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Design of an intelligent sports health management system based on perceptron model

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Abstract

Health management is the whole process of comprehensively monitoring, analyzing, evaluating, providing health consultation and guidance, and intervening in health risk factors of an individual or a group. In this paper, based on multilayer perceptron neural network modeling, a three-layer neural network is selected and relevant parameters of the neural network are set for modeling to build an intelligent sports health management system. The system firstly enriches the channels for collecting user information in information management and makes the basis for health assessment more reliable. Secondly, in the aspect of health assessment, the health status is redefined. Finally, in terms of health intervention, it uses two ways of exercise prescription and option recommendation to comprehensively solve users' health problems in physical, physiological and psychological aspects. Through the system analysis, we found that the main factors affecting college students to choose sports programs are lack of management knowledge, lack of venue equipment, unorganized, high study pressure, and their own poor physical quality, all of which have an influence degree of more than 60%. The satisfaction of teachers, students and parents to the system is 80.74%, 74.95% and 93.41% respectively. Therefore, the system designed in this paper is practical and can effectively use the limited resources to make students achieve the best health effect.

Keywords: *college sports, health management, artificial neural network, perceptron model, exercise prescription*

Introduction

In recent decades, the rapid spread of electronic computers and the high-speed leap of network technology have made how to conduct scientific data management a new problem (Yong W 2015). Nowadays, the processing of medical examination data for student health checkups in university hospitals is still basically in a manual way, which causes not only an increase in the labor workload of hospital medical examinations due to the large number of students and numerous medical examination items, but also the inefficiency of doctors and examiners, etc. in examining bodies and storing data (XIONG & MO) (Taskinen R 2017). This makes the time from physical examination to obtaining the results of the examination not only longer, but also very tedious to access information and data. Manual examination not only has huge data but also makes it difficult to analyze the data in depth and provide a comprehensive understanding of students' health

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information, not to mention providing sufficient data basis for medical research (Dalen-Lorentsen et al., 2021) (Ren, Sun, & Shi, 2019).

Health management is to determine the health status of users through comprehensive monitoring and analysis of health behaviors, and to provide health consultation and intervention services to users (Sun & Li, 2021). Its purpose is to mobilize the initiative of individuals, encourage people from all walks of life to contribute to health management services, and make full use of available resources to improve health management effects (Wu, 2017). In the implementation of sports health management services, the same step-by-step requirements of information management, health assessment, health thousand precautions, supervision and feedback of health management are followed, with the difference that the sports health management service system focuses on the implementation of health interventions by means of sports (Yang & Han, 2021) (Shen, 2022).

In the literature (Dong S 2018), the U.S. government is also very concerned about student health, and its school health model has gone through three stages: physical health system - health education system - health promotion system. Although physical health education and health education have an important impact on students' health status, they are mainly a teaching activity in schools, and students' health is affected by various factors, so it is difficult for physical health education and health education to be effective without dynamic and comprehensive management. In this context, health promotion systems have gradually emerged.

In the literature (Q, 2016), among many European countries, the Finnish health management model is outstanding, characterized by the role of community health services. In the process of implementing this health management system, Finland encountered similar problems as the United States, such as economic, cultural, and health resources, but because of its scientific research framework, community interaction, intervention in various ways, and necessary international cooperation, it finally overcame all difficulties and promoted health management to the whole country, which was not only recognized by the people and achieved good results, but also accumulated valuable experience for It has not only been recognized by the people and achieved good results, but also accumulated valuable experience for the development of health management in countries all over the world.

In the literature (X, 2015), Japan is one of the leading countries in the world in the field of institutional health research. Japan attaches great importance to health management and has established a relatively complete school health system and accumulated abundant data on the growth and development of adolescents. Literature (Li X 2016) The basic contents and methods of health management services in Japan are health survey, health checkup, post-checkup assessment and assistance, health promotion activities and health education. The success of health management in Japan is based on a sound legal system, a comprehensive health management system, and a health management record management system, as well as a strong national health awareness.

The literature (Xie, 2019) analyzed the current situation of student physical fitness level research in the United States and Japan and found that various governmental departments in foreign countries attach great importance to student physical fitness status, test indicators are constantly developed and changed to better reflect the physical fitness status of students, and the content and standards of physical fitness tests are constantly adjusted and improved, and a large amount of information is obtained through continuous practical testing, the ultimate goal of which is to be able to The ultimate goal is to improve the overall physical health of the nation, so that the physical fitness standards can play a greater role in the development of the health of the whole population.

