Research Article

Research on College Students’ Physique Testing Platform Based on Big Data Analysis

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With the progress of the times, people’s living standards have significantly improved, gradually put physical health in the first place, college students as the country’s future talent reserve, its physical health development is particularly important. But for a long time, the physique level of college students has failed to reach the standard, and universities are exploring ways to improve the physique level of college students. In view of the existing deficiencies in the monitoring platform of student’s physique, we fully utilize the advanced technology of computer and Internet development and follow the basic principles of economical practicality, scalability, user-friendliness and real-time information exchange to establish monitoring and service platform for college students’ physique. With the aid of the thinking mode of big data and related technology, build the physical health of college students in China big data analytics platform framework, physical health of large numbers of college students in China are put forward according to the analysis platform construction principle, data source, data handling, data platform and application platform, etc., in order to guide the physical health of college students practice in our country, to promote the reform of physical health education for students in colleges and universities. By using big data analysis technology, 65,535 physical health records of all students in a university from 2017 to 2019 were recorded as data sources, and algorithm based on distance was applied to cluster analysis of two groups of data classified by male and female gender, and a series of data were processed, converted, and modeled.

1. Introduction

With the gradual abundance of material life, people’s living standards have been greatly improved, and physical health has become a common topic of concern. In the concept of “physical health,” the emphasis is on understanding the connotation of “physical health.” The formation of constitution combines innate heredity and acquired function, which is a relatively stable characteristic of human body in form and function. In addition to the development level of body form, physical quality, athletic ability, physiological and biochemical function level, it also includes adaptability and psychological state [1].

As a special group of society, college students are the representatives of youth and vitality, are important national talent resources, shoulder the responsibility of promoting social progress, so the physical health of college students is particularly important. At present, the overall physical health level of college students is worrying, showing a declining trend year after year. Although the height, weight, chest circumference and other body shape development indicators of college students increase year by year, most of them have weak awareness of physical exercise, declining physical quality, athletic ability and physiological and biochemical function, poor adaptability to the environment, and poor psychological state. Taking the lung capacity of college students from 1985 to 2014 as an example, the data show that the mean lung capacity has been declining. Although it has improved after 2005, it is still not as high as that in 1985 [2].

There are many reasons for this situation. In order to promote the development of college students’ physical health, it is necessary to recognize the problems existing in the development process.

The investigation of college students’ physical health level can help colleges and universities and educational
management departments to grasp the development level and changing trend of students' physical health in time, and also enable college students to recognize their physical health status [3]. In recent years, various universities in order to seriously implement the “national students physical health standard” (NSPHS), every year on college students' physical fitness test, based on the test data input, report management, most of the college has also established a special platform to manage college students' physical test data, but only rely on an annual fitness test is very difficult to comprehensive measure the physical health of college students Information such as health status, students' daily exercise status, physical education course learning status and daily diet can be used as effective data to reflect students' physical health development, but these data have not been effectively used.

In addition, the traditional physical health survey of college students often adopts sampling survey and questionnaire survey, and the data source is relatively single and scattered, which inevitably leads to the one-sidedness of the survey results. And traditional investigation mode corresponds to the amount of data storage, management and analysis of relatively small, the rapid growth of the huge amounts of data today, the number of college students increases year by year, relevant data generated by the larger, the traditional physical health survey method is no longer adapt to such huge amount of data, so to play a role in the new survey method [4].

The promotion of students' physical health has always been an aspect of the school's close attention and development. In recent years, the students' physical health test has been carried out strictly in accordance with the National Standards (NS) for Students' physical health. However, the vast majority of physical health test data in colleges and universities are only “stored” in the way of database, and the “stored” data base is seldom mined and fully utilized. According to the survey, most colleges and universities process students' physical health data mainly through simple statistical analysis and reports, thus forming the "non-benign circle" of data mining deficiency, data analysis depth is limited, and related research cannot be used for health promotion [5].

