Artificial intelligence–based mountain soil erosion and the impact of climate conditions on marathon competitions

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Received: 12 March 2021 / Accepted: 1 May 2021 / Published online: 21 May 2021
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Abstract
Artificial intelligence is another breakthrough under the rapid development of the Internet and technology. It provides possibilities for the learning of knowledge, the automation of knowledge acquisition, the universality of expressing knowledge, and the efficiency of searching and solving. In the context of the global development of artificial intelligence, it also provides the possibility for the activation of the agent. Mountain is an important geomorphic unit on the earth’s surface. The biodiversity and the richness of resources are the foundation for storing tourism resources, water resources, and mineral resources. These abundant resources in the mountains also provide a good ecosystem for the surrounding areas and optimize the ecological environment of the surrounding areas. But the mountain ecosystem is actually very fragile. It can be compared to the engine of global climate change. Under the influence of global climate change, the diversity of species and the production of social development services will be affected. The water and soil elements of the ecosystem will change accordingly, and the coupling process will also change. In 2020, the domestic marathon event data will increase year by year, and the number of participants will continue to increase. Marathon is a challenging sport for all people to participate in, and its key point is no longer the word “sports.” “Marathon” is people’s pursuit of health and self-challenge. Completing the full course of the marathon will give people a sense of pride and accomplishment from the bottom of their hearts. The Chinese Athletics Association held 1102 marathons in 2020, an increase of 236% from the 328 in 2019. But with the rapid development of marathon sports, many problems have also appeared.

Keywords Artificial intelligence · Soil erosion · Climatic conditions · Marathon

Introduction
Artificial intelligence is another dream under the rapid development of the Internet and technology, which realizes the automation of system information acquisition and the efficiency of searching and solving (Aird 2018) (Cabrera-Miranda and Paik 2019). In the context of the global development of artificial intelligence, it also provides the possibility for the activation of the agent. The mountain ecosystem is actually very fragile. It can be compared to the engine of global climate change, acting as a signal amplifier (Chang et al. 2019). Mountain is an important geomorphic unit on the earth’s surface. The biodiversity and the richness of resources are the foundation for storing tourism resources, water resources, and mineral resources (Chapman 2004). These abundant resources in the mountains also provide a good ecosystem for the surrounding areas and optimize the ecological environment of the surrounding areas. Compared with foreign countries, China’s marathon history is very short, and the participation rate of early marathons is not very high. According to public records, only 86 runners participated in the 1981 Beijing Marathon. Later, although the number of participants increased to nearly 10 times, because the starting base was too small, there were still very few participants in the 1998 competition, with only 752 participating(Chen et al. 2018). It was not until the first 10 years of the twenty-first century that the number of participants rose to more than 10,000. It was not until 2020 that the domestic economy entered a transitional
period. The broad masses of people were encouraged to actively participate in physical exercises, and the people began to care about their own health problems (Clausen and D’Souza 2001). With the development of the Internet, the marathon has gradually become an Internet celebrity project through the use of advertisements on TV and mobile phones. It has been accepted by many middle-class people with money and time, and eventually has become a popular fashion sport. Ultra-long marathons originated in Europe and the USA more than 100 years ago. Compared with ordinary marathons, ultra-long marathons can better embody the athletes’ ability to control, surpass, and challenge themselves with perseverance (Connaire et al. 2015) (Dai and Zhou 2018). This article uses artificial intelligence technology to analyze the soil erosion in the mountains. At the same time, it explores the influence of the mountains and climatic conditions at different altitudes on the marathon competition, and analyzes the related influencing factors and the relationship between the factors (Datta and Mashaly 1990).

Application of artificial intelligence in mountain soil erosion

Because artificial neural networks have unique large-scale calculations, strong fault tolerance, and nonlinear fitting capabilities, their applications in water and soil engineering are becoming increasingly active (Drag 2017).

