m}\sum_{i=1}^{m}\left(h_o\left(x^{(i)}\right) - y^{(i)}\right)x_j^{(i)} \tag{9}$$

Finally, Eqs. 4-9 are obtained by substituting the expressions of the gradient descent method:

$$\theta_j := \theta_j - \alpha\frac{1}{m}\sum_{i=1}^{m}\left(h_\theta\left(x^{(i)}\right) - y^{(i)}\right)x_j^{(i)} \tag{10}$$

The logistic regression model finds the optimal solution corresponding to minimizing the loss by constantly updating the values, and then the data can be classified by logistic regression.

The experiments in this paper are to perform multiple classifications of postures, so the binary logistic regression model needs to be improved. The multiclassification problem can be viewed as multiple binary classification problems, and the objective function of the k-classification logistic regression model can be obtained from equation (5):

$$h_0\left(x^{(j)}\right) = \begin{bmatrix} p\left(y^{(i)}\right) = 1 \mid x^{(i)};\theta \\ p\left(y^{(i)}\right) = 2 \mid x^{(i)};\theta \\ \vdots \\ p\left(y^{(i)}\right) = k \mid x^{(i)};\theta \end{bmatrix} = \frac{1}{\sum_{j=1}^{k} e^{\theta_i^T x(i)}}\begin{bmatrix} e^{\theta_1^T} x^{(i)} \\ e^{\theta_2^T} x^{(i)} \\ \vdots \\ e^{\theta_k^T} x^{(i)} \end{bmatrix} \tag{11}$$

where $\theta_1, \theta_2, \cdots \theta_k$ are the model parameters and $\frac{1}{\sum_{j=1}^{k} e^{\theta_i^T x(i)}}$ is the normalization term such that the sum of all category probabilities is equal to 1. The loss function for multicategorical logistic regression is then obtained using the same method as:

$$J(\theta) = -\frac{1}{m}\left[\sum_{i=1}^{m}\sum_{j=1}^{k} 1\left\{y^{(i)} = j\right\}\log\frac{e^{\theta_j^T x^{(i)}}}{\sum_{l=1}^{k} e^{\sigma_j^T x^{(i)}}}\right] \tag{12}$$

where $1\{\cdot\}$ means that the value is 1 when the expression inside the parentheses holds, otherwise the value is 0. Then the optimal solution θ of the loss function is found using gradient descent during training, and the probability vectors of each sample x belonging to each category are computed during testing $h_\theta\left(x^{(i)}\right)$, where the category corresponding to the largest probability is the category of the sample. After constructing a multicategorical logistic regression model, the unknown test set feature vectors from the pose sample library are input into the trained logistic regression model, and the prediction results of the model can be obtained.

3 Model test analysis

3.1 Experimental data set

The data set created using the BlazePose network in order to assess the quality of sports movements consists of 6000 motion sequences that contain 30 types of sports movements (of which 1800 are standard reference sequences and 4200 are training sequences). It is evaluated in the dataset by 10 referees who determine the real value of the action quality scores. The scoring is done on a scale of 0-5. Even though the scores given by various referees to the same action will differ, it is kept within the range of +0.5; in this case, the combined deviation of three scores would be 1.5 and the final score would be an average of the three scores. In this research, individual sports movements were rated according to the criteria of the assessment of sports action and the sports competition routines prepared and issued by the National Sports Commission Wushu Research Institute. Prior to the scoring the three referees read through the appropriate provisions of the scoring guidelines. Every action was given a maximum of 5 points and the pairs of actions were considered equal if the quality scores of the two actions differed no more than 3 points. Scaling down action quality score by a factor of 5 was used during the experiment to make possible further calculation steps.

3.2 Evaluation indicators

Spearman rank correlation p . Spearman rank correlation measures the rank correlation between the predicted value and the true value, the higher the value of p , the closer the predicted score is to the true score, and the better the assessment performance. The calculation formula is as follows:

$$p = \frac{\sum_i \left(x_i - \bar{x}\right)\left(y_i - \bar{y}\right)}{\sqrt{\sum_i \left(x_i - \bar{x}\right)^2 \left(y_i - \bar{y}\right)^2}} \tag{13}$$

where x and y represent two data series. Spearman Correlation No explicit emphasis is placed on the true score values, but rather on relative rankings.