The literature (Jiang G P 2018) used three different experiments to analyze the impact of physical education courses on students' physical activity in several universities, and the results showed that, in addition to traditional factors such as gender and course programs, the skill content of the courses had the greatest impact on students' attitudes toward physical activity. The literature (Rui Y 2015) used literature and statistical methods to statistically analyze the test indicators of students' physical form, quality, and function, so as to analyze a series of problems in the development of physical fitness of college students and thus propose measures to solve the problems in various aspects such as physical education curriculum, physical fitness test indicators, and family education.

The sports health management service system designed in this paper is a closed spiral structure including information management, health assessment, health intervention and supervision and feedback based on the perceptual machine model to improve and maintain the health status through participation in sports, and finally achieve the goal of improving students' physical fitness. The system is then modeled based on a multilayer perceptron neural network, and a multilayer perceptron neural network model is constructed through relevant tools, and a three-layer neural network is selected.

The modeling was performed by setting the relevant parameters of the neural network, selecting the corresponding evaluation criteria, and finally determining that the model fits better when the number of neurons in the hidden layer is 5. To verify the usability of the system, the final performance test is performed, as well as the satisfaction analysis.

Theoretical system of sports health management service system

The exercise health management system designed in this paper provides practical tools for college students to perform health self-management. In the health management service system can update the content of exercise prescription according to the current user's health status and behavior habits, effectively encourage users to actively participate in sports, increase exercise participation, and realize the transformation from passive exercise to active exercise.

In the option recommendation process, for healthy people who are not interested in sports, the sports program will be recommended to them according to the indicators of physical fitness and other indicators, and stimulate the interest in sports by strengthening the sense of achievement in the process of sports; for people in a subhealthy state, the sports program will be recommended to them according to the abnormal indicators in the psychological, social and physical health information, and improve the subhealthy state in the process of participating in sports, and in In the process of participating in sports, we can improve the subhealth status and stimulate the interest in sports.

Ideas and overall structure of the theoretical system of sports health management

The idea of constructing the theoretical system

Health management services include health self-management, which is driven by internal motivation from oneself, and health social management, in which interventions are made by external forces. Health self-management is the self-correction of bad behaviors and lifestyles that occur in daily life, so as to prevent the emergence of health risk factors, in order to improve the health of the body, with emphasis on self-management and active participation. Health social management system is to implement health interventions by recommending personalized exercise programs for healthy and sub-healthy people, increasing physical activity time through supervision and monitoring, and developing lifelong awareness of physical activity in order to maintain people's health status.

Health social management can help college students to carry out health self-health management more effectively, and health self-health management is the guarantee of implementing health social management, so it can be seen that the two are complementary to each other. In this paper, we use modern technology such as cell phone and Internet to understand users' health status, make management plans for them, and implement measures to monitor and give feedback on the implementation of the plans, which are used to help health self-management, so as to achieve the purpose of maintaining health status and enhancing health level.

The overall structure of the theoretical system

Figure 1 shows the theoretical system of sports health management service system, which is divided into three modules: information module, matching algorithm module, and health database.

The information module includes user information database and resource information database. The user information database mainly consists of three parts: explicit information such as physical examination data, physical test data, psychological test and health self-test data, implicit information indicating personal behavior such as social software from users' cell phones, cell phone positioning and internet browsing, and health information fed back during the operation of the system.

The resource information base is mainly composed of indicators and criteria for evaluating health, information for making exercise prescriptions, and information on the characteristics of exercise items. The matching algorithm module includes information processing model, health evaluation model, exercise prescription generation model, and exercise item recommendation model, and the output module includes the output template of exercise prescription.

