Geochemical characteristics of South China Sea based on random forest algorithm and Wushu teaching action simulation

Han Jianyun

Received: 11 June 2021 / Accepted: 31 July 2021 / Published online: 17 August 2021
© Saudi Society for Geosciences 2021

Abstract
With the development of information technology, random forest algorithm has become one of the most widely used mining algorithms with its high classification accuracy. The classification performance of traditional random forest algorithm in the medical field is significantly reduced, and it will take longer to build multiple decision trees of random forest itself. In this paper, the South China Sea is selected as the research area, the groundwater cold water and hot water in this area are comprehensively investigated, and the formation conditions and genetic mechanism of the groundwater hot water system are deeply analyzed. As a traditional national sport, Wushu teaching has a profound cultural heritage, which is essential to promote the physical and mental health of college students. In order to speed up the development of Wushu education in colleges and universities, the following measures are put forward: strengthen the construction of Wushu teachers, enrich the content of martial arts teaching action; strengthen the docking of theory and technology; and make full use of the latest teaching methods to improve the quality of education. As an important part of China’s education system, the rapid development of university education in recent years has provided China with a large number of high-quality workers and highly practical technical talents. It plays an important role in China’s economic construction and rapid social development. Therefore, this paper uses the random forest algorithm technology to study the geochemical characteristics of the South China Sea and the content of teaching action simulation. Based on the research of random forest algorithm, this paper applies it to the study of geochemical characteristics of the South China Sea and martial arts teaching action simulation, which promotes the better development of martial arts teaching.

Keywords Random forest algorithm · Geochemical characteristics of the South China Sea · Wushu teaching · Movement simulation

Introduction
In today’s society, with the rapid development of cloud computing, Internet of things, mobile Internet, and other technologies, the types of data and the corresponding scale are also increasing rapidly. Random forest algorithm is a classification regression algorithm based on this evolution, which is integrated by voting. The results of multiple decision trees inherit all the advantages of decision tree algorithm and greatly improve the accuracy of classification (Simeonov et al. 2003). At the same time, due to its unique concept of randomness, random forest is superior to other traditional classification algorithms in processing gene expression data (Renard and Freimund 1994). The classification and regression of dimension data can be successfully applied to diagnosis and prediction. Many scholars have applied random forest algorithm to the field of medical diagnosis and achieved excellent results. Therefore, the combination of random forest and spark parallel computing framework is very suitable for the research in the field of medical auxiliary diagnosis. It not only achieves higher diagnostic accuracy, but also improves the overall running speed of the system. It has a very wide application prospect. Based on this, this paper further explores and improves the random forest algorithm and finally builds an auxiliary diagnosis system combined with spark platform (Singh et al. 2019). Medium and low temperature geothermal resources are widely distributed in China, which do not need...
extra special heat source and have great availability. For this reason, no matter from the development and utilization of geochemical characteristics or geothermal research in the South China Sea, the medium and low temperature geothermal energy has attracted much attention in recent years. The basic research of its system formation conditions, geothermal water cycle mode, and water rock interaction is very important for the development and utilization of energy (Versari et al. 2002). Therefore, geochemical properties are the window to reflect the deep geochemical phenomenon, which is very important for geothermal research. The action simulation function of martial arts has also been reflected in school martial arts teaching and has become a popular martial arts course content for teenagers to enhance their physical strength and improve their health (Vasistha and Ganguly 2020). College martial arts classroom teaching integrates part of martial arts content from shallow to deep in stages, which plays an important role in improving the physique of Chinese teenagers. Wushu education is an important part of China’s education system. With the state and class paying more and more attention to university education, university education is developing more steadily (Thanh 2019). It provides China with a large number of high-quality cultural working people and technical engineers. With the continuous increase of the scale of education and training, the distribution of colleges and universities in the country is more reasonable, and the capacity of infrastructure construction is also increasing, which also play a very important role in the construction of the country and the development of society.

Materials and methods

Overview of the study area

Topography of the study area

Meteorology The study area is selected in the southern coastal area, where the climate is mild and the annual sunshine is good. The annual average temperature is about 22 °C, the annual average maximum temperature is about 36.9 °C, and the minimum temperature is about -0.1 °C. The precipitation in this area is abundant, but the spatial and temporal distribution is uneven and the seasonal and regional differences are obvious. The average annual rainfall is 2300 mm, and the average annual evaporation is 1517–2021 mm. The distribution of annual precipitation mainly concentrated in April to September (accounting for 85.6% of the annual precipitation).

