Real-time water quality prediction model based on variance statistics and measurement of college students’ physical health

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Received: 4 June 2021 / Accepted: 15 July 2021 / Published online: 5 August 2021
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Abstract
In the application of real-time water quality prediction model based on variance statistics and college students’ physical health measurement, when changes are detected, there is almost no possibility that all quality characteristics will change at the same time. In other words, the drift term may only occur in a few elements of the covariance matrix, which leads to sparsity. This paper presents an adaptive lasso multivariable exponentially weighted moving covariance statistical management chart (alewmc) based on sparsity. The pollution of water environment has seriously affected the normal life of human beings, and the real-time water quality prediction model has become the main problem of water environment treatment. In the process of water bloom formation, many uncertain factors are involved, so it is difficult to effectively model and predict the mechanism of real-time water quality prediction model with mathematical methods. In recent years, in the research process of real-time water quality prediction model, many scholars at home and abroad have studied from the mechanism of real-time water quality prediction model and real-time water quality prediction, and have achieved certain research results, which makes real-time water quality prediction become one of the focuses of real-time water quality prediction model. At the same time, for the calculation of college students’ physical health, the development of youth sports has always been highly concerned by the country. How to promote youth sports work, improve young people’s physique, enhance health, and promote the healthy development of young people are the focus of future sports.

Keywords
Variance statistics · Real-time water quality prediction · College student · Physical health measurement

Introduction
With the rapid development of computer technology, distributed statistical management processes are more and more closely related to computer technology, and its application scope and degree are more and more extensive. In the process of decentralized statistical management, the most important thing is to make management chart, which is used to manage the production process (Koycegiz and Buyukyildiz 2019). Management chart can directly reflect the changes of product quality in manufacturing process, and it is an objective record of product quality. The management chart is mainly used to analyze, judge, detect, record, and evaluate the quality characteristics of products in the manufacturing process, and judge whether the manufacturing process is managed. In the process of distributed statistical management, in order to judge whether the quality characteristics of variables have changed, it is usually used to investigate the statistical characteristics of variables, such as mean, variance, range, and so on. Water is an important medium for human beings to live on the earth. It is not only the carrier for the circulation of various substances in the environment in nature, but also the condition for the existence of life on the earth (Kurt et al. 2003). However, when the environment has been destroyed and various human behaviors lead to serious eutrophication in a large area of water, it is a difficult problem of water environment governance in the world. According to the relevant data, at present, more than 3/4 of the closed water bodies in the world have the problem of eutrophication, and the real-time water quality prediction and treatment method is imminent. Therefore, the main
research work of this paper is to establish the prediction model of water bloom through intelligent prediction algorithm and computer technology, and predict according to the factors and indicators of water bloom. This prediction provides some references for the prediction and early warning of water blooms, as well as for further management. It also provides some new ideas for the study of water blooms in rivers. At the same time, the research results of this paper bring positive effects for the further development of intelligent technology. Now, the research on the method of water bloom prediction mainly starts from two aspects. One is based on the mechanism of water bloom, including many ecological variables and uncertain parameters. On the other hand, it is an intelligent modeling method based on artificial neural network (Miao et al. 2010). One of the advantages of this method is that it can deal with highly nonlinear problems and has its own information processing and computing functions. It is very suitable for nonlinear problems with unclear mechanism. This method has been widely used in the study of water bloom prediction in recent years (Ortiz and Roser 2006). How to calculate the physical health of college students is one of the hot issues concerned by the government, universities, and society. The exploration of physical education reform around improving students’ physical health has never stopped (Yalcin et al. 2016). Under the influence and promotion of the concept of quality education, many colleges and universities in China have accelerated the pace of physical education curriculum reform (Patyk-Kara et al. 2001). In addition to improving the optional physical education curriculum and health care physical education curriculum, expanding the content of physical education curriculum and health care physical education curriculum has become the development trend of physical education teaching. This paper attempts to compare the physical health measurement of college students by three intervention teaching. This paper attempts to compare the physical health measurement of college students by three intervention methods of physical education development curriculum, development + traditional physical education curriculum, and traditional physical education curriculum through teaching experiments, so as to provide a theoretical and practical basis for the reform of physical education curriculum in Colleges and universities (Ozturk and Arici 2020).