Mean Square Error MSE. The mean square error is a measure of the difference between the predicted score and the true score, emphasizing that the predicted score should be as close as possible to the true score, and that the smaller the mean square error, the better the model's performance. The formula is as follows:

$$MSE = \frac{1}{N}\sum_{i=1}^{N}\left(y_i - y_i\right) \tag{14}$$

3.3 Analysis of results

(1) Loss function analysis

The sports action evaluation model adopts the logistic regression method to gain experience and knowledge by learning the structure and intrinsic pattern of the input data to continuously adjust the network parameters, and the loss function training results are shown in Table 1. After 500 times of training, the loss function can be reduced from 0.671 to below 0.058, so that the sports action evaluation model has the optimal performance performance.

Table 1: Loss function training result

Number of training sessions	Loss function	Number of training sessions	Loss function
50	0.671	300	0.247
100	0.622	350	0.243
150	0.535	400	0.225
200	0.511	450	0.115
250	0.312	500	0.058

(2) Evaluation index data analysis

The comparative experimental validation was performed on the basis of the sports movement quality assessment model developed by means of the logistic regression algorithm (proposed in this section) and the sports movement quality assessment model developed with the help of the random forest algorithm. The findings of the evaluation-index analysis are presented in Table 2. Overall, the p-value interval of the logistic regression algorithm (0.7-0.95) is higher compared to the random forest algorithm (0.6-0.7), which means that the logistic regression algorithm is more successful in assessing sport movements. Actions 29, 12, 2, and 17 are quite brief, and have little limb displacement and a small chance of self-occlusion. On these actions, the logistic regression algorithm produces a higher assessment score, with p-values of 0.944, 0.937, 0.935 and 0.924 respectively. Conversely, actions 13, 14, 9, and 18 comprise of longer sequences, and greater variation in gestures. Some of the nodes will be hidden during the turning and arm-sliding process and the form of the movements more intricate so the logistic regression algorithm does not work as well with p-values of 0.712, 0.725, 0.748 and 0.771 respectively. Though the performance of the model is decreased to a certain degree due to the complexity of the sports actions, the model introduced in this article could also be used to meet the current requirements of the innovative development of sports teaching in colleges and universities.

Table 2: Evaluation index data analysis results

Action	Logistic regression algorithm		Random Forest Algorithm	
	p	MSE	p	MSE
1	0.88	0.098	0.612	0.076
2	0.935	0.096	0.654	0.094
3	0.863	0.043	0.644	0.1
4	0.872	0.02	0.69	0.038
5	0.845	0.095	0.669	0.044
6	0.823	0.085	0.655	0.102
7	0.791	0.043	0.683	0.029
8	0.824	0.097	0.646	0.081
9	0.748	0.043	0.693	0.056
10	0.87	0.094	0.646	0.066
11	0.881	0.051	0.618	0.104
12	0.937	0.02	0.652	0.038
13	0.712	0.017	0.633	0.025
14	0.834	0.109	0.673	0.072
15	0.923	0.021	0.642	0.031
16	0.796	0.067	0.683	0.051
17	0.924	0.082	0.627	0.099
18	0.771	0.055	0.63	0.013
19	0.808	0.014	0.653	0.051
20	0.838	0.045	0.669	0.076
21	0.839	0.102	0.626	0.1
22	0.889	0.01	0.682	0.11
23	0.825	0.029	0.681	0.06
24	0.725	0.06	0.657	0.012
25	0.78	0.077	0.636	0.091
26	0.823	0.094	0.693	0.031
27	0.885	0.017	0.685	0.068
28	0.882	0.032	0.659	0.055
29	0.944	0.05	0.64	0.073
30	0.903	0.076	0.607	0.108