In order to solve the above problems, in recent years, quite a number of scholars test data to the student physical health evaluation system are studied, such as, bateer, etc. On college students' physical health evaluation system and research and development of exercise prescription, ming-jun wang based on return and related analysis, such as physical health evaluation index weights relation with contribution to thinking. This kind of research has paid more attention to the evaluation methods and correlation analysis models of students' physical health results, but there are still some limitations such as a large amount of information contained in the database is buried, and the practical problems that can be solved are quite limited. In view of this, scholars began to consider using multivariate statistical methods to analyze and process the big data of physical health. Zhang et al. [6] established the grading model of students' physical health evaluation with the method of cluster analysis, and Li et al. [7] built the college students' physical health evaluation system based on Foxtable [8]. There are also related researches based on grey relational analytic hierarchy process and VLOOKUP function. Such researches have greatly increased the database mining and utilization rate, especially the research on scientific evaluation and analysis of data has substantial progress, but there is still a lot of space for data mining and practical application [9–11].

With the advent of the era of big data, the massive data and strong analytical ability of big data will provide more valuable possibilities for students' physical health promotion. In order to reveal the hidden, previously unknown and potentially valuable information from the massive fuzzy and noisy historical data in the actual application database, in order to make a comprehensive analysis of students' physical health data with advanced technology, Unearthed physical health level of different grade students of the physical characteristics of the project, how to use big data of relevance, depth and deep thinking way, provides more accurate student physique health promotion needs of scientific data to support, for university students' sports service policy setting and implementation to provide the reference basis [12].

With the development of big data and information technology, cloud computing and Internet of Things technologies are also emerging. The emergence of these technologies has changed people's way of thinking and life. In daily life, everyone's behavior will generate corresponding data in the cloud through electronic devices. With the geometric growth of data types and volumes, it has become a development trend to use data analysis and mining technology to provide personalized services for individuals and organizations. All kinds of universities, middle schools and primary schools across the country carry out physical health tests every year and keep a large amount of test information, accumulating a large amount of data over the years [13–15]. These data are often not well managed and integrated, so it is difficult to conduct further mining and analysis of the data. Now it is necessary to use the mobile Internet technology and smart devices, and applications of big data technologies, dressing for the physical health of Chinese students to provide a quick, scientific, standard and effective physical health management service cloud platform, let parents, teachers and students at any time with an understanding of the physical health of teenagers and movement situation, can also be for countries in view of the Chinese youth's physique health policy to provide accurate In order to improve the physical fitness level of Chinese teenagers. Therefore, it is of great significance to design and study the cloud platform of physical health testing.

The following paper organized as follows: Section 2 defines the key technologies of big data analysis of college student physique, and this section also discuss the network resource system and physical health archive system. Section 3 defines the data samples and model design. In this subsection discuss the clustering results of male and female. Section 4 concludes the article.

2. Key Technologies of Big Data

The key technologies of big data include data collection, preprocessing and storage, data analysis and mining, data privacy protection, etc. European and American countries
have included the research and use of big data into their national development strategies. Giant enterprises such as Google, Microsoft, Baidu and Amazon also regard big data technology as their lifeline and a key chip for future development. The cloud platform of physical health testing refers to the use of “Internet +” to achieve personal health management of students in physical health testing, that is, to complete the collection, statistics, scoring and analysis of physical data in the process of physical health management. In order to ensure the physical health test data quality, improving physical health test efficiency, applicable intelligent detection equipment, such as students in the life indispensable portable devices such as mobile phone, pedometer, accelerometer to record motion signs data (heart rate, calories, blood pressure, etc.) can also record the activist’s pace, distance and trajectory, etc., for the students in sports and finally Provide convenient management tools in daily life.

In recent years, with the booming development of the mobile Internet and the popularization of the Internet of Things, the application scenarios of big data technology are increasingly rich. “Big data” has become a popular word in the information technology industry. In his book “The Third Wave,” alvin Toffler, a famous futurist, praised big data as “the colourful movement of the third wave.” The establishment of data platform based on big data technology has become a new direction for colleges and universities to improve students’ physical health. So, what exactly is big data? Big data, or mega data, refers to the large volume, high growth rate and diversity of information assets that require new processing models for greater decision-making power, insight and process optimization. Specifically, we can understand the characteristics of big data technology from four dimensions: volume, velocity, variety and value density.