Wu took a city as an example, using the meteorological data of the previous 3 months to establish a BP network model to predict the ET0 of the next month. The statistical method is used to analyze the difference between the historical data and the statistical characteristic parameters of the model prediction data. Artificial neural networks are also used for soil pesticide concentration issues and drainage design. The complexity of the problems in the field of soil and water conservation engineering and the uncertainty of the relationship between the system and the factors limit the in-depth development of this discipline (Gao and Wu 2006). To a certain extent, the introduction of artificial neural networks will greatly promote the development of some research directions in the field of soil and water engineering, such an environment where human beings rely on survival, can develop to the greatest extent (Hosseini Kordkheili et al. 2011). As an algorithm that can be optimized globally, genetic algorithm has been developed rapidly in the inversion research of hydrogeological parameters.

Analysis of climatic conditions

According to the assessment report of the Intergovernmental Panel on Climate Change (IPCC) temperature change trend, the annual surface air temperature in China has risen by 0.5–0.8 °C in the past 100 years, which is higher than the global average level in the same period (Ju et al. 2014). And the climate in the north is significantly higher than that in the south of the Yangtze River. In the past 30 years, winter temperatures have risen significantly, and there have been 20 consecutive warm winters across the country. In precipitation change trends, nearly one hundred Chinese precipitation has not shown more important trend changes, but obvious sudden changes in time nodes and regional differences, for example, in the past 50 years, the middle and lower reaches of the Yangtze River, the southeast and northeast regions of the year the amount of precipitation increased significantly. With the global climate change in the future, China’s temperature and sea level will continue to rise, which will lead to the deterioration of the ecological environment (Kim et al. 2018).

Status quo of research on marathon competition

Sports events have injected vitality into the development of the city and left a valuable legacy for the host city. Promoting the national fitness marathon, realizing the sports lifestyle, and contributing to the construction of a healthy city, it has become a stage for public athletes and outstanding athletes to compete together. From the empirical analysis of the Xiamen city government’s public service supply and use concepts, models and measures, and then from the Xiamen International Marathon in the reasonable supply of public goods (public services), explore the local government’s innovation and experience (Lei et al. 2014). The second part focuses on the analysis of two key factors of the Xiamen International Marathon: the structure of the organizing committee and fundraising. At the same time, it discusses the direct experience of this kind of competition and points out the transformation factors of the “government-run competition” model (Li et al. 2010).

Materials and methods

Data source

Taking the data of 745 weather stations in China as the meteorological data source for the reference period, due to the change of the data year, the data of 599 weather stations from 1981 to 2020 were extracted. Figure 1 is obtained by calculating the annual average number of rainstorm days at various weather stations across the country (Li et al. 2017).

Research design

Literature data method

Document retrieval is divided into two types: online and offline: the data is collected through Internet information
platforms such as CNKI, EBSCO sports and life sciences, and the required data is collected by the National Library of China (Li et al. 2019a).

Field observation method

The main observation results did not improve significantly, which may be related to training at an altitude of 2000 m. First, observe whether the training has the same effect in the three regions with the same altitude of 2000 m, different oxygen content, different zonal zonality, and different vertical zonality (Li et al. 2019b).

Interview method

1. Interviewees: coaches and athletes
2. Interview content: member interview outline and coach interview outline
3. Interview location and time: In September 2020, the interview was conducted at Chenggong Subtropical Base in Province A (Low and Cheung 2012).

Case analysis method

Obtain key information through interviews, and then search for keywords to conduct specific case analysis.

BP network algorithm design based on artificial intelligence

Artificial intelligence has achieved great success in logical reasoning. The artificial intelligence technology system is shown in Fig. 2.

BP network generally uses (0,1) hyperbolic tangent sigmoid transfer function in the hidden function layer, as in formula (1):

$$f(x) = \frac{1}{1 + e^{-x}}$$  \hspace{1cm} (1)

In the output layer, it is generally a linear function as in formula (2):

$$f(x) = x$$  \hspace{1cm} (2)

The sample error calculation formula is as formula (3):

$$E_p = \frac{\sum (t_{pi}-O_{pi})^2}{2}$$  \hspace{1cm} (3)

The output of the hidden node is as formula (4):

$$y_i = f \left( \sum_j w_{ij}x_j - \theta_i \right)$$  \hspace{1cm} (4)

All sample errors are as in formula (5):

$$E = \sum_{k=1}^{p} e_k < \varepsilon$$  \hspace{1cm} (5)

One of the sample errors is shown in formula (6):

$$e_k = \sum_{l=1}^{n} \left[ t_{l}^{(k)} - O_{l}^{(k)} \right]$$  \hspace{1cm} (6)

After 10,000 times of training and learning, it shows a very high fit, as shown in Fig. 3, and the obtained network weight thresholds are shown in Table 1 and Table 2.