(3) Action quality score deviation

Once the validity of the suggested model had been confirmed, it was also used to assess and examine sports movements and the results of the deviation of movement quality scores are given in Table 3. The standard actions act as the standard of movement quality measurements, but the information on these actions is received through repetitive experiments. A certain degree of deviation is present even when the same individual performs the same action multiple times. Consequently, this paper employs the logistic-regression-based action quality assessment model to examine the sports action dataset experimentally and to measure the quality-score discrepancies between the reference actions and the training actions. Experimental findings prove that there is some deviation between the reference movements, but the gap is very narrow (0.01-0.03) compared to the gap between the training movements which is much broader (0.1-0.3). When simpler movements are involved, the estimated errors of both standard and training actions lie in a narrow range; in case of more complex movements, the range of deviation in the evaluation outcomes is significantly larger. This is another indication that simpler movements have less action elements and most learners can learn them faster, thus the deviation in the quality assessment is less. Conversely, more complex movements require more action elements and therefore the deviation in their movement quality is larger. The model presented in the current paper fulfills the initial role of movement assessment. It is capable of detecting large deviations of students limb movements, supplying standard actions videos as learning materials at any time, assisting teachers in understanding the condition of students in movement learning, analyzing frequent wrong movements, and supporting targeted physical education lessons in offline classrooms.

Table 3: Deviation result of action quality score

Action	Training movements	Reference action	Action	Training movements	Reference action
1	0.245	0.013	16	0.263	0.016
2	0.272	0.02	17	0.271	0.015
3	0.201	0.017	18	0.279	0.027
4	0.227	0.022	19	0.28	0.022
5	0.207	0.023	20	0.277	0.018
6	0.231	0.012	21	0.246	0.014
7	0.233	0.019	22	0.241	0.018
8	0.262	0.023	23	0.247	0.019
9	0.261	0.029	24	0.274	0.022
10	0.267	0.028	25	0.273	0.025
11	0.294	0.03	26	0.265	0.014
12	0.251	0.018	27	0.241	0.014
13	0.258	0.029	28	0.224	0.026
14	0.206	0.016	29	0.206	0.023
15	0.297	0.017	30	0.215	0.021

4 Intelligent Physical Education System Design and Implementation

The intelligent assessment model of sports movement quality is introduced in Chapter 3, which is later tested and examined in Chapter 4 to confirm the practical applicability of the model to college sports. In order to make the model more capable in supporting the teaching of physical education in colleges and universities, it is used as the technical foundation to create an intelligent physical education system. The system to be developed in this chapter will resolve the current issues related to teaching physical education. This is a collection of smart physical education software that is actually applicable in practice and that converts theoretical findings into real-life practice.

4.1 System design

The development goals of the intelligent physical education system are defined through preliminary work including the feasibility analysis and functional analysis of the system. The design process is mainly focused on the planning of system functions, the development of key technologies, and the construction of the overall system architecture based on the findings of the system analysis.

4.1.1 System functional design and its characteristics

The user shoots the action video under a single viewpoint through a smart portable device such as a cell phone, transmits it to the server side for analysis, and returns the action analysis results to the user. The returned results include: action evaluation, action suggestions, learning guidance and so on. In addition, the user can register an account to save the history. The system function design should also reserve the development interface, so that it is convenient to expand the system in the future.

4.1.2 System key technology design

The intelligent physical education system mainly utilizes three key technologies, i.e., BlazePose network, posture sample library, and classifier. According to the coordinates of the key joints detected by BlazePose network, combined with the characteristics of its own movements such as stretching and concise, the sports professional guidance information is integrated into the analysis of sports movements, and the posture samples are constructed according to the technical points of each movement, so as to realize the intelligent detection of the quality of the sports movements through the classifiers for posture recognition.

4.1.3 Overall system architecture

The overall process of the architecture is that the intelligent mobile terminal collects the sports action video, compresses the video data by using the hardware device on the mobile terminal, and after that, through the mobile Internet, transmits the video data to the cloud; the cloud will compute the data, which goes through the three modules of data acquisition, construction of the sample library, and action gesture recognition, respectively, and after that, the results of the computation will be fed back to the user's mobile terminal device.

4.2 System implementation

4.2.1 System development and operating environment

The development process of this system uses object-oriented approach as the main development method. The Intelligent Physical Education System is developed and run mainly using the Ubuntu operating system. The specific configuration environment is as follows:

(1) Development environment

Development tools: JetBrains Pycharm, 64-bit, JetBrains Phpstorm, 64-bit, Google Android Studio, 64-bit.

Operating system: Ubuntu, windows 11, 64 bit.

(2) Development Language

Web system: PHP Version 7.0.60, PHP framework: Thinkphp.
Android client: java.
Artificial intelligence algorithm: Python 4.0.2.
(3) Running environment
Operating system: Ubuntu 16.04.3 LTS.