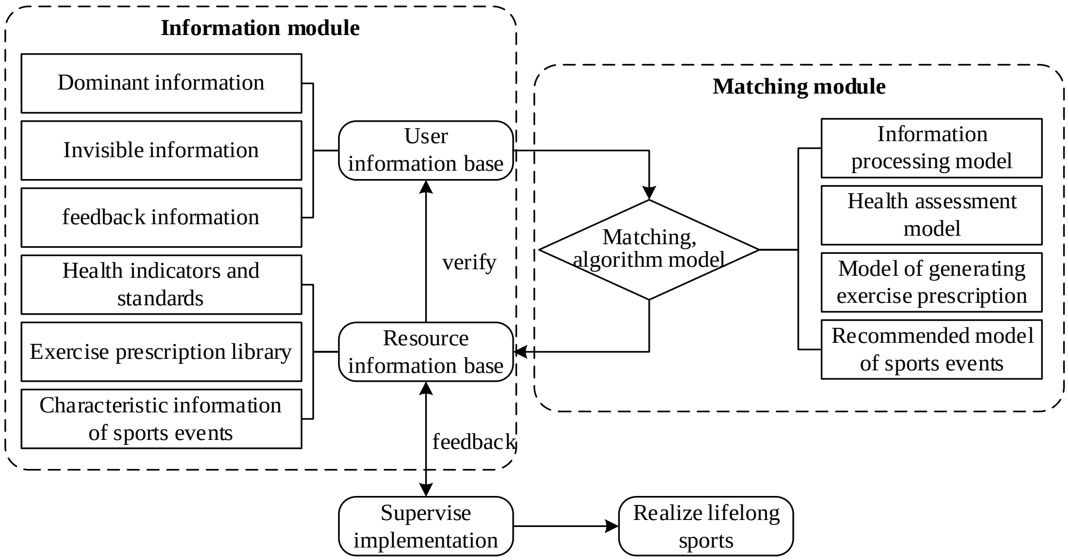

Figure 1: Theoretical system of sports health management service system

The specific measures in the process of building the theoretical system of sports health management are:

(1) The way of collecting user health information. The users' invisible interest information is collected and summarized through explicit information such as physical examination results, physical test results, psychological test and health self-test results, and word frequency-inverse file frequency technology.

(2) The way of health assessment. According to the health standards issued by the International Health Organization, the health status is assessed in three dimensions: physical, psychological and social, and the users are divided into healthy, subhealthy and diseased people.

(3) Basis of health intervention. Based on the collected health information, the user's superior and abnormal indicators are screened and formed into a collection. The formation of the superior indicator collection is to strengthen the indicators again, and the abnormal indicator collection is to restore the abnormal indicators to normal.

(4) Priority setting when solving health problems. Firstly, in formulating exercise prescriptions, the indicators that fail in the physical fitness test data are used as the main basis for formulating exercise prescriptions. When several failed indicators appear at the same time, the system will formulate exercise prescriptions for the main purpose in the order of cardiorespiratory, body shape, and quality, in accordance with the processing principle of solving problems item by item. Secondly, in the option recommendation, the psychological test data and the data reflecting social health in the health self-test are taken as the main basis, and the abnormal indicators appearing in these data are

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summarized, according to which the option recommendation is made. If there are multiple abnormal indicators reflecting psychological and social health, the initial ranking is made by the severity of the abnormal indicators, and the one with the most serious abnormal indicators is selected as the basis for the option recommendation, and for multiple abnormal indicators with the For multiple abnormal indicators with the same degree of severity, they are ranked again according to the numbering order of the psychological and social health indicators in the annex.

Matching algorithm module

Multi-layer perceptron neural network construction

The network structure of the MLP will be determined in the process of adjusting the network weights to minimize the total error, and the prediction error of the MLP network takes the form of error squared. For the output nodes, if $V_{jk}(t)$ denotes the weights between the j rd hidden node and the k th output node at moment t, $Y_j(t)$ and $\theta_k(t)$ denote the output value of the j th hidden node and the deviation of the k th output node at moment t, respectively, and $e_k(t)$ denotes the error between the predicted $O_k(t)$ value of the output node and the expected (observed) value $O'_k(t)$ at moment t, then the prediction error $E_k(t)$ of the output node $k(k=1,\cdots,l)$ at moment t is expressed as shown in Equation (1):

$$E_k(t)=\frac{1}{2}\left(e_k(t)\right)^2=\frac{1}{2}\left(O'_k(t)-O_k(t)\right)^2$$
$$=\frac{1}{2}\left[O_k{}'(t)-f\left(\sum_{k=1}^{l}V_{jk}(t)Y_j(t)+\theta_k(t)\right)\right]^2 \quad (1)$$

The total prediction error $E(t)$ of the output node at the moment of t is a multivariate linear function of the network weights, the values of each input variable and the output expectation, forming an error hyperplane, which can be obtained by substituting equation (1) into equation (2):

$$E(t)=\frac{1}{2}\sum_{k=1}^{l}\left(e_k(t)\right)^2=\frac{1}{2}\sum_{k=1}^{l}\left(O'_k(t)-O_k(t)\right)^2 \quad (2)$$