Meteorological data in 2020 are input into 4-factor and gastrointestinal medication BP-ET0. From the above training, the prediction model and the ET0 value (expected value) output model and the calculated ET0 value (measured value) Penman-Monteith formula are established, and the result is shown in Fig. 4 and Table 3.

Results

Comprehensive analysis of mountain soil erosion

Comprehensive overview of the study area

The geographical environment of the A River Basin is very special. The plants in the basin are distributed in a diverse manner and belong to mountainous rivers. Although there are many types of plants in this watershed, its ravines are many and large, so the vegetation coverage is very low. At the same time, the soil and water in the De A River Basin is facing a severe situation: precipitation in this area is relatively

![Fig. 1 National weather stations in the base period](image)
concentrated, and it is located in the center of heavy rain. This has brought serious harm to the balance of the ecosystem (Ma et al. 2019) (Muren et al. 2013). The overview of River A is shown in Fig. 5.

**Soil data analysis**

First, we need to fill the holes in the original DEM data. The data obtained after filling is a smooth DEM without depressions, as shown in Fig. 6.

Figure 7 shows the soil attribute data of the A River Basin, including soil type, texture, thickness, name, and other data.

Firstly, the images are spliced in ArcGIS 10.2; the image is cut using the watershed boundary vector, and the human-computer interaction visual interpretation and projection coordinates are performed on the image, and the following (Fig. 8) is obtained.

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**The overall characteristics of the spatial and temporal patterns and changes of soil erosion in the watershed**

Using the DEM system to convert the land and the like into a uniform resolution, combined with ArcGIS 10.2, the soil erosion modulus distribution of the A River Basin from 2000 to 2020 can be obtained, as shown in Fig. 9 (Rahmati et al. 2016).

**Comprehensive analysis of mountain climate conditions**

**The temporal and spatial distribution of ET0**

There are 135 meteorological stations in Inner Mongolia. The meteorological and geographical environment is complex, with an altitude of 104.7–1747.8 m, 98.9–125.3° east, 37.8–50.68° north, and they are evenly distributed. In order to fully reflect the changes of ET0 under different geographic and meteorological environments, the annual average values of

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**Table 1** The weight threshold of the four-factor artificial neural network model

| Temperature factor | Radiation factor | Humidity factor | Wind speed factor | Output layer |
|--------------------|------------------|-----------------|------------------|-------------|
| W1                 | W2               | B1              | B2               |
| 0.17S              | 0.567            | 0.298           | 0.44S            | 1.167       |
| 0.285              | 0.041            | 0.795           | 0.386            | 0.515       |
| 0.624              | 0.041            | 0.054           | 0.610            | 1.071       |
| 0.055              | 0.294            | -0.135          | 0.353            | 4.071       |

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the main meteorological factors in the three districts in Table 4 are calculated.

Based on the relationship between four meteorological factors and ET0, the relationship between four meteorological factors in different subregions and different non-freezing periods under different meteorological environments is discussed. Table 5 shows the correlation coefficients between ET0 and meteorological factors in a certain area.

Data processing results

On the basis of previous studies, combined with data time series and actual conditions, this study selected the maximum rainfall of 3 days as the precipitation indicator reflecting the impact of floods. The data of 745 weather stations in China is used as the source of meteorological data for the reference period. After data integration and screening, it is found that the year of the data is different. Finally, data from 599 weather stations from 2000 to 2020 were extracted for analysis. Chinese hydrologists generally use the Pearson III model to simulate the distribution of hydrological data series. The frequency curve of China’s new regulations “generally should adopt the P-III distribution, and can be used after other linear analysis.” After discussing the applicability of the distribution curves in the previous period, this paper finally chooses the Gamma distribution to fit the maximum 3-day rainfall sequence, as shown in Figs. 10 and 11.