4.2.2 System main function module realization

This system is an intelligent and modernized physical education system based on traditional physical education and completed by using human posture recognition technology development. It carries out accurate evaluation and intelligent guidance on the sports movements made by users by recording sports movement information on mobile terminals, and feeds the information back to the mobile terminals. In this system, a series of algorithms is the soul of the whole system operation, responsible for the operation of each functional module in the system, and it is necessary to integrate each abstract algorithm into a number of functional modules and merge them with the system structure. The specific functional modules include the following: data acquisition module, building sample library module, action posture recognition module.

5 System test analysis

In order to check whether the suggested system of teaching physical education based on the movement assessment model can be effective, simulation experiments were conducted. Three main elements of testing are considered including coverage of a physical education program, its reliability, and satisfaction. The particular test contents are:

5.1 Physical Education Program Coverage

The three physical education teaching systems were independently applied to the instruction based on the real circumstances of the various universities. The changes in the course coverage of each system were studied by means of the following experimental tests. In Figure 1, the results of the comparison of the physical education courses coverage are shown, wherein A-C correspond to the Kinect-based sports training system, the Web-based physical education teaching system, and the physical education teaching system developed using the movement assessment model, respectively. It can be observed in Figure 1 that the actual situations in the universities are diverse, leading to relatively clear differences in the physical education course coverage. Relative to the other three systems, the sports course coverage rate of the system based on the movement assessment model is much higher, i.e. 0.8-0.9, which perfectly illustrates the advantage of the sports teaching system suggested in this paper.

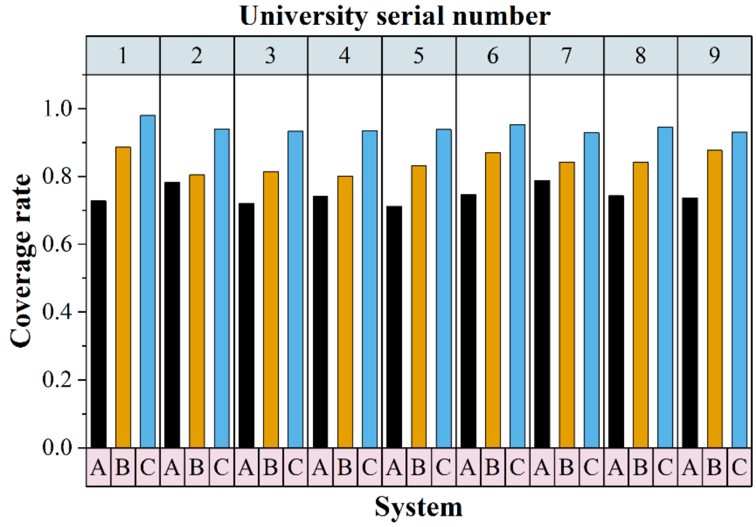

Figure 1: The comparison of the coverage rate of physical education courses

5.2 Teaching system reliability

Also, reliability was considered to be one of the main indicators in the given experiments to assess the general effectiveness of the suggested system and the comparative data on the reliability of various sports teaching systems are shown in Figure 2. Since this system is based on an action assessment model that is based on the logistic regression at the design level, its reliability is significantly enhanced and its reliability lies between 0.90 and 0.95, which is significantly higher than the reliability of the Kinect-based sports training system and that of the Web-based sports teaching system. Also, the suggested system may provide more effective representation of sports movements with different differences, which can help improving learning results of students in physical education.