Similarly, for the hidden node, if $W_{ij}(t)$ denotes the weight between the i rd input node and the j th hidden node at moment t, and $X_{ij}(t)$ and $\theta_j(t)$ denote the output value of the i th input node and the deviation of the j th hidden node at moment t, respectively, then the prediction error $E_j(t)$ of the hidden node j at moment t is as in Equation (3):

$$E_j(t)=\frac{1}{2}\left[Y_j'(t)-f\left(\sum_{j=1}^{m}W_{ij}(t)X_i(t)+\theta_j(t)\right)\right]^2 \qquad (3)$$

The core of MLP network back propagation is the adjustment of network weights using the gradient descent method, whose adjustment goal is to achieve the minimum total prediction error, so that the hyperplane keeps approaching the correct position. The adjustment rule uses the Delta rule in the perceptron, i.e., the weights are adjusted proportional to the error, i.e., the connected input. Essentially, each moment t adjusts the network weights in accordance with the rule that minimizes the prediction error the fastest. At moment t, the local gradients (error signals at each layer) $\delta_k(t)$ and $\delta_j(t)$ at output node k and hidden node j are shown in Eqs. (4) and (5), respectively:

$$\delta_k(t)=e_k(t)f'(U_k)=\left(O_k'(t)-O_k(t)\right)f'(U_k) \qquad (4)$$

$$\delta_j(t)=\left(\sum_{k=1}^{l}\delta_k(t)V_{jk}(t)\right)f'(U_j) \qquad (5)$$

If the Sigmoid activation function is used for both output and hidden nodes, then $\delta_k(t)$ and $\delta_j(t)$ are shown in (6) and (7), respectively:

$$\delta_k(t)=\left(O_k'(t)-O_k(t)\right)O_k(t)\left(1-O_k(t)\right) \qquad (6)$$

$$\delta_j(t)=\left(\sum_{k=1}^{l}\delta_k(t)V_{jk}(t)\right)Y_j(t)\left(1-Y_j(t)\right) \qquad (7)$$

If $t+1$ moment, the weights $V_{jk}(t+1)$ and $W_{ij}(t+1)$ between the j nd hidden node and the k rd output node and the i th input node and the j th hidden node are shown in equations (8) and (9), respectively:

$$V_{jk}(t+1)=\alpha V_{jk}(t)+\Delta V_{jk}(t)=\alpha V_{jk}(t)+\eta\delta_k(t)Y_j(t) \qquad (8)$$

$$W_{ij}(t+1)=\alpha W_{ij}(t)+\Delta W_{ij}(t)=\alpha W_{ij}(t)+\eta\delta_j(t)X_i(t) \qquad (9)$$

$\theta_k(t+1)$ and $\theta_j(t+1)$ are the deviations of the k th output node and the j th hidden node at moment $t+1$, respectively, which can be regarded as special weights with input value of 1. The adjustment is shown in Eqs. (10) and (11):

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$$\theta_k(t+1) = \alpha\theta_k(t) + \eta\delta_k(t) \quad (10)$$

$$\theta_j(t+1) = \alpha\theta_j(t) + \eta\delta_j(t) \quad (11)$$

The essence of the MLP learning algorithm is to use the "fastest descent method" to find the minimum value of the total error function of the network, and correct the weights in the direction of the negative gradient of the error function. Specifically, the algorithm consists of two processes: forward propagation of the input signal and backward propagation of the output error signal. In the forward propagation phase, the network weights are kept constant, and the hidden nodes process the input data top-down layer by layer, and the output of the upper layer nodes is the input of the lower layer nodes, and when the prediction result of the output layer nodes is not equal to the desired output, the prediction error is calculated to enter the next phase. In the back-propagation stage, the error signal is back-propagated back to the input node layer by layer along the forward propagation path, and all network weights are corrected according to the error size propagated to that layer until the error is minimized then the iteration is stopped.

The algorithm flow of the MLP network is shown in Figure 2, i.e., the training process is carried out according to the following steps:

(1) Initialization settings: assign random numbers to weights $W_{ij}(0)$ and $V_{jk}(0)$, adjust the learning rate $\eta \in (0,1)$, error $E(0) = 0$, sample counter $p = 1$, total training counter $q = 1$, and training precision $E_{\min}$ to positive decimals.

(2) Calculate the output of each layer: input P training sample and calculate the hidden layer output Y_j and output layer output O_k according to Eq.

(3) Calculate the total output error $E(t)$ at moment t according to equation (2).

(4) The local gradients $\delta_k(t)$ and $\delta_j(t)$ of the output and hidden nodes are calculated according to Eqs. (6) and (7), respectively.