In the early stage of the research, according to the correlation between the key indicators of the water body of the water source and the water pollutants, based on the in-situ automatic monitoring data of the water body of the water source station of s Prefecture, the on-line detection data of real-time water intake, the historical data of the laboratory, supplemented by environmental related data, empirical data, other calibration data, etc, the multidimensional vector water quality information of a specific water body is established. The system model can intelligently analyze the multi parameter water quality monitoring data. Therefore, the water quality monitoring data sources involved in the model include in-situ monitoring data and laboratory data realized by buoy in s state water source. Among them, the laboratory data is more accurate than the monitoring data of buoy in s state and the online monitoring data of water resources and water department (Tomlinson et al. 1980). Therefore, in the process of practical application, the data of the other two data sources are calibrated by using the laboratory data as the standard.

According to the determination of model index, the sample database is preprocessed. The sample bank is the real data collected by monitoring and collecting according to the actual water source, but it is because of the authenticity of this data that there is no uniform standard for the simulation and prediction of the model, so the data analysis and processing work is carried out. The data of water source is collected and uploaded according to different time periods. Therefore, the data of the same day may contain 4 groups of data or more, and the data quantity in each day is different. This requires the data of the sample library to ensure that the data quantity owned every day is consistent, so the first step of data processing is to average, that is, weighted average the samples with multiple sets of data of every day, so that there is only one set of data every day, which makes it convenient to prepare for the next step of data modeling.

Material and methods

Data source and preprocessing

There are many factors influencing the outbreak of water bloom. In order to predict and simulate the occurrence of bloom as accurately as possible, we must select the parameters closely related to the mechanism of bloom production from various indexes, analyze the occurrence rules, and propose a quantitative definition suitable for the prediction of water bloom (Srinivasa et al. 2010).

Maximum likelihood estimation is the most common method to estimate covariance matrix of multivariate normal distribution (Van der 2000). However, in multivariate normal distribution, if the sample size n is less than dimension P, that is, if the unknown number is larger than the sample size in the process, the MLE is no longer useful. Therefore, covariance matrix of multivariate normal distribution Ω. The least likelihood estimation of inverse matrix of the need to be explained according to different situations μ and Σ. The maximum likelihood estimation formula is as follows:

$$L(\hat{\mu}, \hat{\Sigma}) = \max_{\mu, \Sigma} L(\mu, \Sigma)$$  (1)
Therefore, the likelihood function can be written as:

\[ L(\mu, \Sigma) = f(x_1, x_2, \ldots, x_n) = \prod_{i=1}^{n} f(x_i) \]

\[ = \left[ (2\pi)^n |\Sigma| \right]^{-\frac{1}{2}} \exp \left[ -\frac{1}{2} \sum_{i=1}^{n} (x_i - \mu)^\prime \Sigma^{-1} (x_i - \mu) \right] \]

(2)

From Formula (2), we can get that the logarithmic likelihood function is:

\[ l(\mu, \Sigma) = -\frac{pn}{2} \log 2\pi - n \cdot \log |\Sigma| - \frac{1}{2} \sum_{i=1}^{n} (x_i - \mu)^\prime \Omega (x_i - \mu) \]

When \( n > P \), we can get \( \mu \) and \( \Sigma \). The maximum likelihood estimator of \( \mu \) is:

\[ \hat{\mu} = \mathbf{x} \]

\[ \hat{\Sigma} = \frac{1}{n} \sum_{i=1}^{n} (x_i - \mathbf{x})(x_i - \mathbf{x}) \]

(4)

Starting from Eq. (3), random vectors \( X_1, X_2, \ldots, X_n \). It is a normal population \( \Sigma \mu \). The likelihood function of the inverse matrix of the independent distribution covariance matrix in \( \Omega = \Sigma^{-1} \). It can be as follows:

\[ l(\mu, \Omega) = -\frac{pn}{2} \cdot \log 2\pi + \frac{n}{2} \cdot \log |\Omega| - \frac{1}{2} \sum_{i=1}^{n} (x_i - \mu)^\prime \Omega (x_i - \mu) \]

(5)

Since \( a = -\frac{mp}{2} \cdot \log 2\pi \) constant, Eq. (5) can be approximately written as:

\[ \log(\mu, \Omega) = \frac{n}{2} \cdot \log |\Omega| - \frac{1}{2} \cdot \sum_{i=1}^{n} (x_i - \mu)^\prime \Omega (x_i - \mu) \]