Hydrology The area has abundant water resources, wide river network layout, and large extension range. The important reservoirs in this area play an important role in providing water and irrigating the farmland around the reservoir.

Geology of the study area

The crust in this area is uplifted intermittently and exposed to severe weathering. Under the background that the whole uplift is affected by fault tectonic activity, some areas show different ups and downs. The Cenozoic tectonic activity controlled the current topographic pattern and crustal movement. The river system, earthquakes, and hot springs are all related to the activity of this era. A series of large-scale deformation structures such as large-scale fold deformation zone and deep large fault zone have been formed by long-term crustal activity. The strong tectonic activity of Cenozoic in this area has played a positive role in the formation of geothermal structure. Therefore, the following describes in detail the major deep faults and the major structural faults that control the movement of geothermal water in the study area.

Research data

Remote sensing image data source acquisition

In this study, the Landsat4-5tm Landsat images from the South China Sea are used as the main data sources. The collection time was December 30, 2010, and the average cloud content was 9.04. The color in the image matches the actual color of the original area or landscape, and the perspective effect of rivers and waters is excellent.

Remote sensing image data preprocessing

Before land surface temperature inversion, the thermal infrared and multispectral data in the study area must be preprocessed. First of all, read the visible and thermal infrared data of Lansat4-5tm, and then carry out a series of radiation calibration operations on the collected data. The above behaviors are obtained through envi5.1 software. Then, in all the standard data, the appropriate ground control points are selected for subsequent operation, and the bilinear interpolation method is selected to establish the geometric correction model. Finally, the multispectral remote sensing data and atmospheric corrected thermal infrared remote sensing data are stitched and pruned by using the registered vector file ROI.

Research methods

Random forest algorithm

The traditional classification method of machine learning is to model based on the existing data and analysis results, check the rules, and uniformly classify and predict the recorded data. The basic classifier of random forest algorithm is decision tree; the classification effect is better than the traditional classification algorithm, because bagging sampling produces
multiple decision trees; and the final result is determined by multiple decision trees together. To understand this algorithm, we first need to understand the concept of decision tree.

**Definition of random forest** Random forest (RF), as the name suggests, is a classifier that combines multiple unrelated decision trees to form a forest and votes or averages each tree to produce the final result. Random forest uses a decision tree as a sub-classification model after bagging. Firstly, bootstrap random sampling method is used to generate sub-training sets on the original data set, and each sub-training set constructs an independent decision tree. Secondly, in the construction of decision tree, random forest is not to find out the best performance of all features to classify, but to randomly extract some features, and then find the optimal solution from them, which are also the two important random steps in random forest.

**Random forest algorithm evaluation** Compared with the traditional classification algorithm, random forest is a step forward in classification and has many other advantages:

1. The final result of random forest is determined by multiple unrelated decision trees, which can successfully avoid the over fitting problem in decision tree classification. And compared with the decision tree, the calculation accuracy is greatly improved.
2. The OOB data set generated by bagging method can not only be used as a test set, but also be used to calculate the corresponding importance of a single variable to measure the generalization error of the model.
3. Random forest usually uses cart as a segmentation function. Therefore, random forest can flexibly deal with continuous or discrete variables without normalizing the values of variables, thus significantly reducing the data processing steps.
4. Random sampling and random selection of eigenvalues are one of the most important characteristics of random forest algorithm, therefore the algorithm has a good tolerance for outliers and missing values and avoids the excessive influence of individual differences on the model.
5. Random forest algorithm is very suitable for running in parallel environment, because there is no correlation between multiple decision trees generated in the training process. Adding parallel computing framework can significantly reduce the training time of large data sets.

Although the advantages of random forest are obvious, the algorithm still has some shortcomings in medical data, financial credit data and other professional application scenarios. This type of data has two main characteristics: It has many functions and is easy to lose, and the amount of different types of data varies greatly. First, the idea of algorithm classification is that the minority is subordinate to the majority. Therefore, when faced with data sets with very different sample sizes, it is easy to classify minorities into majority categories, resulting in a high probability of misclassification. Secondly, more redundant features will interfere with the learning ability of the model, which will cause over fitting of the model with high probability and limit the universality of the model. Therefore, the algorithm has a lot of room for improvement on these two points.