(5) The weights $V_{jk}(t+1)$ and $W_{ij}(t+1)$ of the output node and the hidden node are adjusted according to Eqs. (8) and (9), respectively, and the deviations $\theta_k(t+1)$ and $\theta_j(t+1)$ of the output node and the hidden node are corrected according to Eqs. (10) and (11), respectively.

(6) Check if all the samples have completed training: if $p > P$, continue to the next step, otherwise return to (2).

(7) Check whether the total network error meets the accuracy requirement: if $E(t) < E_{\min}$, training is finished, otherwise return to (2).

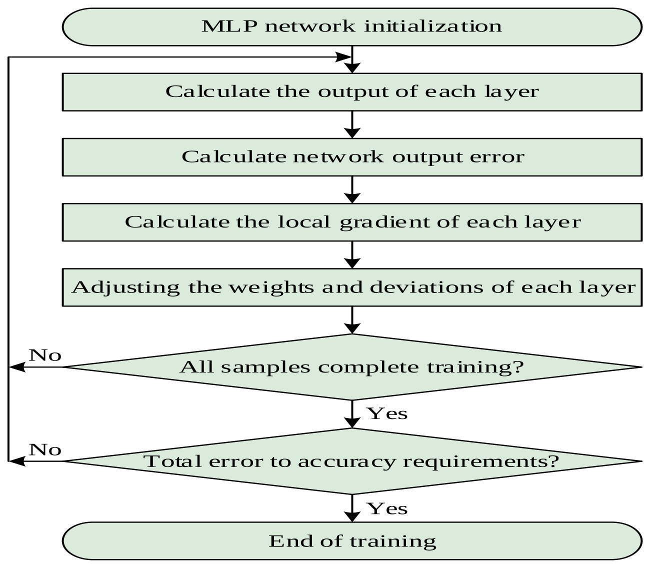

Figure 2: Construction process of the MLP Network

Topology of the neural network

The topology of artificial neural networks is divided into single-layer and multi-layer, either multi-layer or single-layer, and each layer contains several neurons. The neurons are connected to each other by directed arcs with variable weights. The neural network is trained repeatedly by iterating on the available information. During the training process, the weights of the neuron connections are gradually changed to complete the information processing and finally to simulate the relationship between inputs and outputs. The complex structure of the neural network is determined by the number of layers of the neural network and the number of neurons in each layer. For the neural network with simple structure, the convergence speed is relatively fast during learning and training, but the disadvantage is the low prediction accuracy of classification, while the complex neural network, the convergence speed is slower during learning, but the prediction accuracy is relatively high. This is why two or more hidden layers are used in the actual problem solving process. Using multiple hidden layers will complicate the problem, multiple hidden layers are usually not easy to find the optimal solution, and the more parameters a complex neural network needs to set in the process of sample learning, the greater the prediction error may be, and the more likely to produce overfitting during training, thus leading to The generalization performance of the neural network is weakened. The three-layer neural network can achieve any n-dimensional (input layer) to m-dimensional (output layer) mapping, so in the process of specific

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practical modeling, it is usually more cost-effective to choose a neural network with one layer, based on this study to choose a neural network model with one hidden layer. In the training process of neural networks, the number of neurons in the hidden layer is the basis for the fault tolerance of neural networks. There are many different methods to determine the number of neurons in the hidden layer, and there is no unified standard for the time being. The following are four methods to determine the number of neurons:

(1) Loppmann: the maximum number of neurons in the hidden layer is $m*(n+1)$; the optimal number of neurons ranges from 2 to $m*(n+1)$.

(2) Kuarycki: the maximum number of neurons in the hidden layer with only one layer is $m*3$; the optimal number of neurons is between 2 and $m*3$.

(3) A.J. maren: When the number of neurons in the input layer is greater than the number of neurons in the output layer, only one layer of the hidden layer has an optimal number of neurons of $(m*n)*0.5$. This method is directly determined as a value.

(4) Others: The optimal number of neurons is $(m*n)*0.5+a$, and a is a constant between 1 and 10. In the above four methods, the meaning of each parameter is as follows: n represents the number of variables in the input data, m represents the number of cells in the target field, and a is a constant between 0 and 10. In the study of this paper, after logistic regression, there are 10 risk factors left, so there are 10 input variables, so n is 10, and the output variable is diabetes, so the output variable is one, so m is 1. Among these four methods, the first three methods are chosen because there is only one hidden layer, and in the first three methods, the maximum number of neurons of Kuarycki is 2~3. Among the first three methods, Kuarycki's maximum number of neurons is 2~3, A.J.maren's single hidden layer's optimal neural is 6, and Loppmann determines the range of neuron values from 2~11. Therefore, the Loppmann method is chosen to determine the number of neurons with higher error tolerance. The parameter of the number of units in the hidden layer will be adjusted within this range in later studies in order to expect better fitting results.

