

Analysis of Outdoor Environment of Fitness Martial Arts in Chengdu Based on Big Data

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ABSTRACT. *The continuous development of every thing in the world must have the environment on which it depends for its survival, and the environment can not be separated from the development of human reproduction, cultural heritage and development, and innovation breakthrough in science and technology. The same is true of the development of fitness martial arts, which cannot be separated from the basic conditions of natural environment, social environment and political environment. Through the collection and collation, data cleaning, analysis and visualization of the relevant data on Chengdu on the Internet, it is concluded that the air environment in Chengdu is getting better year by year, the park fitness venues show the characteristics of the scattered distribution of urban centers, the government is strongly supporting and promoting the development of national fitness activities, and the new parks and other fitness venues are used to better promote the development of national fitness.*

KEYWORDS: *Fitness martial arts, Outdoor environment, National fitness*

1. Introduction

“Healthy China 2030” proposes to follow the principles of “health first, reform and innovation, scientific development, fairness and justice” to promote the equalization of public services in the field of health. The “National Fitness Plan (2016-2020)” proposes to coordinate the construction of a public service system and facilities for national fitness through three-dimensional construction, integrated promotion and dynamic implementation, so as to make it convenient for people to exercise nearby. ^[1] All provinces have successively formulated health strategies suitable for the development of provinces.

Chinese martial arts is one of the traditional sports of Chinese nation. The development of fitness martial arts has a driving effect on martial arts. Fitness martial arts is a sport with a wide range of influences and massive participants. It is easy for the majority and conforms to the characteristics of Chinese national habits. It has practical values such as promoting the overall development of oneself, physical values including fitness and comfort, and social values such as shaping beneficial relationships. It is based on traditional theories including “yin and yang,

viscera and bowels, qi and blood, and meridians”, with “dong xing (movement)” as the basic exercise form, and the basic function of nurturing people with “essence, spirit, qi, and blood” to make the various functions of human body coordinated and unified in the state of “Deficiency and Excess, motion and stillness”.^[2-3]

Currently, most researches are carried out more from the perspective of sports itself, and mainly focus on school sports. Research on mass sports accounts for a minority, and research on the fitness environment is much more infrequent. With the advancement of science and technology, researches should pay more attention to cooperation with science and technology to increase its practical significance. The development of human society is inseparable from a suitable environment, and the healthy development of martial arts is similar, health problems caused by sports in environmental pollution cannot be neglected.

Martial arts is characterized by attaching special importance to breathing, and the environment is particularly important. Fresh air and silent atmosphere, parks are unskceptically the optimal choice. Exercise in such an environment, supplemented by correct methods, can get twice the result with half the effort. Through the investigation and analysis of air and other data of parks, we can more efficaciously control the state of the area.

2. Research Method

2.1 Data Source and Collation

Big data refers to the collection of data published on the Internet with official permission, which has the characteristics of large dimensions, mixed information, and fast update. This article uses python technology, following the robots regulations to obtain relevant research data. The content of the data obtained is the POI of all parks in Chengdu, the national fitness information released by the Chengdu government from 2016 to 2019, the air quality in Chengdu in the past five years (month), and the population of each district in Chengdu (Ministry of Civil Affairs of the People's Republic of China) . Through data cleaning and other processing methods, invalid, error, and null information are eliminated, and eventually valid data is obtained for research.

2.2 Data Analysis Methods

2.2.1 Average Nearest Neighbor Analysis

Calculate the nearest neighbor index based on the average distance between each feature and its nearest neighbors. The calculation will return five values: average observation distance, expected average distance, nearest neighbor index, z-score, and p-value. The result of z-score and p-value is a measure of statistical significance, used to judge whether to reject the null hypothesis. [3-4] The calculation formula

$$\text{is: } ANN = \frac{\bar{D}_O}{\bar{D}_E}$$

2.2.2 Analysis of Aggregation Points

Create visual graphical analysis by aggregated point analysis and create polygons around clustering of approximate point features. Create polygons around the clusters of three or more points within the aggregation distance and create a one-to-many relationship table for connecting aggregated polygons to their source point features based on the same location for subsequent observation.

3. Research Results and Analysis

3.1 Distribution Characteristics of Park Fitness Places

Table 1 Descriptive Statistics of Parks in Chengdu

Average	Standard Deviation	Variance	Kurtosis	Skewness	Minimum Value	Maximum Value	Summation
26.2	16.85729578	284.1684211	0.429196966	0.829358283	2	68	524

Through Baidu, AutoNavi API and other data platforms, searching for keywords as parks to obtain relevant data for data cleaning, 524 effective park addresses in Chengdu are finally obtained. From the descriptive analysis of Table 1, the peak value of park data in each district is 0.429196966, and the distribution is kurtosis. The skewness is 0.829358283, on the right. Obvious differences are existed in the number of parks in various districts of Chengdu. The main feature is the city center is clustered with districts around are sparse. Wuhou District is the most plentiful one and Pujiang Country is the least one. The average number of parks in each district/county is 26.2, and there are 12 districts/counties below the average. 22 parks directly named after sports, including parks under construction through the data analysis.

The importance of the park to martial arts fitness is self-evident, it can provide people with a relatively comfortable fitness environment. The overall environment of the park is suitable for martial arts exercises. At the same time, as an iconic place, it can play a leading role in drainage, facilitate making friends through martial arts, and form a situation of mutual promotion. Therefore, urban development needs to consider the location of fitness parks in an all-round way to promote the construction of sophisticated cities.