**Analysis of geochemical characteristics**

Normalized difference vegetation index (NDVI) has a wide range of vegetation coverage and strong spatial and temporal adaptability. Therefore, the remote sensing index is widely used as the evaluation standard of vegetation coverage. The expression is

\[
\text{NDVI} = (\text{NIR} - \text{R}) / (\text{NIR} + \text{R}) \tag{1}
\]

According to the calculation results of normalized difference vegetation index (NDVI), the vegetation coverage (FV) was estimated by mixed pixel decomposition method; the calculation formula is as follows:

\[
F_V = (\text{NDVI} - \text{NDVI}_S) / (\text{NDVI}_V - \text{NDVI}_S) \tag{2}
\]

The surface emissivity is the basic parameter of land surface temperature remote sensing inversion, including the emissivity of water, natural surface, and urban pixels; the calculation formula is as follows:

\[
\text{LSE}_{\text{water body}} = 0.995 \tag{3}
\]
\[
\text{LSE}_{\text{Natural surface}} = 0.9625 + 0.0614Fv - 0.0461Fv^2 \tag{4}
\]
\[
\text{LSE}_{\text{town}} = 0.9589 + 0.086Fv - 0.0671Fv^2 \tag{5}
\]

In ENVI, the band math can be used to calculate the mixed pixel scale.

Based on the data of lansattm5, the radiation intensity of blackbody is calculated by using the radiation transfer equation method:

\[
B(T) = \left[L_g \cdot L_{\text{atm}} \cdot \tau \cdot (1 - \varepsilon) \cdot L_d \right] / \tau \cdot \varepsilon \tag{6}
\]

According to the calculated Planck thermal radiance of blackbody at t and the inverse function of Planck formula, the real surface temperature T can be obtained:

\[
T = K_2 / \ln(K_1 / B(T) + 1) \tag{7}
\]

The main steps in ENVI are Basic tools > Bandmath. Enter the following formula in the formula input field, where B1 is the radianve value of the blackbody with temperature T in the thermal infrared band.
(1282.71)/\log (666.09/b_1 + 1) - 273 \tag{8}

Results

Inversion results of land surface temperature

Since the inversion data are normally distributed, the M + a*s statistical method can be used to extract the temperature anomaly information, where m is the mean temperature, s is the estimated standard deviation of the sample, and the expansion coefficient is the standard deviation of a, which is usually 1.5, 2.0, and 2.5 (Table 1).

Table 1: Inversion eigenvalue of land surface temperature in the study area (December 30, 2020), unit °C

|                | Mean (M) | Maximum | Minimum | Square difference (s) | M+1.5S | M+2.0S | M+2.5S |
|----------------|----------|---------|---------|-----------------------|--------|--------|--------|
|                | 17.25    | 29.04   | 2.54    | 2.15                  | 20.14  | 21.52  | 22.9   |

Results

Inversion results of land surface temperature

Since the inversion data are normally distributed, the M + a*s statistical method can be used to extract the temperature anomaly information, where m is the mean temperature, s is the estimated standard deviation of the sample, and the expansion coefficient is the standard deviation of a, which is usually 1.5, 2.0, and 2.5 (Table 1).

Figure 1 shows the distribution of surface temperature anomaly in the South China Sea after extracting temperature anomaly information according to the threshold. Because the South China Sea belongs to deep buried geothermal, it is not easy to detect on the surface, especially in deep buried areas. Due to the anomalies, the interpretation should be combined with the geological structure of the existing survey area and drilling exploration data to infer the potential geothermal water resources.

Geophysical characteristics

The value of 1:200000 Bouguer gravitational field in a province shows a trend of low in the north and high in the south × 10^-5 m / S^2 to 14 × 10^-5 m / S^2 along the southeast (Fig. 3).

The magnetic field characteristics of a province are closely related to the complex geological structure in the region (Fig. 4).

Geothermal water resource test results

Each element of the observation set contains three feature variables and one attribute variable. The attribute variables are “0” and “1.”
indicating that there is no geothermal anomaly and there is geological anomaly, as shown in Table 2.