Equation (6) is simplified as follows. The maximum Formula (6) is the same as the minimum formula:

\[ \frac{-2}{n} l(\Omega) = -\log |\Sigma| + \text{tr} \left( \Omega \Sigma^{-1} \right) \]

(7)

If the dimension \( P > n \), the maximum likelihood estimation is no longer useful. Therefore, in order to better solve this problem, in order to obtain the sparse estimation of the inverse matrix of covariance matrix, several common methods are proposed. The basic idea of L1 normal method is to make penalty rules according to the most likely presumption and limit the parameters to make the results meet the sparseness. Here, we will introduce several common analytical methods, using L1 method to solve covariance matrix.

### Time-series ARIMA model design

The construction of time-series ARIMA model will be completed by Minitab software. Minitab, as a professional statistical software for data analysis, has very strong data processing ability and trend prediction ability, and has the advantages of strong operability, simple, and fast. It has wide application space in various fields, which can effectively deal with statistical monitoring data and provide scientific guidance for solving practical problems.

In this chapter, mean square error (MSE) and mean absolute error (MAA) are used to evaluate the prediction function of the model.

\[ MSE = \frac{1}{n} \sum (y - \hat{y})^2 \]

The formula is the value of measured number, the value of predicted number, and the value of sample number. This paper mainly calculates the mean absolute error of the model as the main basis for evaluating the accuracy of the model.

### Selection of water quality indicators

(1) Ammonia nitrogen: excessive ammonia nitrogen content will cause water eutrophication and consume a lot of oxygen. This is not conducive to the survival of fish and some aquatic organisms. At the same time, ammonia nitrogen is also a nutrient, which plays a positive role in the water. (2) Total nitrogen: the total amount of various forms of inorganic and organic nitrogen under water. As an important water quality monitoring index, it reflects the total content of nitrogen in water. (3) Total phosphorus: a certain amount of phosphorus in water can promote the growth of algae, but once the concentration exceeds the standard, it will cause eutrophication of water body and lake, and produce peculiar smell, which is not conducive to the growth and development of aquatic organisms. Domestic sewage, chemical fertilizer, and organophosphorus pesticide contain a lot of phosphorus. Excessive discharge will cause a series of serious consequences. (4) Dissolved oxygen: it is closely related to the self-purification ability and water cleanliness. The molecular form of oxygen dissolved in water is called do. (5) Chemical oxygen demand: COD reflects the degree of organic pollution in water. It is widely used in water quality monitoring, industrial production, sewage treatment, and other fields. It is an important indicator of organic pollution parameters.

### Calculation method of college students’ physical health

In this paper, five colleges and universities in full-time undergraduate physical health test data as the research object, the
full-time undergraduate physical health test data, and results of five years of college students were extracted and analyzed. This study compared the physical health test results of undergraduates from five selected universities in 2016, 2017, 2018, 2019, and 2020. In other words, the overall body changes of undergraduates in five universities were analyzed and investigated. In this paper, the actual measurement data results, interview data results, reading a large number of literature, logical analysis, the university students’ physical status and development strategy, and the past research results are combined for analysis.

Results

Water quality prediction and result comparison

Based on the analysis results, the scores of the three principal components were calculated, and the time sequence diagram was constructed to observe the changes of water quality (Fig. 1).

According to the sequence diagram 1 and Figure 2, and comparing the environmental quality standards of surface water, we can get the water quality changes of each pollution index from 2016 to 2020. The observation shows that the range of ammonia nitrogen change is very large, and the concentration of ammonia nitrogen seriously exceeds the standard, which is inferior to the standard of class V water. Only a few months of ammonia nitrogen content can reach the standard of class V water. The variation range of total nitrogen is smaller than that of ammonia nitrogen, but the exceeding standard of total nitrogen is more serious. When the total nitrogen content is the lowest, it is also the highest than the concentration of class V water, reaching the standard of inferior class V water. The content of total phosphorus was relatively stable before the end of the 18th year, and the fluctuation range was small. When the content was the highest, it could reach the standard of class III water. However, in the 19th year, the content of total phosphorus increased suddenly, and the change range was very sharp, and its concentration hovered between class V water and inferior class V water. The change range of permanganate index is low, and it can reach the standard of class IV water when the value is the highest, but the permanganate index is lower in the past 6 months, reaching the standard of class III.