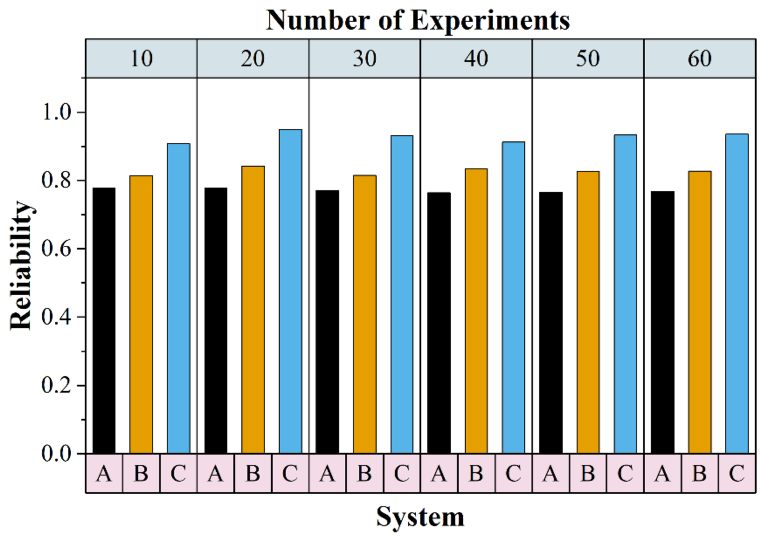

Figure 2: Comparison results of the reliability of physical education teaching systems

5.3 Analysis of Systematic Teaching Satisfaction

This subsection solicits opinions and suggestions from students in the form of questionnaire survey, which is designed from the students' point of view and combined with the characteristics of online sports students in the hope of gaining an understanding of the status quo of teaching satisfaction of the physical education teaching system, etc., discovering the gaps, exploring the reasons for the gaps to occur, and providing reliable and real bases for the innovative paths of development of physical education in colleges and universities. The details are as follows:

5.3.1 Data acquisition

(1) Questionnaire design

The questionnaire is split into two parts. The first part is collecting basic information about the learners while the second one explores the factors influencing student satisfaction through the use of five-point Likert scale. Based on the questionnaires created by local and foreign experts and scientists regarding the satisfaction of a teaching system and learning, seven latent variables have been finally determined, which are image of online learning, learner expectations, perceived interactivity, perceived freedom, quality of the course, perceived risk, and learner satisfaction. To conceptualize these latent variables and ensure coverage of all the measurement indicator range, 35 measures were developed overall, where every latent variable was represented by five test items.

(2) Questionnaire Distribution and Collection

There were a total of five classes chosen randomly in one university containing 50 students each, making it 250 questionnaires that were distributed altogether. Out of all these, only 220 of them were valid questionnaires and the recovery rate was relatively high at 88.00 percent. The analysis of data gotten through the questionnaire survey was done using professional statistical software. The most popular software among the researchers in education are Excel and SPSS. The process of entering the gathered data into the appropriate software should precede the actual statistical analysis, followed by the selection of appropriate analytical methods depending on the research aim, and saving and recording the final outcomes.

(3) Reliability and validity analysis

a Reliability test

The questionnaire data reliability test results were performed using SPSS 22.0, which is indicated in Table 4. As it could be seen, the values of the Cronbach alpha coefficients of the seven latent variables are all higher than 0.80, and the total reliability coefficient of the questionnaire is 0.844. These results also indicate that the questionnaire can be considered to have good reliability and high internal consistency.

Table 4: The results of the reliability test of the questionnaire data

Variable name	Reliability coefficient	The number of items	Reliability
Online learning image	0.827	5	good
Learner's expectations	0.88	5	good
Perceptual interactivity	0.814	5	good
Freedom of perception	0.85	5	good
Course quality	0.856	5	good
Perceived risk	0.852	5	good
Learner satisfaction	0.828	5	good
Overall reliability of the questionnaire	0.844	35	good

b Validity analysis

SPSS 25.0 was used to conduct both the KMO test and Bartlett test of sphericity with the findings in relation to the validity analysis presented in Table 5. As can be seen from the results, the KMO value is 0.933 and it is higher than 0.7. Besides, Bartlett test of sphericity has an approximate value of 3245.348, degrees of freedom of 411, and significance value of 0.003, which means that the statistically significant value has been achieved. Because the significance value is 0.000, which is less than 0.05, correlations are present between the variables, and therefore, the assumption of the independence between variables does not hold and the whole dataset is highly valid.

Table 5: Validity analysis results

KMO measurement		0.933
Bartlett spherical test	Approximate chi-square	3245.348
	Degree of freedom	411
	Significance	0.003

5.3.2 Results of descriptive statistics

The data of the questionnaire was transferred into SPSS to conduct descriptive statistical analysis, with the findings on system satisfaction being represented in Table 6. As it is seen in the table, the mean values of the online-learning image, expectation of the learner, perceived interactivity, perceived freedom, course quality, perceived risk, and learner satisfaction and overall satisfaction are 3.553, 3.765, 3.774, 3.837, 3.879, 3.425, 3.728, and 3.709 respectively. Of all these indicators, course quality is the indicator with the highest mean score, indicating that enhancing the quality of physical education courses could be a good means of increasing student satisfaction with the physical education teaching system.