The overall structure system of physical health testing cloud platform includes cloud foundation platform, cloud service support platform and cloud application platform.

2.1. Cloud Base Platform. Cloud infrastructure provides storage, computing, network, and other basic computing resources for the health testing cloud service platform. As a supporting platform of Saas model, physical health testing cloud infrastructure can serve students and campaigners indirectly. The construction of cloud infrastructure for physical health testing includes cloud computer room construction, network system construction, cloud storage system construction, cloud host system construction, network security system construction, etc.

2.2. Physical Health Cloud Service Support Platform. Physical health cloud service platform for more than the number of users use frequency is high, in order to support the large-scale application of the Internet environment, meet the continuous extension of application software of sports services, need to build support cloud service platform, provide flexible deployment condition for upper cloud applications, at the same time to undertake other colleges of data integration and application integration, the upper interface supporting service and management, and to provide Quality health test cloud service platform operation monitoring and other support. Cloud service support platform provides effective support for mobile intelligent terminals to access public services.

2.3. Physical Health Cloud Application Platform. In order to enhance teenagers’ physique, promote health and provide scientific and technological service platform, we should mobilize all relevant forces in society to form a public service system of sports and physical health that combines science and effectiveness.

2.3.1. Network Resource System. Network resources system construction need overall planning, step-by-step implementation, based on the system characteristics of scientific fitness, make full use of network advantage, build up the service in all kinds of school students physical health test service to establish a scientific fitness public service center, relying on universities, research institutions, and social forces, production, collection and purchase of gathering all kinds of teaching resources, to support the transmission of all kinds of teaching resources Pass and share. The content covers exercise prescription, video teaching, health guidance, interactive Q and A, etc., focusing on the needs of teachers, students and parents, and providing them with all kinds of relevant resources and services.

2.3.2. Physical Health Archive System. Physical health records management is an important basic work. The content of the construction includes the construction of the national unified student physical health archives information database, and the realization of data integration and information sharing with the student status management system. Dynamic acquisition of multidirectional students in school sports performance data, data mining and analysis, to provide students physical health trend analysis.

2.3.3. Cloud Service Portal. Cloud service portal is a unified service window for different users. Portal is the carrier of all kinds of information services. Portal provides different application environments and personalized services for all kinds of registered users. The cloud service portal will use mobile Internet technology to support the access of all kinds of intelligent mobile terminals. At the same time, relying on the cloud service portal platform, online questionnaire survey can be carried out, and national physical health knowledge learning and self-testing can provide a more powerful platform for interaction and communication.

2.3.4. Constitution Monitoring and Management System. Through intelligent sports equipment and wearable devices, in all kinds of hardware and software integration system, the school actively promote physical health through intelligent hand ring, pedometer, heart rate belt, accelerometer, such as complete real-time data acquisition, through constitution
monitoring management system, make the broad masses of teachers and students and parents anywhere at any time to master the students’ sports physical data, and provide support for big data analysis.

2.3.5. Information Standard System. The public service system will establish a unified national information standard system covering information coding standards, technical standards, application standards, user specifications, information management and other aspects. Establish a national student physical health standard service platform.

2.3.6. Data Decision Analysis System. Build a cloud data decision analysis system, relying on the established cloud service platform and students’ physical fitness and sports information data, deeply dig and analyze students’ physical health rules and data, and provide real-time, authoritative and standard analysis reports for scientific guidance of students’ sports. Data analysis system needs to establish a set of mathematical models, calculation standards, analysis index system. The e-space EMS provides powerful customized report tools for management departments and managers. You can quickly customize statistical reports based on the requirements of management departments and query and analyze the comprehensive data.