Use GIS spatial differences to get grid maps 12 and 13 (Figs. 12 and 13).

The impact of climatic conditions on the marathon

Analysis of temperature conditions

Heat is the “killer” of the marathon. Because if the temperature is too high, athletes will sweat and dehydration may occur. Therefore, the average temperature of the city in the past 10 years is calculated, and the following (Fig. 14) is drawn.

Analysis of precipitation factors

It can be seen from Fig. 15 that the monthly average precipitation in a city, and the maximum monthly average precipitation in August, indicates that the annual precipitation is relatively concentrated.
A lot of rain will affect the performance of the race, but a small amount of precipitation is conducive to marathon running.

**Analysis of relative humidity factors**

From 2010 to 2020, it can be seen that the relative humidity of the city will decrease from January to April. Affected by the monsoon climate, spring urban winds, sand and dust weather will cause the loss of air humidity. Figure 16 shows the city’s nearly ten relative humidity statistics for the year.

**Analysis of wind speed conditions**

Strong wind will cause the performance of marathon runners to plummet. Figure 17 shows the average wind speed statistics of the city in the past 10 years.

**Analysis of atmospheric pressure conditions**

When the air pressure is between 1015 and 1023 hPa, it is most conducive to running a marathon. The international marathon in a particular city will be held in June. It can be seen from Fig. 18 that June is basically the month with the lowest monthly average air pressure in a certain city, which will have a certain negative impact on the results of the competition.

### Table 3 Comparison of data model test results in 2020

| Month | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|-------|---|---|---|---|---|---|----|----|
| Measured ETq | 12.216 | 13.503 | 12.461 | 10.415 | 10.399 | 10.061 | 7.578 | 4.4S5 |
| 4-factor forecast | 12.583 | 13.163 | 12.509 | 10.467 | 10.447 | 10.136 | 7.440 | 4.063 |
| Absolute error (min/d) | 0.368 | −0.340 | 0.04S | 0.052 | 0.04S | 0.075 | −0.138 | −0.422 |
| Relative error (%) | 3.010 | −2.452 | 0.383 | 0.504 | 0.460 | 0.749 | −1.824 | −9.404 |
| 3-factor forecast | 13.304 | 13.909 | 11.820 | 10.161 | 10.109 | 9.689 | 7.773 | 4.061 |
| Absolute error (min/d) | 1.088 | 0.406 | −0.641 | −0.254 | −0.290 | −0.371 | 0.195 | −0.424 |
| Relative error (%) | 8.905 | 3.007 | −5.142 | −2.440 | −2.785 | −3.692 | 2.572 | −9.465 |

**Discussion**

**The influence of mountains at an altitude of 4000 m on marathon training**

Because the natural environment of the Qinghai-Tibet Plateau at an altitude of 4000 m is very harsh, if you go to Tibet at an altitude of 4000 m, most of you will experience altitude sickness. It is difficult for the body to adapt in a short time, and it may even cause some damage to the body. The choice of altitude training height is exquisite: when it is too low, it will not stimulate the body, and when it is too high, the body will not be able to bear it. These are extremely detrimental to completing training tasks and improving functions, especially training that needs to improve comprehensive competitiveness. Therefore, the height of high-intensity training is the key to the success or failure of the entire high-intensity training.

**The influence of mountains at an altitude of 2500 m on marathon training**

Ethiopia has no special training grounds, only dirt roads, highways, etc. The best long-distance runners in the world train here, such as Ogatje from Japan and Dibaba from Ethiopia. The altitude of 2500 m is the necessary height for intensive training to gradually improve and adapt to the plain. Although it cannot be used as a top-level height training, it is enough for...
people to adapt to plain sports and can improve the comprehensive athletic ability of the trained person. The main purpose of altitude training is to add extra stimulation to the body, make it strong enough to produce excessive recovery, to improve functional changes and preserve energy. Athletes run through the event at an altitude of 4000 m. Because they have lived at an altitude of 4000 m for a long time, through physiological compensation, they basically react to life in a high-altitude hypoxia environment. There will be no such an altitude training at an altitude of 2500 m. Altitude hypoxia and exercise oxygen double load stimulation will not cause more profound stimulation to the body; it will not damage the ultrastructure of tissues and organs, nor can it increase the number of muscle fibers and hypertrophy during recovery, and the body will not produce complex physical fitness and training effects. It is worth mentioning that this kind of ultra-long distance marathon has indirectly become a training station for athletes.