After the completion of the model, the ammonia nitrogen and COD index data are imported again, and the matlab code is run to get the predicted values of ammonia nitrogen and COD index. The comparison between the predicted values and the actual values is shown in the figure below.

It can be seen from the prediction results in Figure 3 that the ammonia nitrogen index will gradually increase in the short term and slightly decrease, and the overall pollution degree of ammonia nitrogen is still very serious. The predicted values of 39, 40, 41, and 42 are 8.271363513090519, 8.152982165818346, 7.02032177467892, and 7.131123740921300 respectively.

It can be seen from Figure 4 that the level of COD continues to decline. Compared with the water environmental quality standard, the level of COD is class IV water or above. The pollution degree of COD in Sanchuan River is low, and it has gradually improved in recent years. The predicted values of 39, 40, 41, and 42 are 28.454366603089497, 25.529826817137511, 26.29061855661449, and 27.049947736197577 respectively.
Prediction of phytoplankton water pollution based on chlorophyll

In order to facilitate the comparison and make full use of the historical data provided by the water sources, similar to the prediction modeling of the artificial neural network in Chapter 2, the selected sample data is also trained and predicted for 2 years, and a group of data is sampled every day. After determining the input and output nodes of the network model, all the data in the water bloom prediction index system are normalized to meet the data requirements of support vector machine network modeling. The change of chlorophyll content in 736 sets of data in the past two years is shown in Figure 5.

Therefore, the change value of chlorophyll content in the normalized sample data is shown in Figure 6:

In the process of modeling, the training function is svmtrain. The penalty factor C and kernel function parameter g involved in this function are arbitrarily given at the beginning of modeling or given by relevant experience. However, in order to select the best set of C and G parameters, and then use cross validation, we can find the best value of C and G in a certain sense.

Among them, based on the 1-day libsvm water bloom prediction model, cross experiment method is used to select the optimal C and G higher line diagram under certain conditions, as shown in Figure 7.

In selecting different time intervals for simulation prediction of water bloom, the prediction curves after 1 day, 2 days, 5 days, 7 days, and 10 days are shown in Figures 8–12, where the ordinate is Chla content, unit: mg/L, abscissa: the number of predicted samples.

The prediction curve of libsvm model (after 1 day) is shown in Figure 8.

The prediction curve of libsvm model (2 days later) is shown in Figure 9.

The libsvm model forecasts the curve (5 days later) is shown in Figure 10.
The prediction curve of libsvm model (after 7 days) is shown in Figure 11.

The prediction curve of libsvm model (after 10 days) is shown in Figure 12.

According to the time-series characteristics of water bloom occurrence, the original information is granulated, that is, the chlorophyll content is extracted as an information grain with 10 days as a granulation window. Figure 13 shows the change of chlorophyll content in water during this period. And Figure 14 shows the change graph of the training set after granulating by using triangular fuzzy particles with 10 days as a window.

### Analysis of college students’ physical health measurement results

We generally believe that the shape of the body bone is a basic form that mainly reflects the external and internal of human beings, that is to say, it can objectively reflect the normal nutritional metabolism of the human body at all stages of growth. For an all-around person, the ratio of basic height to weight should be kept in a proper range. Moreover, the measurement of body height is related to body shape and obesity. Students of the same school age, due to their eating habits, nutritional conditions, and participation in sports and other factors, will lead to varying degrees of obesity, or affect the continued development of the body.

Due to the rapid development of economy, people’s life and quality have been improved and people’s diet structure, nutritional conditions, and other aspects have undergone tremendous changes, so that the problem of obesity has attracted more and more attention. Similarly, the problem of students’ obesity is gradually emerging, and the number of obese students is also on the rise. Therefore, it is necessary to monitor the weight of height standard. According to the regulations,
students’ weight standards are divided into four levels: normal, low weight, overweight, and obesity. See Table 1.

From the comparative analysis of the annual vital capacity of five college students in physical health test (Table 2), we can see that from 2016 to 2020, the vital capacity of male college students in D province first decreases and then increases: the average vital capacity of male college students in 2016 is 4445.98 m³, the average vital capacity of male college students in 2016 is 4276 m³, and the average vital capacity of male college students in 2017 is 4004.25 m³. The vital capacity of male college students is in a decreasing trend in the 3 years of 2016–2017. The average vital capacity of male college students is 4168.76 m³ in 2018 and 4216.14 m³ in 2020. In the 3 years of 2017–2020, the average vital capacity of male college students is gradually increasing.