3. Data Samples and Model Design

3.1. Data Preprocessing. Physical fitness data analysis is very important problem in kinematics and health sciences. Generally speaking, the original data contains too much noise data and incomplete data, which need to go through data cleaning, data screening, data processing and other processes. Data cleaning is a process of re-examining and verifying data to delete duplicate information, correct existing errors, and provide data consistency. For example, if the vital capacity in a record is “9999”, which is obviously abnormal, filtering conditions can be set to delete such data. The association between the total score of the physical health test and the significance degree of each test item is what this study requires, so the redundant fields such as year, grade number, class number, class name, ethnic code, date of birth and other fields are filtered and only the useful fields are left. Data processing is to process data into a form that meets the requirements of a specific data mining model. The scores of some items of male were counted through the statistical nodes, and the results were shown in Table 1.

The scores of some items of female were counted through the statistical nodes, and the results are shown in Table 2.

3.2. Statistical Anomaly Detection Method. Statistical method is one of the simplest and basic methods in anomaly detection, and its principle is also very easy to understand. The most commonly known distribution is the Gaussian distribution, which is used as an example to briefly describe the idea of anomaly detection based on statistics.

### Table 1: Score statistics of some items (male).

<table>
<thead>
<tr>
<th>Project</th>
<th>Avg</th>
<th>Min</th>
<th>Max</th>
<th>Std</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total score</td>
<td>61.060</td>
<td>11</td>
<td>115</td>
<td>8.880</td>
<td>35503</td>
</tr>
<tr>
<td>Vital capacity (m)</td>
<td>4356.36</td>
<td>1004</td>
<td>6564</td>
<td>861.068</td>
<td>35503</td>
</tr>
<tr>
<td>50m running</td>
<td>66.681</td>
<td>0</td>
<td>100</td>
<td>11.604</td>
<td>35503</td>
</tr>
<tr>
<td>1000m run score</td>
<td>63.40</td>
<td>0</td>
<td>100</td>
<td>15.348</td>
<td>35503</td>
</tr>
<tr>
<td>Standing long jump score</td>
<td>63.816</td>
<td>0</td>
<td>100</td>
<td>18.01</td>
<td>35503</td>
</tr>
<tr>
<td>Sit forward bending score</td>
<td>68.484</td>
<td>0</td>
<td>100</td>
<td>15.685</td>
<td>35503</td>
</tr>
<tr>
<td>Pull-up rating</td>
<td>36.038</td>
<td>0</td>
<td>100</td>
<td>31.35</td>
<td>35503</td>
</tr>
</tbody>
</table>

According to the original data set, the expectation and variance are calculated to determine the Gaussian distribution function, as shown in equation (1):

$$f(x) = \frac{1}{\sqrt{2\pi\sigma}} e^{-(x-\mu)^2/2\sigma^2}.$$  \hspace{1cm} (1)

When $x < \mu - 3\sigma$ or $x > \mu + 3\sigma$ occurs, we find that the probability of occurrence is very low, so we consider the outliers in this range.

The basic idea of distance-based anomaly detection method is to find the distances of $k$ points nearest to the current point and sum them up. The maximum $n$ points with specified distances are outliers. When measuring the Distance of outliers, it usually refers to Euclidean Distance (ED), Manhattan Distance (MHD) or Mahalanobis Distance (MD), and the calculation formulas are as follows:

$$\text{dis}_{\text{ED}} = \sqrt{\sum_{i=1}^{n}(X_i - Y_j)^2},$$

$$\text{dis}_{\text{MHD}} = \sqrt{\sum_{i=1}^{n}|X_i - Y_j|^2},$$

$$\text{dis}_{\text{MD}} = \sqrt{(\bar{x} - \bar{y})^T S^{-1} (\bar{x} - \bar{y})}.$$  \hspace{1cm} (2)

The representative distance-based anomaly detection algorithm is the K-nearest Neighbor algorithm (KNN). The outliers can be obtained by finding the largest $n$ $k$-nearest neighbor points with flat mean distance. The $k$-nearest neighbor mean distance formula of point $P$ is as follows:

$$D(p) = \frac{\sum_{q \in N_k(p)} \text{dis}(p, q)}{|N_k(p)|}.$$  \hspace{1cm} (3)

Compared with the detection method based on statistics, distance-based anomaly detection method can process multidimensional data, but it also has some problems: first, it
is difficult to choose distance calculation method and parameters \( K \) and \( N \); Second, local outliers cannot be distinguished.