In order to verify the reliability of the discriminant function, we need to use a certain assignment correspondence method to calculate the function value, and the element can be determined by which function value is larger. Table 3 shows the verification results of known class observation set U1.

According to Figure 5, the potential probability distribution and anomaly zoning of geothermal water resources in a province, where the potential probability value is larger, can be divided into three regions.

**Geochemical temperature scale analysis**

Several commonly used geochemical temperature scales and their formulas are listed to estimate the heat storage temperature of the South China Sea and Shenzao geothermal field. The calculation results are shown in Table 4.

The relative error analysis of different geochemical temperature scale estimates and the average temperature of hot field and hot well (BHTa) can correctly evaluate the reliability of local chemical temperature scale estimates (difference ≤ ±). The results are shown in Table 5. The calculation is as follows.
On the other hand, the saturation index (SI) of chalcedony and quartz in geothermal water (see Table 6) shows that the estimated storage temperature of chalcedony is more reliable than that of quartz and other silicon temperature scales.

Figure 6 shows that all the high temperature samples do not reach the equilibrium line and are located in partial equilibrium water or mixed water. For Na, K, and Mg ions, the interaction between water and rock is not in complete equilibrium.

In addition, from the relationship between Na/K activity ratio and temperature (Fig. 7), due to the imbalance between the two, a certain amount of heat will be generated. There is a deviation in using these cation temperature scales to calculate the storage temperature, but it can be used as a reference for many methods.

The multi-mineral equilibrium diagram (Figure 8) shows the trend of various mineral saturation indices with the increase of temperature.

It can be seen from the temperature measurement curve of the central borehole in the South China Sea geothermal field (Fig. 9) that the geothermal gradient gradually decreases with the increase of depth.

It can be seen from Figure 10 that the depth of the hot water circulation in the South China Sea is 3.9–4.7 km, and the average geothermal gradient of the thermal field in the South China Sea after inversion is 30–33 °C/km. This is consistent with the actual measurement of underground temperature, which proves that the hot water circulation depth calculated by the pipeline model has constant reference value.

The fundamental driving force for the rise of geothermal water is buoyancy caused by density difference. The density of water decreases with the increase of temperature and increases with the increase of pressure (Fig. 11).

**Geochemical characteristics analysis results**

Different types of groundwater and surface water samples from the study area were projected onto the Piper trilinear map (Figure 12) to analyze differences in hydrochemical distribution.

The main content of different types of water samples was projected on Schoeller curve (Figure 13) to compare the chemical type differences between cold water and hot water in different hot fields.

| Eigenvalues | Surface temperature abnormal value (C°) | Bouguer gravity anomaly (10⁻⁵m/s) | Aeromagnetic outlier (nT) |
|-------------|----------------------------------------|-----------------------------------|--------------------------|
| Max         | 33.1                                   | -23                               | 300.51                   |
| Minimum     | 11.25                                  | -84                               | -200.32                  |
| Average value | 21.14                                 | -45                               | 39.24                    |
Discussion

Analysis of the current situation of Wushu Teaching

Textbook issues

At present, the martial arts teaching materials of a Provincial Institute of technology are mainly college physical education teaching materials, but there are few self-made or provincial teaching materials. Some provincial technical colleges have no unified requirements for the use of martial arts materials. Some technical schools will formulate teaching materials according to the actual educational needs of students and organize teachers to edit the teaching materials to meet the needs of martial arts education. Due to the diversity of the use of teaching materials, the basis of Wushu education in a Provincial Institute of technology is different. The diversity of teaching materials is also different in content and teaching methods, and the education effect and students’ reaction are also very complex. Therefore, it is more important to solve the problem of insufficient content of teaching materials.

Some local vocational schools cannot meet the needs of today’s Wushu education only with the old comprehensive teaching materials. To solve the problem of teaching materials has become an important problem to be solved.