Activation function selection

The activation function of the hidden layer in a multilayer perceptron neural network usually has a variety of activation functions, of which Sigmod, Tanh, and Relu functions are the three commonly used activation will functions, the activation function of the output layer usually uses logistic, softmax as the activation function of the output layer, there are certain principles for the selection of the activation function of the output layer, if the variable is a binary classification, the output layer has only In the case of dichotomous variables, there is only one neuron in the output layer, so the activation function of the output layer is usually logistic, in the case of n class discrimination, there are n neurons in the output layer, so the activation function of the output layer is usually softmax, because the target variable selected in this study is a dichotomous variable, there is only one neuron in the output layer, so the activation function of the output layer is logistic, the activation function of the hidden layer is The activation function of the hidden layer is determined by comparing three different activation functions with the same number of neurons in the hidden layer, the magnitude of the prediction accuracy and AUC value, and finally the activation function of the hidden layer is determined. Sigmoid function, also known as S-type function. When the value range is (0,1), called unipolar Sigmoid function (non-symmetric Sigmoid function), when the function can be differentiated. The formula is shown in (12):

$$f(x)=\frac{1}{1+e^{-\alpha x}}(\alpha>0) \tag{12}$$

When the value range is (-1,1), called the bipolar Sigmoid function (symmetric Sigmoid function) or hyperbolic tangent function (Tanh), when the function is not differentiable. The formula is shown in (13):

$$f(x)=\frac{e^{\alpha x}-e^{-\alpha x}}{e^{\alpha x}+e^{-\alpha x}}=\frac{1-e^{-\alpha x}}{1+e^{-\alpha x}}(\alpha>0) \tag{13}$$

where, α is the slope parameter of the Sigmoid function.

The formula for the Relu function is shown in (14):

$$f(x)=\begin{cases}0, & 0\geq x\\ x, & 0<x\end{cases} \tag{14}$$

The Softmax function, also known as the normalized exponential function, is a gradient log normalization of a finite term discrete probability distribution, mostly used as the output activation of a multiclassification neural network, mapping the non-normalized output X_i of the network to the [0,1] interval on the predicted output class, with the sum of the multiclassification probabilities $f(X_i)$ of the output being 1. The formula is shown in (15), where $i=1,\mathrm{L}\ ,m$:

$$f(X_i)=\frac{e^{X_i}}{\sum_{j=1}^{m}e^{X_j}} \tag{15}$$

Analysis of intelligent sports health management system

Factors influencing the choice of college physical education classes

The results of the analysis of physical education option classes at Shaanxi Normal University using this paper's perceptual machine model-based physical health management system showed that the factors affecting physical education option classes included course items, venue equipment, teacher's teaching level, teacher's personality, teacher's teaching methods, teacher's control of classroom atmosphere, teacher-student relationship, teaching assessment and evaluation methods, students' physical form, students' learning attitudes, students' will to exercise, the Students' interest in participating in exercise, the degree of mastery of sports skills, the attitude of choosing courses, and exercise peers. The factors influencing college students' choice of sports programs include internal factors: students' physical forms, students' learning attitudes, students' will to exercise, students' interest in participating in exercise, mastery of sports skills, personal values and sports values, and exercise peers. External factors: venue equipment, sports consumption level, sports atmosphere, external pressure, lack of option guidance for students.

The degree of influence of factors affecting college students' choice of sports programs is shown in Figure 3. It was found that the main factors influencing college students to choose sports programs were lack of management knowledge, lack of venue equipment, no one to organize, high study pressure, poor physical quality of themselves, lack of sports partners, no favorite sports, and insufficient awareness of self-exercise.