Table 6: Descriptive statistical analysis results of system satisfaction

Variable name	N	Min	Max	Mean	SD
Online learning image	220	1	5	3.553	0.319
Learner's expectations	220	1	5	3.765	0.384
Perceptual interactivity	220	1	5	3.774	0.348
Freedom of perception	220	1	5	3.837	0.469
Course quality	220	1	5	3.879	0.346
Perceived risk	220	1	5	3.425	0.440
Learner satisfaction	220	1	5	3.728	0.417
Overall reliability of the questionnaire	220	1	5	3.709	0.389

6 Pathways to innovative development in physical education

According to the research findings and analysis presented above, this paper has a better insight into the challenges that accompany innovation and development in physical education practice in the context of the Healthy China Strategy. In order to help universities and colleges effectively apply the Healthy China Strategy in physical education practice, three innovations development ways are suggested, which are described as follows:

6.1 Rationalization of the teaching system

In the context of the physical education educational system, school administrators and appropriate teachers should be able to choose teaching material that would suit their real circumstances. The level of teaching content is the direct determinant of whether the desired instructional goals will be met or not, hence the need to have high-quality standards of physical education teaching. On top of this, there should be increased focus on physical education and health and additional training opportunities in body posture, health management, and physical fitness. There should also be enhanced teaching of theoretical knowledge connected to the chosen learning programs of students along with the focus on the combination of theory and practice. At the same time, there needs to be more course content in sports and health, which will benefit students in their development and create a basis in their overall physical well-being. There is also a need to consider the inner demands of the students and modify the teaching content on regular sports lessons to make them more interested in physical education and health courses, thus leading to a more effective development of physical education.

6.2 Innovative knowledge systems for teaching physical education

The innovative physical education and sports teaching should encourage the combination of humanities, knowledge, science and technology. As information technologies keep developing, the technological revolution has become one of the significant tendencies of modern society and the emergence of the knowledge-based economy has also gained more recognition among the population. Currently, there are some college students who overemphasize cultural knowledge as a way to manage the unemployment crisis, at the expense of sports and health. This is why colleges and universities should pay more attention to physical education teaching. In physical exercise, sports events must be organized based on scientific principles based on individual student attributes and effective evaluation system must be put in place so that every child is able to develop to the expected levels. The assessment of sports should focus more on the process, the idea of active involvement and physical fitness, as well as provide students with the opportunity to select their teachers and classes depending on the interest, which would increase their autonomy and eagerness to exercise.

6.3 Implementation of health teaching

Health teaching implementation needs teachers to have proper knowledge about exercise physiology and to acknowledge that health-based teaching can be used to effectively enhance the performance of the skeletal, muscular and cardiorespiratory systems of students. The physical activities ought to be done actively, i.e. team competitions and inter-team competitions. Health education must be aimed at improving the students muscle ability and cardiopulmonary capacity. Teaching staff could also clarify how physical exercise and physical fitness are related using examples like the rise in heart rate when running, so that students can more easily comprehend the importance of exercise and be motivated to come up with their own exercise plan.

7 Conclusion

Even though physical education teaching in colleges and universities is constantly being improved and developed, there are some issues that still persist. Based on the Healthy China Strategy, this paper creates an intelligent sports action evaluation model based on the integration of the BlazePose network with the logistic regression algorithm. Further, to improve the effectiveness of the model in physical education in colleges and universities, an intelligent sports teaching system is developed based on this model. The research uses the research data to test and analyze the model and the system. The most significant findings that can be found in the text are the following:

(1) The p-value of the logistic regression algorithm ranges from 0.7 to 0.95, while the p-value value of the random forest algorithm ranges from 0.6 to 0.7, and compared with the random forest algorithm, the logistic regression algorithm has a superiority in the physical education action assessment model. The model in this paper can scientifically guide the

standardization of youth sports movements, and then effectively improve the physical fitness state, make more contributions to the country, and always implement the strategy of Healthy China.

(2) The range of physical education program coverage of this paper's system is 0.8~0.9, which makes this paper's system more valuable for physical education teaching applications than the other two systems. In addition, the reliability value of this paper's system ranges from 0.9 to 0.95, which fully verifies the stability and feasibility of this paper's system.