The impact of plains on marathon training

Most of the large-scale sports events will choose the plain environment. The athletes of Tibet World Residence have achieved excellent sports performance in the 4000-m marathon by relying on their geographical advantages of growing in the plains. The plain environment is the best environment for all marathon athletes to carry out speed quality training, which can train their body tolerance and improve their running speed.
Marathon training strategies based on different climates and mountain environments

The amount and intensity of the marathon training plan

In marathon training, in order to have a more intuitive understanding of the training intensity of the athletes, the formula for the continuous running of the training intensity level parameters of the marathon athletes: 3:30–4:10/km is the first speed (lightweight), 3:05–3:30/km is the second level speed (intermediate), and 2:45–3:05/km is the third level speed (fast). These parameters will determine the intensity of the training load according to the duration of the run. Running a marathon distance is also a high-intensity training. In the practice of sports training, coaches face athletes of different competitive levels. These parameters are set for high-level male marathon runners. They are basically

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Fig. 7 Soil type map of a river basin in a mountain A

Fig. 8 A Map of land use types in the river basin in 2010, 2015, 2018, and 2020
runners whose performance is within 2 h and 10 min, so their performance is limited.

Among the 12 coaches in this article, two training methods are used: training characterized by medium training volume and high intensity (more interval and continuous training) and training characterized by high intensity such as high training volume (more interval and continuous training). The proportion of people using these two methods is 50%, which is 6 people. On the other hand, coaches in Latin America tend to use medium- to high-intensity training (including a Mexican coach).

All in all, coaches from all over the world have different views on the amount of exercise in the training of the world’s outstanding marathon runners. But the unanimous view is the weekly exercise is between 160 and 260 km, and the load in the preparation phase is not the largest. The preparation before the race and the exercise in the weeks before the race are the largest. This is due to the special adaptation of the marathon. Ability needs to arrange more special practice effects. The amount of exercise of excellent athletes is based on the average value in the world, and different amounts of strength training are added. Strength training is the core of the modern marathon training content, so in the pre-race preparation and competition stage, the weight-bearing arrangements are mostly higher than the short section of MPR and the long distance close to MRP.

Marathon training method system

The training method of modern marathon is the most effective training method among all the training

Table 4 Multi-year average of meteorological factors in each region

| Month | Western dry morning area | Central semi-arid morning area | Eastern Sub-humid Region |
|-------|--------------------------|---------------------------------|--------------------------|
|       | T            | RH | II | N     | T            | RH | II | N     | T            | RH | II | N     |
| 4     | 8.84 | 34  | 3.37 | 9.06  | 5.08 | 39  | 4.06 | 8.99  | 4.53 | 4.3 | 3.53 | 8.70  |
| 5     | 15.6 | 33  | 3.34 | 9.96  | 12.5 | 38  | 3.94 | 9.83  | 12.8 | 42  | 3.39 | 9.28  |
| 6     | 20.5 | 39  | 2.97 | 10.3  | 17.4 | 49  | 3.14 | 9.83  | 18.2 | 59  | 2.52 | 9.17  |
| 7     | 22.7 | 51  | 2.69 | 9.50  | 20.2 | 6   | 2.61 | 8.95  | 21.0 | 71  | 2.12 | 8.38  |
| 3     | 21.1 | 56  | 2.56 | 9.11  | 18.4 | 65  | 2.38 | 8.74  | 19.0 | 72  | 1.95 | 8.47  |
| 9     | 15.2 | 52  | 2.38 | 8.78  | 12.0 | 57  | 2.64 | 8.64  | 12.7 | 63  | 2.32 | 8.22  |
methods that exist in marathon training in the world today. The reason why some marathon training method systems in the world are called systems is that they all have their own outstanding characteristics of training, and they have achieved success by relying on these outstanding characteristics. It can be seen that the