Teachers

The survey found that the professional level of martial arts teachers in a science and technology college in a province is not high. Many teachers are not martial arts majors, especially the comprehensive martial arts class of grade one. The number of martial arts classes is increasing. It is difficult to guarantee the quality and efficiency of education for non-professional martial arts teachers to teach martial arts theories and skills. Lack of domestic Wushu teachers’ training and the low academic level of Wushu teachers lead to the lag of Wushu education in some provincial technical colleges, low level of scientific research, and poor scientific research results. Therefore, it is necessary to introduce high-level and highly educated talents in martial arts and strengthen the academic

| Table 3 Verification results of Fisher discriminant function |
|-------------------------------------------------------------|
| Category | Fisher discriminant category | Total |
|          | Non-local hotspot “0” | Geo hotspot “1” |          |
| Count    | 30 | 3 | 33 |
| Geo hotspot “1” | 0 | 21 | 21 |
| Correct rate% | Non-local hotspot “0” | 90.8 | 9.0 | 100 |
| Geo hotspot “1” | 0 | 100 | 100 |
| Total correct rate% | A total of 194.44% of the elements in the known category observation set \( U \) are correctly classified |

Fig. 5. Potential probability distribution of regional geothermal water anomaly area

Fig. 4. Potential probability distribution of regional geothermal water anomaly area
The training of existing martial arts teachers, which is of great significance to improve the martial arts teaching level of local technical colleges (Afilal et al. 2018).

Construction of campus Wushu culture and atmosphere

The research shows that few college students in a province carry out martial arts activities in morning exercises, recess exercises, or extracurricular activities. Some universities receive martial arts training to participate in some provincial university martial arts championships. The main reason for this problem is that some provincial universities of science and technology are pursuing short-term effects, that is, focusing on learning martial arts skills and cultivating students’ interests, especially the penetration of lifelong sports concept. In addition, it is a school with few martial arts competitions, performances, exchanges, and other activities. It has few opportunities to contact martial arts, so it is difficult for students to like martial arts. Students’ martial arts consciousness and desire to participate in martial arts are difficult to form (Anandhi and Kannan 2018). The martial arts culture and atmosphere of the school are not rooted, so the enthusiasm of practicing martial arts is naturally affected.

Student performance evaluation

Fair, just, and reasonable evaluation of students’ academic performance is a very important part of Wushu teaching activities in local vocational and technical colleges. For example, the martial arts skill scores of teachers and evaluation

| Numbering | Sampling location | Wellhead temperature | Quartz Chalcedony | Na-K | Na-K-Ca | K-Mg | Na-Li | Buried depth of thermal storage (km) |
|-----------|-------------------|----------------------|-------------------|------|---------|------|-------|-------------------------------------|
| XH01      | A                 | 95                   | 182               | 154  | 218     | 143  | 148   | 219                                 |
| XH02      | B                 | 95                   | 183               | 156  | 212     | 148  | 169   | 200                                 |
| XH03      | C                 | 98                   | 186               | 158  | 222     | 144  | 161   | 229                                 |
| XH04      | D                 | 98                   | 183               | 156  | 212     | 148  | 169   | 203                                 |
| XH05      | E                 | 71                   | 181               | 154  | 215     | 150  | 164   | 198                                 |
| XH06      | F                 | 60                   | 176               | 149  | 212     | 147  | 152   | 190                                 |
| XH08      | G                 | 87                   | 181               | 154  | 212     | 145  | 165   | 1                                  |
| XH09      | H                 | 79                   | 178               | 151  | 217     | 14  | 154   | 214                                 |

Table 4 Calculation of heat storage temperature using geochemical temperature scale

Table 5 Analysis of the difference between the geothermal reservoir temperature estimated by geochemical temperature scale and the average measured bottom hole temperature (BHTa) of geothermal wells

| Temperature scale | South China Sea geothermal field | Shenzao geothermal field |
|-------------------|----------------------------------|--------------------------|
|                   | 0–20% | 20–30% | > 30% | 0–20% | 20–30% | > 30% |
| Quartz, nosteamloss | 0     | 0      | 8     | 0     | 0      | 4      |
| Quartz            | 0     | 0      | 8     | 0     | 0      | 4      |
| Chalcedony        | 8     | 0      | 0     | 3     | 1      | 0      |
| Na-K              | 0     | 0      | 8     | 0     | 0      | 4      |
| Na-K-Ca           | 7     | 1      | 0     | 1     | 3      | 0      |
| K-Mg              | 1     | 3      | 4     | 4     | 0      | 0      |
| Na-Li             | 0     | 0      | 8     | 0     | 0      | 4      |
teams have totally different effects on students. Some students may ignore the teachers’ scores, thinking that teachers will not be too strict and lose initiative and enthusiasm. However, the evaluation team will make students pay close attention to the scores and dare not despise or neglect them in class.