From Table 3, we can see that from 2016 to 2020, the sit-up performance of female students has increased year by year, from the initial average of 33.72 in 2016 to the average of 33.31 in 2017, 34.76 in 2018, 34.73 in 2019 to the average of 35.28 in 2020; on the other hand, the male students’ pull-up performance is not optimistic. In 2016, the average score was 6.19. In 2017, the average score dropped to 5.32 per capita. In the next 3 years, it gradually increased. In 2020, the male students’ pull-up performance has increased to 5.96 per capita.
From the comparative analysis of the results of the five endurance running of the students in five colleges and universities in 2016–2020, we can see that the results of the endurance running of male students and female students present a wavy change, but the overall score exceeds the pass line, and there is no special change (Table 4).

**Discussion**

**Internal influencing factors of college students’ physical health**

Reasonable dietary structure and regular daily life are the most basic conditions to ensure human health. Nutrients play an important role in the process of human life. Human nutrition activities are inseparable from the supply of nutrients. Human nutrition intake is an important factor affecting human health. Reasonable nutrition supply is not only the basis of human life activities, but also an important factor affecting human health and quality. Healthy and reasonable nutrition is the basis to ensure the balanced nutrition supply of human body. Through balanced diet, reasonable nutrition collocation, and regular eating habits, the nutrition intake of human body can basically be in a reasonable state (Abanuz 2019). Through the interview, we know that some college students cannot do regular work and rest after they enter the relatively free university environment from the unified regular work and rest environment of high school. The problems of not having breakfast, eating irregularly, being particular about food, and so on make college students’ eating habits and nutrition intake problems. The failure to ensure a reasonable diet leads to obesity, lean, malnutrition, and other problems in universities. Do not eat breakfast and eating irregular behavior will affect the digestive system of the human body: the stomach is often in a state of over inflation and hunger, so that the digestive system disorders and digestive system’s inability to absorb nutrients lead to lack of nutrition and physical health decline. The bad work and rest habits of college students lead to the decline of their physical health. As for whether there is a regular work and rest habit, most of the students interviewed said that the work and rest time is affected by the curriculum arrangement, “unless there is an eight o’clock morning class. Otherwise, I seldom get up early.” A small number of students interviewed said that they had regular work and rest every day and carried out according to the plan every day. After college students enter the relatively free university environment from the unified regular work and rest environment of senior high school, their

| Grade     | Score | University | Schoolgirl |
|-----------|-------|------------|------------|
| Normal    | 100   | 17.9–23.9  | 17.2–23.9  |
| Low weight| 80    | ≤17.8      | ≤17.1      |
| Overweight| 24.0–27.9 | 24.0–27.9  |
| Obesity   | 60    | ≥28.0      | ≥28.0      |

**Table 2** Comparative analysis of vital capacity (ML) of five college students

| Year | Male     | Female   |
|------|----------|----------|
| 2016 | 4445.97  | 2988.38  |
| 2016 | 4276.13  | 2896.17  |
| 2017 | 4004.24  | 2698.87  |
| 2018 | 4168.75  | 2816.21  |
| 2020 | 4216.15  | 2865.05  |
academic burden is relatively reduced and their free time becomes more. Some students with low self-control will have bad habits such as smoking, drinking, staying up late, and playing games. Smoking and drinking is an important factor affecting human health, and staying up late accelerates the damage to human health. Staying up late for a long time can lead to problems such as low attention, mental depression, and decreased immunity.

The cognition of physical effects of college students is not proportional to their awareness of active participation in physical exercises

Regular participation in sports which promotes human health is well known to the public. Scientific and reasonable physical exercise can promote the physical health of college students, promote the development of the body, improve the level of sports skills, improve the sub-health status, and cultivate good-looking. The interview shows that most students recognize the promotion of physical exercise on human health, and think that regular participation in sports can improve their physical health, but their willingness to participate in sports activities is low. Only one person regularly carried out three sports activities with moderate and high intensity every week (the evaluation standard of sports population: there are 3 physical exercise frequency (including 3 times per week), the time of each physical activity is more than 30 min, and the intensity of each physical activity is above medium level. There are three people who have regularly carried out two physical exercises. Other interviewees often take part in one or two sports, or they do not participate in any sports except sports. The reason for most students’ obesity is that the lack of nutrition in daily exercise, coupled with excessive nutrition, that is, the energy consumption cannot be converted into fat storage, and the lack of physical exercise is also an important reason for the health decline.