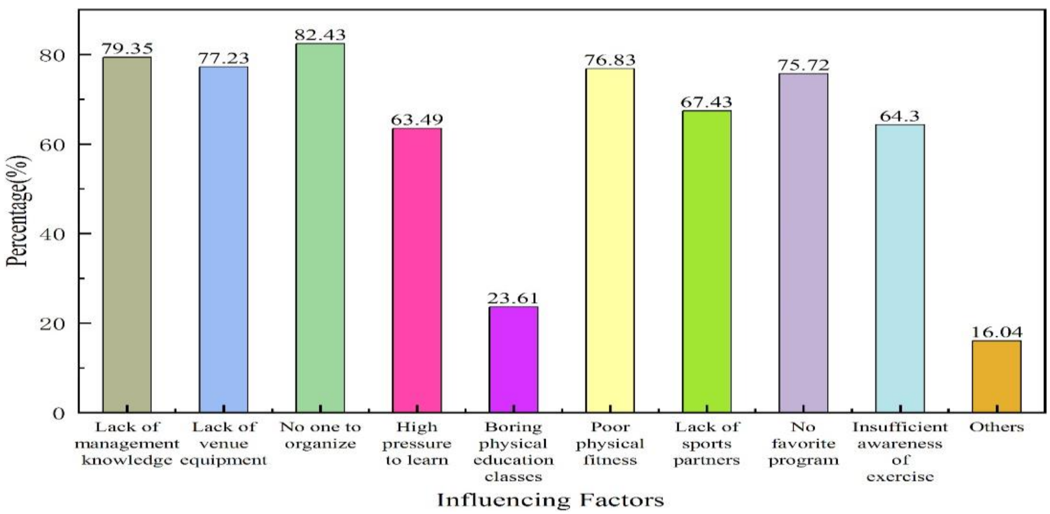

Figure 3: Influencing factors

Health management knowledge is mainly reflected in the identification and assessment ability of health information and complete management system. Using advanced Internet technology and the information processing function of intelligent devices, and then according to the criteria for judging health conditions in medicine and kinesiology, the identification and assessment of health information is realized, and a complete system containing health information management, health assessment and health intervention is constructed. For college students, the venue equipment can be chosen from the existing hardware facilities of the school or the hardware facilities in the surrounding areas such as parks and stadiums. Self-exercise awareness is an important power

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source for exercise and health management, which can be cultivated through the form of online task punching cards in the early stage and setting interesting and effective task contents. Formulating exercise prescription according to one's basic condition can well avoid the influence of one's own poor physical quality on exercise participation. For college students who have no interest in sports, the exercise goal is to strengthen the set of superior indicators and improve the set of dangerous indicators, and the exercise program is precisely recommended to college students by matching the exercise items of various genus characteristics of the item group, and then combining with the content of college students' recent concerns.

Performance Testing

Performance testing is mainly for various indicators of performance requirements, such as the number of registered users, etc. The performance requirements can be met by setting the appropriate database tablespace size and the database storage engine used. Other performance indicators need to be tested using performance testing tools, such as LoadRunner, and the stress test results are shown in Table 1. The fastest login time is 0.04s, the fastest query time is 0.05s, the fastest exit time is 0.01s, the fastest commit time is 0.04s, the fastest modify time is 0.04s, and the fastest update time is 0.03s.

Table 1: Pressure test results table

Number of concurrent users	**Average response time(s)**					
	Login	**Inquiry**	**Logout**	**Submit**	**Modify**	**Update**
300	0.04	0.05	0.01	0.04	0.04	0.03
400	0.12	0.36	0.34	0.07	0.38	0.79
600	0.35	0.69	0.72	0.62	0.83	0.91
1200	0.49	0.84	0.95	1.64	1.64	1.97

Satisfaction analysis of intelligent sports health management system

To verify the satisfaction of the user experience of the optimized solution. 300 people were selected from teachers, students, and parents, and the test ages ranged from 20 to 60 years old, and satisfaction ratings were given to each of the user experience elements, and the satisfaction results are shown in Figure 4. It can be seen that teachers were 80.74% satisfied with the system, and 4.43% were dissatisfied with the system. Students were 74.95% satisfied with the system, and 5.63% were dissatisfied with the system. Parents' satisfaction with the system reached 93.41% and only 1.46% were dissatisfied with the system. Therefore, the system has applicability.