Problems of teaching site and equipment

The research shows that the martial arts teaching places and facilities of the provincial technical college still cannot meet the needs of martial arts education. Especially in the newly built engineering colleges and private universities, there are many problems, such as the lack of educational venues, the lack of educational facilities or obsolete, and the lack of places to teach and train martial arts. In contrast, the teaching conditions of Wushu in a university in a province are obviously better than those in other vocational training schools, mainly because of the financial support of the competent authorities at the national and local levels. In most vocational schools without specific support from the state, the location and equipment of martial arts teaching limit the development and improvement of martial arts education (Bhateria and Jain 2016). In particular, all vocational schools should have indoor martial arts education facilities, in order to prevent that the occurrence of martial arts classes cannot be carried out normally due to weather changes.

Table 6 Mineral saturation index of chalcedony and quartz in geothermal water

|       | A   | B   | C   | D   | E   | F   | G   |
|-------|-----|-----|-----|-----|-----|-----|-----|
| Chalcedony | 0.02 | 0.05 | 0.01 | 0.05 | 0.32 | 0.12 | 0.52 |
| Quartz  | 0.35 | 0.24 | 0.52 | 0.65 | 0.55 | 0.51 | 0.54 |

Fig. 6. Diagram of NA-K-Mg equilibrium of geothermal water

Fig. 7. Log(αNa+/K+) temperature comparison diagram
Countermeasures for the development of martial arts teaching

Deepening the reform and innovation of martial arts course teaching

The innovation of Wushu curriculum education reform is not to set up new standards, but to promote the better development of martial arts education in order to achieve better education effect and greater social benefits. The motivation of students learning Wushu is the foundation of curriculum setting. Scientific, reasonable, and step-by-step reform of teaching materials needs to be improved. In the process of deepening the reform and innovation of Wushu curriculum education, we need to integrate the culture contained in Wushu, actively integrate it with campus culture; and effectively spread the value of Wushu through martial arts competition, friendship, and exchange. In the teaching content, we are increasing martial arts projects combining with regional characteristics and increasing the content of martial arts that students prefer (Chhetri et al. 2020). Therefore, the necessary condition for the development of Wushu education in specific national colleges and universities is to deepen the reform and innovation of Wushu curriculum, so as to promote the continuous improvement of the quality and teaching effect of Wushu education.

Fig. 8. Multi-mineral balance diagram of representative geothermal water samples a XH01; b XH02; c XH05; d XH08; e SH01; f SH02

Fig. 9. Temperature profile of central borehole in Nanhai geothermal field
Strengthen the construction of martial arts teachers and constantly improve the level of specialization

Teachers are the most important factors affecting the quality of education. As a technical college, students have low recognition of martial arts before they go to university. This requires the university martial arts teachers to attract students with their excellent martial arts expertise and stimulate students’ interest, which is difficult for teachers who have not been specially trained. Therefore, in order to get a new level in martial arts education of a technical college in the province, we need to gradually strengthen the establishment of the faculty, strengthen the professional training of martial arts teachers, and lay a solid foundation for improving the quality of martial arts education in a province.

To improve students’ physique as the goal, enrich the teaching content

In order to achieve the goal of training skilled workers and skilled talents for the society, higher vocational colleges must constantly improve the content of education on the basis of the continuous improvement of students’ physical quality. In this way, the content of martial arts doctrine will also flourish. We should change a single technical system and a single mode and strengthen the cultural and regional characteristics of Wushu. Because of the comprehensive quality proposed, the characteristics of martial arts culture are greatly enhanced, which include the characteristics of Chinese culture, the advantages of traditional culture, and the complementary influence of Chinese and Western culture on the overall development of human beings. These aspects of martial arts teaching content will be greatly increased, to improve the physical fitness of college students through martial arts teaching; in the process of martial arts teaching in specific countries, technical colleges need to constantly reform and improve the teaching content and improve the education conditions. Freshmen of a science and technology college in a province have mastered basic martial arts skills in the first semester or second semester or the second year of the university (Jabbar and Grote 2020). College should choose the content of education completely according to the students’ interest in learning, combine with the characteristics of students’ age, and fully adapt to the physical and mental characteristics of students, so as to arrange the corresponding education content reasonably.