The interview and investigation show that college students affirm the promotion relationship between sports and health, but they lack the consciousness of participating in sports seriously, they are inert, lack of perseverance, unable to self-supervision, and cannot grasp the actual situation and guidance about their physical health.

The motivation of college students to participate in sports activities is insufficient

As the saying goes, “interest is the best teacher of people.” Only by generating interest can the love of things remain unchanged. The interest is sports is the need of students to explore sports activities, promote the priority cognition of physical exercise, and actively participate in physical learning and fitness exercise. The survey shows that more and more college students take part in physical exercises, not because they are interested in and fond of sports, but because they are dealing with the tasks of physical health examination and school physical education. Therefore, students’ participation in sports exercise is not ideal for sports effect and is not good for forming good exercise habits (Asan and Erturk 2013). Even the students interviewed said, “if not for the physical test requirements, I will not actively propose to exercise in my life, whether the game is not fun or the TV play is not good-looking.” Sixteen students interviewed expressed their willingness to participate in sports activities, but they could only run or walk fast because of their lack of sports skills. Twenty-one of the students interviewed said that if they had certain sports skills, they would prefer to participate in sports activities. Through interviews, we can see that mastering some sports skills is conducive to promoting students’ participation in sports activities.

Other online entertainment activities occupy too much spare time for College Students

In this era of modern network information, the Internet has become an indispensable part of modern people’s daily life (Barkett and Akin 2018). Online games have even replaced outdoor online game mode as the main leisure activities in people’s daily life style, which makes human’s “action ability” gradually retreat from the forward to the backward, hand and eye TV become the most common “tool,” and the long-term use of online games makes people’s vision significantly decline. More than half of the students interviewed played video games, including large online games and fun games. Students spend a lot of time on the Internet occupies the rest
time of the school, which leads to the students’ lack of sleep, physical and mental fatigue, and the mental failure to concentrate normally, and the pressure of study and life is increasing constantly. This vicious circle seriously affects the normal health of students. Nowadays, many college students are occupied by video games after class. Long sitting for a long time will damage the health of college students. The double side effects make the physical health of college students worried. In addition, Internet pornography also indirectly affects the physical health of college students.

**External influencing factors of college students’ physical health**

**Reflection on the impact of the policy on the physical health of Chinese students**

In the 40th anniversary of reform and opening up, great achievements have been made in our country’s social economy and education. In the analysis of the reform and development of school education, school sports policy plays a very important role. School physical education policy is a basic tool and way to manage national physical education. It directly regulates and guides the reform and development of school physical education. Any school sports policy is used to carry out a school sports reform, reorganize some school sports resources, or solve some school sports problems (Cardona et al. 2005). The perfection of school sports policy, the quality of making school sports policy, the effectiveness and implementation of school sports policy, and the effect of counter-circle and problem solving in the implementation of school sports policy will have an impact on the reform and development of school sports education, and further affect the level and results of students’ physical education.

**Reflection on the influence of society on the physical health of Chinese students**

With the rapid development of China’s economy and society, people’s concept of moderate sports to promote human health is more and more recognized. In addition, people’s living conditions are getting better and better. After the economic situation has improved, people’s enthusiasm to participate in sports activities is also getting higher and higher. In all regions, whether it is community sports venues or gymnasiums, fitness clubs, and other places, people of different groups and ages can be seen to participate in sports activities. Their recognition of sports value makes them more and more actively participate in sports activities, so as to improve their physical condition and quality of life. This kind of recognition and publicity of sports also affects the attitude of students to participate in sports activities (Cengiz et al. 2017).

Now all kinds of social media and network media publicity also affect students’ sports values. At this stage, students have a higher acceptance of new things. Healthy, positive, and upward sports values publicity is conducive to the formation of students’ correct sports values (Dzhamalov et al. 2012).