| Month | Western Arid Area | Central semi-arid morning area | Eastern Sub-humid Region |
|-------|-------------------|-------------------------------|--------------------------|
|       | T     | RH    | U     | N     | T     | RH    | U     | N     | T     | RH    | U     | N     |
| ET°(4) | 0.55  | -0.87 | 0.48  | 0.53  | 0.45  | -0.89 | 0.42  | 0.54  | 0.97  | -0.92 | 0.39  | 0.17  |
| ET°(5) | 0.56  | -0.83 | 0.61  | 0.49  | 0.35  | -0.84 | 0.70  | 0.71  | 0.91  | -0.81 | 0.50  | 0.33  |
| ET°(6) | 0.67  | -0.90 | 0.75  | 0.44  | 0.57  | -0.92 | 0.72  | 0.54  | 0.76  | -0.81 | 0.81  | 0.55  |
| ET°(7) | 0.67  | -0.95 | 0.77  | 0.60  | 0.64  | -0.93 | 0.79  | 0.85  | 0.76  | -0.78 | 0.69  | 0.80  |
| ET°(8) | 0.73  | -0.97 | 0.74  | 0.57  | 0.60  | -0.93 | 0.78  | 0.83  | 0.80  | -0.83 | 0.49  | 0.70  |
| ET°(9) | 0.49  | -0.94 | 0.71  | 0.69  | 0.40  | -0.87 | 0.67  | 0.72  | 0.88  | -0.85 | 0.31  | 0.92  |
| Average | 0.61  | -0.91 | 0.68  | 0.55  | 0.50  | -0.90 | 0.68  | 0.75  | 0.85  | -0.83 | 0.53  | 0.58  |

Fig. 10 The maximum 3-day rainfall of different return periods in the base period
The maximum 3-day rainfall for different return periods in the future

Fig. 11

Annual average number of rainstorm days in the base period

Fig. 12

The marathon training method system is not difficult to establish. You only need to summarize the general laws of the marathon project, and then you can summarize the content that can be used for reference.
In the construction of the method system, on the surface, the supporting software and hardware are not the content of the training method. However, in the entire implementation process of the training method, supportive software and hardware play a relatively large role in whether the training method can be used effectively. Supportive software, hardware, and training methods have an inherent and regular connection. Using this connection, a marathon training system with “marathon training methods” as the core can be established. By doing so, the establishment of the training system can become more complete, and it can allow us to more intuitively see the factors that affect the marathon, so as to better establish the marathon training system. The description of the essential content of the sports training method system shows the training concepts and cutting-edge theories involved in modern marathon training as much as possible. I hope that at least by reading these contents, you can have a preliminary understanding of the modern marathon training method system.

Continuous training method

Continuous training is to complete a certain load without rest for a long time. For a marathon, the continuous training method is the practice of continuously completing the running, and the running time can be minutes or hours. In fact, the current training method, due to the needs of sports training, has been completely changed at a stable pace, that is, the trainer sometimes requires the athlete to change the running pace in a continuous process. Continuous training is a training method that lays the foundation for the marathon. In the entire career of a marathon runner, this training method occupies an absolute position. The table is the specific element of the continuous training method. The types of training methods include running for a long period of time, running at different speeds in time, running time at a fast pace, medium time running at a constant speed, running...
fast in a short time, and running in a short time, at a gradual acceleration. In practice, different coaches use different methods or means for continuous training, but continuous training is the basic training method to develop aerobic capacity and special endurance. According to training needs, coaches conduct continuous training exercises suitable for athletes.

Continue to run for a long period of time, mainly the development of aerobic capacity usually lasts an hour, which is a long time, so the exercise intensity is less than the speed of a marathon, when the aerobic capacity of the exercise intensity developed in the preparatory phase, with the game. The method of improving exercise intensity is also the development of special abilities. Moderate, continuous running for about 1 h increases the intensity of exercise compared to long, continuous running, and it varies according to the purpose of the exercise. The continuous running time is short, and the training time is about 1 min. Due to the short time, the training intensity is generally higher than this, and most of them are arranged in the pre-match preparation period and the competition period.