Strengthen the combination of theory and technology, and integrate martial arts ethics education in the classroom

As a part of Chinese culture, Wushu has been refined and developed by people of all ages. Its extremely complex
technical system and various rational knowledge show that Wushu is unusual and different from traditional sports. It has multiple components and forms of complex culture. As Chinese Wushu has a long history after hundreds of years of development, it is not enough for college students to have a deep understanding of Chinese Wushu if they only rely on technical courses in Wushu education in technical schools. We must promote traditional Chinese Wushu, which is complementary in theory and technology, to modern college students through Wushu teaching activities. This will not only enable college students to acquire martial arts skills, but also enable them to have a deeper understanding of the history and virtues of martial arts. Theory guides practice. Students will learn the development history of Chinese martial arts and the practice skills and methods of specific martial arts techniques. Only by integrating Wushu theory education with practical skills education and integrating Wushu education into classroom teaching can we cultivate high-tech talents with all-round development of morality, intelligence, and physical education (Renard et al. 1991).

**Increase capital investment and improve Wushu teaching conditions**

Good venues, facilities, and complete teaching facilities are the basis of Wushu teaching activities and better teaching effect. Otherwise, it will affect the normal development of Wushu education. At the same time, martial arts teaching venues and equipment are also used to reflect the school’s attitude and investment in martial arts education, which is one of the indicators of school scale and level. From the current situation, the investment in martial arts education facilities and facilities and equipment of a national technical college is very unbalanced. Some national and local engineering colleges operate early and have large scale, and their advantages are greater than other universities. Therefore, to improve the conditions of Wushu education in a National University, it is ultimately up to the leaders of the college to attach great importance to this aspect. If the leaders attach great importance to this aspect, they will invest more money in this aspect and provide good material conditions for the Wushu teaching of the school.

**Fig. 12.** Piper three line diagram of water samples from the South China Sea geothermal field and its periphery
Wushu teaching movement simulation advantage analysis

(1) Most students have a clear understanding of the knowledge and skills they need to master before carrying out activities, but the concept of practical skills is vague, and they do not know how to strengthen their practical skills. This allows students to first consciously understand how to improve their practical ability, such as finding the key to the door. Through this “key,” students can know how to specifically learn and strengthen their practical skills.

(2) By regarding students’ adaptability, organization, and coordination ability and executive ability as the refinement of specific practical skills, students’ goals become clearer. In the whole educational activities, we can carry out targeted training and reflection on these three aspects. The repeated process is to strengthen students’ practical ability again and again. The students who have experienced this strengthening process have been significantly strengthened in both consciousness and practice.

(3) Wushu teaching is an important reason to improve students’ practical skills. Through the scene simulation of Wushu teaching content, Wushu teaching provides sufficient space for students. The form of group cooperation changes the form of evaluating students’ personal ability into the form of evaluating students’ cooperative ability. Students’ practical ability does not mean students’ ability of individual combat, so it is very necessary to have a correct understanding of students’ practical ability. Therefore, the essence of Wushu teaching is not to impart traditional knowledge and skills, but to teach students how to strengthen their practical ability and inspire them through a variety of ways. Through this kind of Wushu teaching, students can master skills and methods to improve their practical skills. In this process, their practical skills have also been significantly improved.

(4) In this paper, the evaluation system of school evaluation and enterprise participation evaluation is an extension of Wushu education. In addition to comprehensive evaluation of students’ practical ability, it is also the cultivation of students’ practical ability development. Students are willing to accept this form of evaluation. Through the evaluation results, they can constantly summarize their practical ability. In short, they can better improve their practical skills.