The improvement of college students’ physique not only depends on the efforts of the school, but also needs the coordination of the society. In recent years, people do not know much about the related fitness knowledge, which leads to excessive and wrong sports activities damaging their own health. At present, most of the social sports instructors and volunteers have different levels of professional ability, and the personnel structure is incomplete. Most of them are middle-aged and old people, and most of them are women. They lack young social sports instructors and cannot guide young people’s interests. The allocation of mass sports venues is not perfect, which cannot meet the needs of people for sports activities. Some fitness clubs and gymnasiums charge high fees, and some people are unwilling or unable to bear the expense. In the community, the equipment in public sports venues is not perfect, which cannot meet the needs of residents for sports activities. Even if there are related sports venues, they are also occupied by the elderly in fitness, such as basketball court and tennis hall. Young people lack sports venues in the community (Eisler 2004). Although the number of sport venues for Chinese residents has increased in recent years, it still cannot meet the fitness needs of residents. How to play the role of large stadiums and sports clubs is an aspect we need to consider (Gao et al. 2011).

**School reflection on the influence of Chinese students’ physical health**

Foreign scholars have conducted a 9-year longitudinal study on all the students born in a school from 1990 to 1992. The purpose is to study the long-term effects of long-term physical exercise on motor skills and school performance. The results show that, during the period of compulsory education, daily physical education and appropriate sports skills training can not only improve the sports skills, but also increase the proportion of students who become gold and enter high school. Physical exercise can improve students’ cognition and academic performance. In China, except sleep time, most of the non-sleep time is spent in school, about 7 or 8 h. College students are more special (Eren et al. 2004). They spend about 9 months in a year living in school. School is a favorable place for students to participate in sports activities. Physical education is a course based on educational knowledge, technology, and sports, which aims to improve students’ physical quality. Physical education is a kind of physical education process based on physical activities and an educational process based on improving physical quality. Physical activity in a certain
form follows certain rules of movement, and it needs some technical ability to support.

**Strategies for students to take the initiative to improve their physical health**

**Students actively adjust their diet structure to nutrition balanced type**

Balanced diet structure is the basic factor of healthy constitution. At present, colleges and universities are surrounded by snack bars, and the convenient take out service makes college students have more choices. Canteen dishes are simple and tasty, and most university canteens have fixed dining time. Students will miss the meal time due to their work and rest habits, participation in activities, and other reasons. Many factors combined to promote college students to choose more takeout (Horasan and Arı 2020). However, due to economic constraints, students tend to choose more affordable food when they take out. These affordable food will have the problem of heavy oil and salt in order to taste delicious, and most of them are high-carbon water food with less nutrients: generally, the price of nutritious and healthy takeout food is also on the high side, and most students cannot try to order (Horasan and Arı 2019).

If students want to improve their physical health, they should first pay attention to diet and nutrition. It is suggested that students should choose the school canteen to eat and balance all kinds of nutrients. In addition to ensuring the most basic food safety problems, food at the same price is more nutritious than takeout. In addition to ensuring a reasonable diet structure, students can also form regular eating habits.

**Students take the initiative to form good work and rest habits**

In high school, students are under great pressure to study and work, and their schoolwork is heavy. In school, students are prone to sedentary lifestyles, less activity time, irregular diet, and other problems (Kadir and Karakas 2000). After entering the university, students’ schoolwork pressure is reduced, and they have more free time to control except the daily class time. However, students’ psychological state has not yet changed, and some unhealthy work and rest habits formed in high school still affect students’ physical health. Therefore, during university, students need to change the original fixed single work and rest habits, correct sedentary lifestyle, lack of exercise, unhealthy diet, unsound interpersonal relationship, psychological pressure, and other problems. First of all, students need to pay attention to the importance of sports activities: participation in sports activities can not only promote exercise and physical health, but also is an effective way to communicate with students. In addition to physical education curriculum requirements, students must master a basic skill that can persist in sports for a long time, which is helpful for students to persist in sports after graduation, which is also helpful for them to persist in learning and realize the goal of lifelong sports.