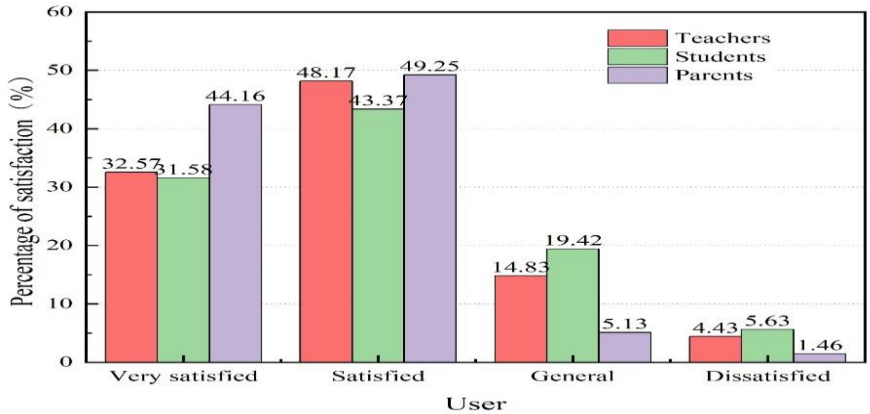

Figure 4: Sports and health system satisfaction

Conclusion

The system designed in this paper, in the field of exercise prescription, updates the content of exercise prescription in real time according to the user's feedback health information and the user's short-term hobby, in order to improve the user's enthusiasm to participate in exercise and health management, compared with the traditional health management mode, not only combines the power of modern technology to bring convenience to the user to improve the efficiency of health management, but also stimulates the user's interest to participate in exercise, which helps to realize lifelong sports It also stimulates users' interest in participating in sports and helps to realize lifelong sports. In this study, we focus on analyzing the essential attributes of sports, combining the characteristics of different sports groups and matching them with users' health needs, until we find the sports that are suitable for users' participation, so as to cultivate users' interest in sports. Interest in sports and thus improve the physical quality of students.In the performance test of this system, the fastest login time is 0.04s, the fastest query time is 0.05s, the fastest logout time is 0.01s, the fastest submission time is 0.04s, the fastest modification time is 0.04s, and the fastest update time is 0.03s. Regarding the satisfaction of using the system, teachers, students, and parents are more than 70% satisfied with the system.

References

Dalen-Lorentsen, T., Bjørneboe, J., Clarsen, B., Vagle, M., Fagerland, M. W., & Andersen, T. E. (2021). Does load management using the acute: chronic workload ratio prevent health problems? A cluster randomised trial of 482 elite youth footballers of both sexes. *British Journal of Sports Medicine, 55*(2), 108-114.

Dong S , W. Z. (2018). Research on the Application of Big Data in Sports and Health Field. *Bulletin of Sport Science & Technology*.

Jiang G P , D.-W. L. I. (2018). Research on the Establishment of Health Service and Management Direction in Sports Majors in Colleges and Universities——Taking Harbin College as an example. *China Winter Sports*.

Li X , Y. L., Section P E. (2016). Research on Sustainable Development Mode of Sports Health Community in Colleges And Universities. *Bulletin of Sport Science & Technology*.

Q, Z. S. (2016). Construction of University Campus Sports and Health Management Service System. *Journal of Weinan Normal University*.

Ren, L., Sun, L., & Shi, J. (2019). *Research on college teachers' group life style and sports health management from the perspective of great health*. Paper presented at the BASIC & CLINICAL PHARMACOLOGY & TOXICOLOGY.

Rui Y , J. A. (2015). The Development and Application of Sports Health Management Network Platform. *Electronic Test*.

Shen, S. (2022). Multi-attribute decision-making methods based on normal random variables in supply chain risk management. *Applied Mathematics and Nonlinear Sciences, 7*(1), 719-728.

Sun, L., & Li, M. (2021). Sports and health management using big data based on voice feature processing and internet of things. *Scientific Programming, 2021*.

Taskinen R , L. T. A., Kunnonpaikalle K (2017). Thesis abstract field of study social services, health and sports degree programme management and development education programme for healthcare professionals author *riikka taskinen title of thesis equal opportunity plan: spa hotel kunnonpaikka*.

Wu, X. (2017). Research and implementation of the mobile application of personal sports health management based on behavior recognition. *AGRO FOOD INDUSTRY HI-TECH, 28*(1), 2615-2620.

X, L. (2015). Research on Scientific Leisure Sports in Universities from the Perspective of Health Management. *Bulletin of Sport Science & Technology*.

Xie, L. (2019). *Design and implementation of college sports health education management system*. Paper presented at the BASIC & CLINICAL PHARMACOLOGY & TOXICOLOGY.

XIONG, M.-N., & MO, L.-Q. Research on Thinking and Governance of Sports and Health Management for College Students from the Perspective of Life Philosophy.

Yang, H., & Han, X. (2021). National sports AI health management service system based on edge computing. *Wireless Communications and Mobile Computing, 2021*, 1-12.

Yong W , X. X., Wen Z (2015). Construction And Management Of Information System Platform Of Students' Sports And Health In College. *Journal of Anhui Sports Science*