**Combination training method**

The combined training method refers to the combination of different training methods and training content in marathon training to achieve the purpose of improving athletic ability. Just when setting up the route, it is necessary to clarify the training purpose and the tasks that need to be completed in advance, such as to increase the interest of team practice, or to cultivate the various abilities of the athletes. The total amount of exercise should be different from the middle- and long-distance running events, that is, larger, such as running on various uphill and downhill terrains. This is also conducive to the improvement of athletes' lower limb strength and endurance. Running uphill, such as running for miles uphill, can cause sore legs, so do not participate in strenuous training sessions. It is best not to arrange such exercises during competitions and transitions. Physical training is also a part of marathon training. Marathon running has high requirements on the lower limbs of the participants. Therefore, the training of the lower limb support ability is very important. It is necessary to attach great importance to the strength of the lower limbs and the function of joints. Generally speaking, the content of physical training is applicable to the physical training of marathon runners.
Interval training method

The main feature of interval training is that there is a period of rest between two or more exercises, and there is not enough time for the body to fully recover. Interval training is also one of the most commonly used training methods for marathons. Due to the long distance of the marathon, it is impossible to run the entire course. Therefore, the training and improvement of its competitive ability mainly adopt short-term and multiple training to accumulate the training volume. At the same time, because the strength form of the marathon athletes of m and m is the same, that is, the aerobic strength is the main factor, so marathon athletes are more likely to transfer the quality and ability of each other in training and running events, and marathon events have higher requirements for speed. The longer the endurance time, some of the best Hami athletes in the world now train for marathons, which is why some of the best marathon runners in the world are also excellent meter runners. Therefore, the number of times a week cannot be arranged too much, at most two times, and there must be a few days apart to ensure the recovery of body functions. The examples in the table are based on the level of male and female athletes. Athletes of different levels can calculate the speed of exercise according to their level and load requirements.

Conclusion

Aiming at the complexity of some systems in the field of soil and water research, artificial neural networks and genetic algorithms are used to optimize soil and water parameters. Because artificial neural network and genetic algorithm show strong self-adaptive ability, it brings convenience for solving complex soil and water system. Based on the analysis of multiple system influencing factors, an artificial neural network model of different influencing factors is established. Through the analysis of the test results, the optimized model is obtained. In view of the shortcomings of traditional optimization algorithms, the application of genetic algorithms to solve the crop moisture model to adjust the soil moisture content opens up a new way to solve the objective factors affecting the marathon. The geographical environment of the A River Basin is very special. The plants in the basin are distributed in a diverse manner and belong to mountainous rivers. Although there are many types of plants in this watershed, its ravines are many and large, so the vegetation coverage is very low. At the same time, the soil and water in the De A River Basin is facing a severe situation: precipitation in this area is relatively concentrated, and it is located in the center of heavy rain. When the terrain undulation is in the range of 70–500 m, most of it is moderate erosion,
and the total erosion amount is 93.86%. The area with an altitude of 600–1200 m, a slope above 15°, and a topographic undulation of 700–500 m are key area for soil erosion prevention and control. The weather has a great influence on the marathon, because the human body’s physical fitness will be affected by changes in the weather, and the marathon is the most demanding of all sports. Even in the most comfortable weather environment, an ordinary adult who has not received a lot of physical training cannot complete the 42.195 km long-distance running. Even well-trained athletes face serious challenges in weather conditions such as high temperature, low pressure, high humidity, or heavy storms. In addition to the relative humidity of 30–60%, the temperature of the best marathon should be between 14 and 16 °C, and the wind speed should not exceed 5 m/s. Weather and climatic conditions really have a great influence on the marathon, especially when the weather environment will directly affect the climatic conditions; it will also put pressure on the physical fitness of the marathon runners and affect the results of the competition. Therefore, we must learn to use artificial intelligence to monitor climatic conditions, and seek a time that is most conducive to athletes’ physical strength to carry out a marathon, so that participants can create new competition records.

**Funding** This paper was financially supported by Provincial Philosophy Science Program: Research on Sustainable Development of Marathon from the Perspective of National Fitness Project Number: 2019BTY01.

**Declarations**

**Conflict of interest** The author declares no competing interests.

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