In order to solve the problem that local outliers cannot be accurately distinguished in distance-based anomaly detection methods, a density-based outlier method is proposed. Local Outlier Factor (LOF) algorithm is the most representative one. The main idea is to judge the anomaly by comparing the density of each point with its neighboring points. The smaller the density is, the more likely the anomaly is. The density is measured by the LOF.

The local outlier of the point in the LOF algorithm can be expressed as:

\[
\text{LOF}_k(p) = \frac{\sum_{q \in N_k(p)} |lrd_k(o)|/lrd_k(p)}{|N_k(p)|},
\]

Where, is the \( k \)-th distance field, that is, all points within the \( k \)-th distance of point \( P \); Refers to the locally accessible density, expressed as:

\[
lrd_k(p) = \frac{1}{\sum_{q \in N_k(p)} \text{reach} - \text{dist}_k(p, o)/|N_k(p)|}
\]

Although the problem that local outliers cannot be distinguished is improved, the computational complexity is still large, and the efficiency is greatly affected by parameters.

3.3. Clustering Results. For male students, seven fields were selected as input fields: vital capacity score, 50 M score, 1,000 m score, standing long jump score, sitting forward score, pull-up score and total score. For girls, seven fields were selected as input fields: vital capacity score, 50 M score, 800 m score, standing long jump score, sitting forward score, one-minute supine sitting score and total score. The clustering results were divided into 1 to 5 categories. The clustering results were obtained by comparing the same items of the 5 categories of data and analyzing the running model with this value.

After summarizing the average score of each individual body elements of the five groups of students in the male and female groups, it can be seen that each cluster has its own characteristics. The clustering results and specific analysis of each cluster are as follows.

3.3.1. Boys. The clustering results of male students are shown in Table 3 and Figure 1. In cluster 1, boys had the highest mean total score, while in cluster 3, boys had the lowest mean total score. In 50 m, 1,000 m, standing long jump, sitting forward bend and pull-up, students in cluster 1 had the highest scores, while students in cluster 3 had the lowest scores except for pull-up. Students in lung capacity cluster 5 had the highest score, and students in cluster 3 had the lowest score. Clustering 1 and 4 boys pull-ups ratings were similar, clustering, 2, 3, 5 bad boys score, and especially the clustering on 2 boys pull up scoring average in single digits, in general, pull-ups in 5 class students score value of each project is the lowest, this also reflects the boy’s upper body strength of serious insufficient; In cluster 4, boys’ 50 m, 1,000 m, sit-forward bend, and citation up have excellent performance in the 5 categories of students, ranking the second in the average score of these 4 items. It can be seen from the change trend chart of average scores of male students after clustering in Figure 1 that the change trend of each cluster is generally similar, with traces to follow. Clustering results of male students is shown in Table 3.

The variation trend of boys’ physical fitness items was similar, especially the variation of cluster 1 and cluster 4 items was quite moderate. But the boy in the reflection of upper body strength pull-ups five clustering performance is poorer, especially clustering, 2, 3, 5 near the ratings are in single digits, aiming at this phenomenon, the boy’s upper body strength of high urgent, sports classroom teaching and in students’ extracurricular physical exercise should be to strengthen the upper body strength of practice, made in the short of fitness project under full time. The specific physical exercise suggestions for boys in each cluster are as follows:

Cluster 1: six test indicators of this student group have the highest average score among the five clusters, indicating that students of this group have good physical fitness and reflect good physical fitness level and body shape. It is suggested that these students continue to maintain a healthy lifestyle and the habit of exercise to maintain a good health level.

Cluster 2: the average scores of 1,000 m and standing long jump were all below the bar, especially the average score of pull-ups was single digit &lt;135. To some extent, it reflects the poor aerobic endurance and upper and lower limb strength of the boys in this cluster, especially the serious shortage of upper limb strength. It is suggested that this group of students should increase the number of aerobic exercises every week, and make the exercise plan of upper and lower limb strength exercise as appropriate, so as to improve the physical health level of the whole body.