(3) Based on the descriptive statistical analysis of the satisfaction of the physical education teaching system, it can be seen that the mean values of the seven latent variables are above 3.4, among which the mean value of the course quality is the largest, which indicates that students are satisfied with the course quality of the system in this paper. Finally, the innovative development path of physical education is proposed from three different dimensions.

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References

[1] Zhang, C., & Gong, P. (2019). Healthy China: from words to actions. The Lancet Public Health, 4(9), e438-e439.

[2] Liu, G. G., & Chen, X. (2019). China in transition: health, wealth, and globalisation. The Lancet Public health, 4(9), e444-e445.

[3] Bao, Y., Meng, S., Sun, Y., Jie, S., & Lu, L. (2019). Healthy China Action plan empowers child and adolescent health and wellbeing. The Lancet Public Health, 4(9), e448.

[4] Tan, X., Zhang, Y., & Shao, H. (2019). Healthy China 2030, a breakthrough for improving health. Global health promotion, 26(4), 96-99.

[5] Estabrooks, P. A. (2023). An overview of dissemination and implementation science in physical activity and health promotion. Kinesiology Review, 12(1), 4-18.

[6] McKenzie, T. L., Sallis, J. F., Rosengard, P., & Ballard, K. (2016). The SPARK programs: a public health model of physical education research and dissemination. Journal of Teaching in Physical Education, 35(4), 381-389

[7] Peng, D., & Tong, J. (2017, July). Study on the Development Strategy of Physical Education in Regional Campus. In 2017 2nd International Conference on Politics, Economics and Law (ICPEL 2017) (pp. 236-239). Atlantis Press.

[8] Keating, X., Liu, X., Stephenson, R., Guan, J., & Hodges, M. (2020). Student health-related fitness testing in school-based physical education: Strategies for student self-testing using technology. European Physical Education Review, 26(2), 552-570.

[9] Liu, L., & Li, F. (2017). The way to deepen reform of school physical education in the background of “Healthy China”. Eurasia Journal of Mathematics, Science and Technology Education, 13(10), 6545-6553.

[10] Wu, D., & Du, H. (2021). Sports Science Contributes to the Development of the “Integration of Sports and Education” in China. Journal of Innovation and Social Science Research ISSN, 2591, 6890.

[11] Yang, G., Li, Y., Liu, S., Liu, C., Jia, C., & Wang, S. (2021). Physical activity influences the mobile phone addiction among Chinese undergraduates: The moderating effect of exercise type. Journal of behavioral addictions, 10(3), 799-810.

[12] Tian, Z., & Wei, Y. (2021). The Value and Development Strategy of Chinese Minority Traditional Sports under Healthy China Strategy. Frontiers in Sport Research, 3(5).

[13] Wang, X., & Gu, M. (2022). The positioning of mental health education in social work under the healthy China strategy. Journal of Environmental and Public Health, 2022(1), 4338011.

[14] Xiong, X., Yu, L., & Pu, S. (2021). The strategy of “sports for people” in university physical education in east China under the concept of integration of sports and education. International Journal of Vocational and Technical Education, 1(4), 1

[15] Wang, B. (2015, December). Strategy of innovatively training social physical education tutors with resource of universities. In Control, Mechatronics and Automation Technology: Proceedings of the International Conference on Control, Mechatronics and Automation Technology (ICCMAT 2014), July 24-25, 2014, Beijing, China (p. 301). CRC Press.

[16] Zhang, B. (2019). Regional Sports Industrial Development Strategy in the Vision of" Healthy China 2030". Ekoloji Dergisi, (107).

[17] Hao, Y., Qiu, Z., Xu, Q., He, Q., Fang, X., & Wang, C. (2023). Innovation strategy design of public sports service governance based on cloud computing. Journal of Cloud Computing, 12(1), 69.

[18] Yip, W., Fu, H., Jian, W., Liu, J., Pan, J., Xu, D., ... & Zhai, T. (2023). Universal health coverage in China part 2: addressing challenges and recommendations. The Lancet Public Health, 8(12), e1035-e1042.