Conclusion

In this paper, we deeply study the domestic and foreign big data and choose the random forest algorithm as the basic algorithm model. In this paper, we combine the ReliefF algorithm with the random forest algorithm and add the recursive thought in the construction process of the decision tree to solve the above two problems, so as to improve the classification performance of the random forest algorithm. Firstly, according to the characteristics
of unbalanced data, the nearest neighbor sampling method in ReliefF algorithm is changed to the number of positive and negative samples, which is determined according to the opposite proportion of the majority class and the minority class. The random forest algorithm itself needs to build multiple decision trees, which greatly increases the time complexity compared with a single decision tree algorithm. Therefore, it is very important to parallelize the algorithm. This paper also discusses the formation conditions of the geochemical characteristics of the South China Sea, the formation mode of the underground hydrothermal fluid, and the movement characteristics of the underground hydrothermal fluid in the deep fault zone; interprets the surface temperature field of the study area by using remote sensing data; and makes discriminant analysis to determine the abnormal distribution and control factors of the underground hot water in the study area. Then, based on the analysis of the formation conditions and combination model of the geochemical characteristics of the South China Sea, through the analysis of the water rock equilibrium state, the temperature and circulation depth of the sea area are calculated by using the geochemical temperature scale, and the conceptual model of the geothermal water genesis model of the deep fault zone is constructed. At the same time, it puts forward the measures to develop Wushu education in colleges and universities: continue to deepen the reform and innovation of Wushu education; strengthen the construction of Wushu teachers; enrich the content of Wushu education; strengthen the combination of theory and technology; and promote Wushu classroom teaching with fair, reasonable, and rigorous evaluation mode. To improve the education and scientific research conditions of martial arts teachers, relying on action simulation education to carry out this kind of martial arts education activities is very popular among students. Now, because the society has very high requirements for practical skills, the traditional practice of blindly letting students learn has been unable to meet the needs of society. Only by truly improving practical skills can students integrate with society. This is the ultimate teaching goal of vocational schools.

Declarations

Conflict of interest  The authors declare no competing interests.

References

Afiial F, Draoui M, El Messari JS (2018) Application of the DKPR method for mapping vulnerability to contamination of water Smir’s River Dam (North Morocco). J Water Sci Environ Technol 2(2):402–410
Anandhi A, Kannan N (2018) Vulnerability assessment of water resources-translating a theoretical concept to an operational framework using systems thinking approach in a change climate: case study in Ogallala Aquifer. J Hydrol 547:460–474. https://doi.org/10.1016/j.jhydrol.2017.11.032
Bhateria R, Jain D (2016) Water quality assessment of lake: a review. Sustain Water Resour Manag 2:161–173. https://doi.org/10.1007/s40899-015-0014-7
Chhetri R, Kumar P, Pandey A, Shahu P, Singh R, Pandey S (2020) Vulnerability assessment of water resources in Hilly Region of Nepal. Sust Water Resour Manag 6(3):34. https://doi.org/10.1007/s40899-020-00580-7
Jabbar FK, Grote K (2020) Evaluation of the predictive reliability of a new watershed health assessment method using the SWAT model. Environ Modell Assess 192(4):224. https://doi.org/10.1007/s10661-020-8182-9
Kent KG, Foster GR, Weesies GA, Porter JP (1991) Revised universal soil loss equation. J Soil Water Conserv 46(1):30–33
Renard KG, Freimund JR (1994) Using monthly precipitation data to estimate the R-factor in the revised USLE. J Hydrol 157(1–4):287–306. https://doi.org/10.1016/0022-1694(94)90110-4
Simeonov V, Stratis JA, Samara C, Zachariadis G, Voutsas D, Anthemidis A, Sofoniou M, Kouimitzis T (2003) Assessment of the surface water quality in Northern Greece. Water Res 37:4119–4124. https://doi.org/10.1016/S0043-1354(03)00398-1
Singh S, Hassan SMT, Hassan M, Bharti N (2019) Urbanization and water insecurity in the Hindu Kush Himalaya: insights from Bangladesh, India, Nepal and Pakistan. Water Policy 22(S1):9–32. https://doi.org/10.2166/wp.2019.215
Thanh NT (2019) Evaluation of multi-precipitation products for multi-time scales and spatial distribution during 2007–2015. Civil Eng J 5(1):1–13
Vasistha P, Ganguly R (2020) Water quality assessment of natural lakes and its importance: an overview. Mater Today 32:548–552. https://doi.org/10.1016/j.matpr.2020.02.092
Versari A, Parpinello GP, Galassi S (2002) Chemometric survey of Italian bottled mineral waters by means of their labelled physico-chemical and chemical composition. J Food Compos Anal 15:251–264. https://doi.org/10.1006/jfca.2002.1058