Cluster 3: students in this cluster had the lowest overall score of physical health test and average score of other test data except for primer up. It can be seen objectively that the students in this cluster have very poor physical quality and their physical health level is not optimistic. For this kind of students, the school can consider adding special exercises to strengthen physical fitness in physical education, and urge students to complete the class content according to the quality and quantity; At the same time, we can provide guidance and suggestions for students’ extracurricular exercise or help students to formulate exercise prescriptions during school period, so as to enhance their physical fitness from short-term practice to long-term implementation.

Cluster 4: there were only 3,138 records in this category. In comparison, the scores of each project of students in this cluster are above the average level. Students in this cluster should not only persist in exercising, but also consider increasing the amount of exercise and intensity for the disadvantaged projects, so as to make a qualitative improvement on the original base.
Table 3: Clustering results of male students.

<table>
<thead>
<tr>
<th>Field</th>
<th>Mean lung capacity</th>
<th>50 M fractional mean</th>
<th>Average value at 1000 m</th>
<th>Average value at 1000 m</th>
<th>Average forward bending points of the sitting body</th>
<th>Average pull-ups</th>
<th>Mean total score</th>
<th>Record number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster 1</td>
<td>94.49</td>
<td>81.584</td>
<td>48.533</td>
<td>93.393</td>
<td>95.149</td>
<td>49.441</td>
<td>93.983</td>
<td>13441</td>
</tr>
<tr>
<td>Cluster 2</td>
<td>99.91</td>
<td>93.905</td>
<td>55.309</td>
<td>50.454</td>
<td>44.431</td>
<td>8.135</td>
<td>55.194</td>
<td>5309</td>
</tr>
<tr>
<td>Cluster 3</td>
<td>95.058</td>
<td>49.431</td>
<td>51.991</td>
<td>38.044</td>
<td>54.514</td>
<td>10.841</td>
<td>50.009</td>
<td>3890</td>
</tr>
<tr>
<td>Cluster 4</td>
<td>95.353</td>
<td>99.394</td>
<td>45.313</td>
<td>44.105</td>
<td>93.153</td>
<td>40.485</td>
<td>49.984</td>
<td>3138</td>
</tr>
<tr>
<td>Cluster 5</td>
<td>81.118</td>
<td>98.193</td>
<td>44.993</td>
<td>49.344</td>
<td>49.893</td>
<td>14.984</td>
<td>43.049</td>
<td>10409</td>
</tr>
</tbody>
</table>

Figure 1: Change trend of average scores of male students after clustering.

Cluster 5: the mean lung capacity score of boys in this cluster was the highest. This reflects the good cardio-pulmonary function of this group of students, which has congenital advantages in enhancing physical fitness. Such students should consider making efforts to enhance their upper body strength, make full use of their advantages and improve their overall physical health.

3.3.2. Girl. The clustering results of girls are shown in Table 4 and Figure 2. Compared with the clustering results of boys, the average scores of different items in the clustering results of girls are more complex. The scores of clusters 1, 3 and 4 showed similar trend, while cluster 2 and cluster 5 showed significant contrast. Cluster 1 was the highest in the average score of the 7 items listed, far outnumbering all other clusters, and had the highest record count of 17 408. The mean lung capacity score of girls in cluster 3 was only 10.111, and the mean seat flexion score of girls in cluster 5 was 18.616, forming two anomalous valley bottoms. As can be seen from Table 4, it is these two vastly different item scores that cause the mean total scores of girls in cluster 3 and cluster 5 to rank first and second from the bottom. In 50 m, 800 m, standing long jump and sit-up, girls in cluster 2 have the lowest scores, but there is not much difference with the other four clusters, so they are in the middle of the average scores. In cluster 4, the change trend of the scores of girls was moderated and maintained a high level, and the average scores of all other items except 800 m and sit-up ranked second.