[19] Zhang, G., & Wang, S. (2025). Integrating sports industry development with national health promotion: A biomechanics-informed study of the healthy China strategy. Molecular & Cellular Biomechanics, 22(2), 807-807.

[20] Zhou, Z., Ren, H., Yin, Z., Wang, L., & Wang, K. (2014). A policy-driven multifaceted approach for early childhood physical fitness promotion: impacts on body composition and physical fitness in young Chinese children. BMC pediatrics, 14(1), 118.

[21] Dai, J., & Menhas, R. (2020). Sustainable development goals, sports and physical activity: the localization of health-related sustainable development goals through sports in China: a narrative review. Risk management and healthcare policy, 1419-1430.

[22] Wang, B. (2022). Research on the realization path of fitness strategy under the guidance of the “healthy China” era. Journal of Healthcare Engineering, 2022(1), 2102076.

[23] Mingzheng, L., & Yinchun, Y. (2025). The Realistic Dilemma and Optimization Strategy of the Reform of Physical Education Secondary School Examination--A Comparative Study Based on the Policy Practices of Multiple Provinces in Southwest China. Frontiers in Sport Research, 7(3).

[24] Chen, P., Wang, D., Shen, H., Yu, L., Gao, Q., Mao, L., ... & Li, F. (2020). Physical activity and health in Chinese children and adolescents: expert consensus statement (2020). British journal of sports medicine, 54(22), 1321-1331.

[25] Weng, Y. (2021). The Development Strategy of School Physical Education Based on the Vision of" Healthy China. Development, 3(4), 10-14.

[26] An, Y., Yang, J., Niu, S. J., & Wang, J. (2022). Health first: the sustainable development of physical education in Chinese schools. Sustainability, 14(5), 3133.

[27] Wang, D. (2017). Improving school physical education to increase physical activity and promote healthy growth of Chinese school-aged children—Time for action. Journal of sport and health science, 6(4), 384-385.

[28] Wu, S., Luo, Y., Qiu, X., & Bao, M. (2016). Building a healthy China by enhancing physical activity: Priorities, challenges, and strategies. Journal of sport and health science, 6(1), 125.

[29] Deng, F. (2021). On the reform and innovation strategy of college physical education under the concept of “Health First”. Journal of Frontiers in Educational Research, 1(8), 51-55.

[30] Meng, X., Horrell, A., McMillan, P., & Chai, G. (2021). ‘Health First’and curriculum reform in China: The experiences of physical education teachers in one city. European Physical Education Review, 27(3), 595-612.

[31] Ding, K. (2025). A Study on the Promotive Effects of Physical Education on College Students’ Lifelong Exercise Behavior: An Analysis of the Moderating Role under the “Healthy China” Strategy. Frontiers in Sport Research, 7(1).

[32] Cui, C., & Mingfei, X. (2023). Research on Teaching Mode Reform and Innovation in our School—Breakthrough and Innovation: Health and Physical Education Teaching Mode Reform and Discussion. Curriculum and Teaching Methodology, 6(2), 15-24.

[33] Gao, X. (2025). Innovation and Practice Exploration of Middle School Physical Education Teaching Methods from the Perspective of Core Literacy. International Educational Research, 8(2), p159-p159.

[34] Niu, Z. (2018, October). Strategy Analysis of Physical Exercise Promoting College

Students' Physical Health under the Background of Healthy China. In 2018 3rd International Conference on Politics, Economics and Law (ICPEL 2018) (pp. 79-81). Atlantis Press.

[35] Li, J., & Kim, S. Y. (2019). On the Development Direction and Policy of Chinese School Physical Education under the Background of'Healthy China 2030 Program'. IJEMR, 3(1), 21-27.

[36] Sun, X. (2019). The development of sports rehabilitation industry and strategy in China under the vision of great health. In E3S Web of Conferences (Vol. 131, p. 01014). EDP Sciences.

[37] Xiong, X. (2019, August). The Research on Current Situation and Innovation Strategy of Badminton Teaching in Colleges and Universities. In 5th International Conference on Arts, Design and Contemporary Education (ICADCE 2019) (pp. 1060-1062). Atlantis Press.

[38] Byun Hyun,Jeon Sangwan & Yi Eun Surk. (2023). Analysis and prediction of older adult sports participation in South Korea using artificial neural networks and logistic regression models. BMC geriatrics,23(1),676-676.