**Conclusion**

With the rapid development of economic globalization, the real-time water quality prediction model based on scattered statistics and college students’ health status measurement is more and more attractive. Therefore, in order to deal with the quality problems in the production process, the use of statistical technology for measurement becomes more and more urgent, and the role of decentralized statistics is becoming more and more significant. An adaptive lasso multivariate exponentially weighted moving covariance matrix management chart (alewmc) is proposed to detect the drift, analytical covariance matrix in the process of statistical quality management. In this paper, according to the three kinds of data sources provided by water source, the index system of water bloom prediction is obtained after correction. Two intelligent methods of neural network and support vector machine are used to study and discuss the water bloom prediction method of water source. The system established the short-term prediction model of water bloom based on neural network and the short-term prediction model of water bloom based on support vector machine. At the same time, they were respectively applied to the prediction of water bloom in water source areas. Through comparative analysis, the simulation model with better prediction effect was obtained, and the effectiveness of theoretical research was verified. At the same time, this paper also uses. Net platform and related technologies to develop a real-time water quality monitoring and intelligent early warning system. Finally, the real-time water quality prediction model based on the variance statistics and the measurement of college students’ physical health also show a trend of decline and recovery in the past 5 years. The students’ body shape, especially the index of height and weight, is gradually increasing. The index of students’ physical function and quality has also been improved. Students’ physical health is negatively affected by the following factors: the imbalance of students’ main food structure, irregular work and rest habits, the lack of awareness of the impact of sports on health and active participation in physical exercise, the lack of motivation to participate in sports activities, and more time for online entertainment.

**Funding** The research in this paper was supported by the following Shaanxi Provincial Education Department Project:

1. Key scientific research project of Hunan Provincial Department of Education (19A204).
2. project of Hunan Social Science Achievement Evaluation Committee (NO. XSP20YBC195).
3. Research achievements of Hunan Education Science 13th Five-Year plan (XJK20BTW00).
Declarations

Conflict of interest The authors declare no competing interests.

References

Abanuz YG (2019) Application of multivariate statistics in the source identification of heavy-metal pollution in roadside soils of Bursa, Turkey. Arab J Geosci 12:382. https://doi.org/10.1007/s12517-019-4545-3

Asan K, Erturk MA (2013) First evidence of lamprophyric magmatism from the Konya Region, Turkey: a genetic link to high-K volcanism. Acta Geol Sin 87:1617–1629

Barkett MO, Akün E (2018) Heavy metal contents of contaminated soils and ecological risk assessment in abandoned copper mine harbor in Yedidalga, Northern Cyprus. Environ Earth Sci 77:378. https://doi.org/10.1007/s12665-018-7556-6

Cengiz MF, Kilic S, Yalcin F, Kilic M, Yalcin MG (2017) Evaluation of heavy metal potential in Bogacayi River water (Antalya, Turkey). Environ Monit Assess 189:248. https://doi.org/10.1007/s10661-017-5925-3

Koycegiz C, Buyukyildiz M (2019) Temporal trend analysis of extreme precipitation: a case study of Konya Closed Basin, Pamukkale. Univ J Eng Sci 25(8):956–961

Kurt H, Özkan M, Koçak K (2003) Volcanic rocks are associated with subduction in the west of Konya in central Anatolia geotectonic, petrographic and geochemical. Geol Bullet Turkey 46:39–51

Miao C, Ni J, Borthwick AGL (2010) Recent change in water discharge and sediment load in the Yellow River basin. Geol Prog Phys Geogr 34:541–561. https://doi.org/10.1177/0309148510381891

Ortiz E, Roser BP (2006) Major and trace element provenance signatures in stream sediments from the Kando river, San’in district, Southwest Japan. Island Arc 15:222–238

Ozturk A, Arici OK (2020) Cenozoic anthropogenic ecological risk assessment of soils and wheat in the eastern region of Konya (Turkey). Environ Sci Pollut Res 27:15371–15484. https://doi.org/10.1007/s11356-020-10917-8

Putyrk-Kara NG, Chepukauskis V, Bardeeva EG, Shevelev AG (2001) Mineralogy of placer deposits: modern approaches and solutions. Lithol Mineral Resour 36:393–405. https://doi.org/10.1023/A:1012303829538

Srinivasa GS, Reddy MR, Govil PK (2010) Assessment of heavy metal contamination in soils at Jajmau (Kanpur) and Unnao industrial areas of the Ganga Plain, Uttar Pradesh, India. Hazard Mater 174:113–121. https://doi.org/10.1016/j.hazmat.2009.09.024

Van der Oever F (2000) Aruba—a geochemical baseline study. Geologie en Mijnbouw/Netherlands J Geosci 79:467–477

Yalcin F, Kilic S, Nyamsari DG, Yalcin MG, Kilic M (2016) Principal component analysis of integrated metal concentrations of Bogacayi riverbank sediments in Turkey. Pol J Environ Stud 25(2):471–486. https://doi.org/10.15244/pjoes/61009