The changes of the scores of the physical fitness items of the female students were more complicated, among which vital capacity and sitting forward were the key influencing factors of the lower scores of the two clustering total scores, both of which were below 20. In general, the scores of girls in standing long jump and supine sitting are lower, which reflects the explosive power of lower limbs and the strength of waist and abdominal muscles. On this basis, girls should pay attention to the lower limb strength as the starting point, and then supplemented with the daily exercise of lumbar abdominal muscle strength, in order to achieve the relative balance of physical quality level. Suggestions on specific physical exercise for each cluster of girls are as follows:

Cluster 1: girls in this cluster have the highest average score of all 6 test indicators and the highest record number. Similar to cluster 1 for male students, it is suggested that these students keep good exercise habits and healthy lifestyle to maintain good health.

Cluster 2: the score of girls in this cluster is the lowest in 50 m, 800 m, standing long jump and sit-up, which largely reflects that there is a relatively large gap in aerobic, anaerobic endurance, lower limb explosive power and lumbar and abdominal muscle strength of these students. Students in this cluster can consider strengthening their daily running, skipping and lumbar and abdominal muscle strength exercises, and make corresponding exercise plans according to their physical quality and exercise needs.

Cluster 3: in comparison, there was no significant difference between the students of other items except lung capacity and those of the other 4 clusters. Therefore, the students of this cluster should greatly strengthen the exercise of aerobic tolerance and practically improve their lung capacity.

Cluster 4: the students in this cluster maintained a high level of physical health. It is suggested that the students in this cluster should strengthen aerobic endurance and lumbar and abdominal muscle strength, and promote physical health through reasonable diet and exercise.

Cluster 5: there was no significant difference in all indicators except sitting forward, which just reflected poor flexibility of girls in this cluster. Should strengthen the warm-up and stretching before exercise, as well as the relaxation and ligament stretching after exercise, in order to improve the flexibility of the body.

The clustering results show that, from the general trend, male and female are obviously inadequate in the strength
level of upper and lower limbs respectively, but the gender differences in other items are not significant, but there are significant differences in each indicator between different clusters. Therefore, in physical health promotion, while paying attention to the performance and gap of different genders in different items, it is necessary to explore the internal relationship between students’ physical fitness and indicators according to the clustering results, and then make different physical exercise plans for college students of different clustering. And adjust and transform the training methods and means, in order to comprehensively improve students’ physical health level.

The visual images in the experimental stage can clearly show the degree of abnormality judged by the algorithm, but for the administrator operating the performance test system, it is enough to clarify which items are abnormal and the reason for the abnormality. Therefore, a marked block thermal map is designed to show abnormal student results. The figure uses a Cartesian coordinate system, each cell on the horizontal axis is marked with the name of the student, and each test item is named on the vertical axis. The color depth of the cross squares indicates the score of a student in a certain project, and all the project squares marked as abnormal are light color, which can be seen at a glance. The statistical overall range can be selected from the whole department-class. Figure 3 is the graph of abnormal detection results of a certain class.

4. Conclusion

This paper constructs an analysis platform for big data of college students’ physical health and discusses relevant issues. Different from traditional physical health promotion methods, bDPPH-CS based physical health analysis and improvement suggestions integrate qualitative analysis at the macro level and quantitative calculation at the micro-level, making the guidance work of college students’ physical health more scientific, more targeted and operable. It will play an active role in coordinating the efforts of the government, schools and families to improve the physical health of college students. It can collect and manage students’ physical health data through intelligent testing equipment, and upload these data to the cloud platform using “Internet +” technology. On the one hand, it can effectively improve the efficiency of physical health standard testing, and on the other hand, it can achieve multiterminal integration. To build a trinity physical health data interconnection, communication and sharing platform for parents, students and schools. The average score of the physical fitness test items in the male group was similar and the change was moderate. The average score of the physical fitness test items in the female group showed two obvious bottoms and the changing trend was more complicated. By analyzing the clustering results, the internal relationship between students’ physical quality and indicators is explored, and the corresponding health promotion countermeasures are put forward in order to comprehensively improve students’ physical health level.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.
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