Sports is one of the key factors. The construction of the park is affected by various factors including the population, economic development, and social benefits

of an area. Nevertheless, while considering these factors, it is also necessary to consider the fairness of its services. Therefore, the state of park services can be obtained from the number and distribution of park construction.

3.2 Analysis of Park Convergence Points in Chengdu

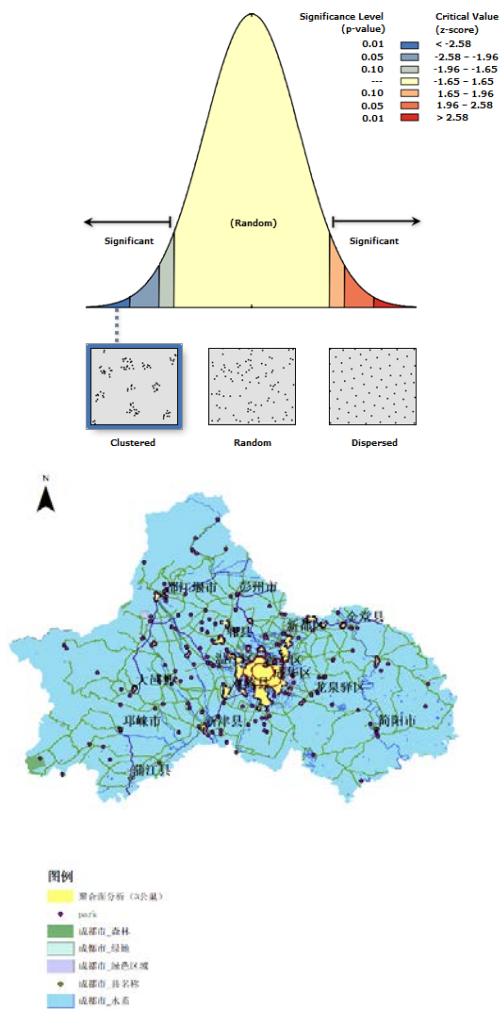


Fig.1 Analysis of Aggregation Points in Chengdu Parks

Through the ARCGIS, the average nearest neighbor analysis and the aggregation point processing (the aggregation distance is 3 kilometers) are displayed, and the results are above. The z-score is -25.114242 and the p-value is 0. The result demonstrates a lot that the park is unevenly distributed. It can be seen from Table 2

that parks in Chengdu present a characteristic of clustering in urban centers and discrete distribution in other areas. Some areas have problems such as limited park services and deficient parks. Although the distribution of urban parks is restricted by many factors, as a high-quality place for sports services, the uniform distribution of parks plays a crucial role in the overall development of the city, the implementation of the national fitness plan, and the promotion of sports health.

3.3 Rainfall in Various Districts and Counties of Chengdu in 2019

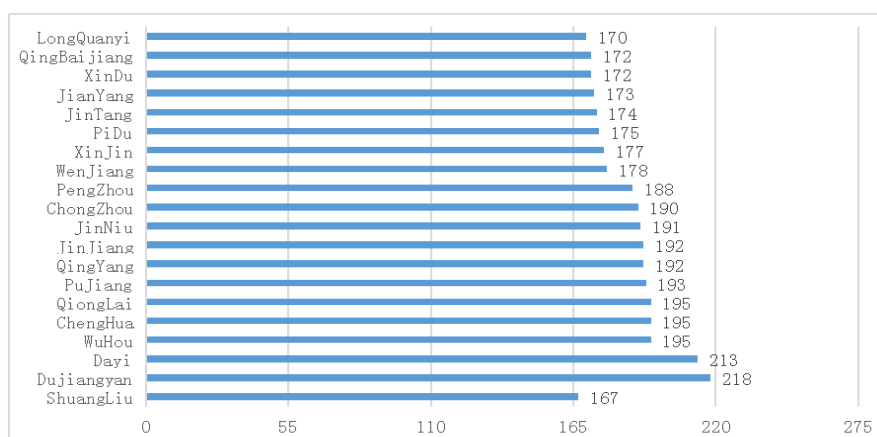


Fig.2 the Number Of Rainy Days in Chengdu in 2019

Exercising in an outdoor environment, rainfall will become one of the resistance factors for exercise. Understanding the state of rainfall is beneficial to better grasp the development of national fitness, the location of indoor fitness venues, and the dynamics of fitness flow.

The average rainfall in Chengdu in 2019 was 186 days, with the highest value in Dujiangyan City and the lowest in Longquanyi District. For areas with relatively heavy rainfall, rain shelters can be set up in parks, and for areas with less rainfall, publicity for outdoor fitness can be increased to improve park service benefits.

3.4 Analysis of Population Density in Various Districts of Chengdu

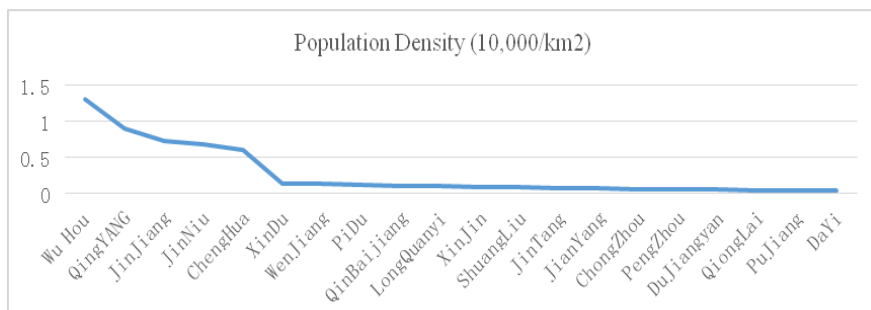


Fig.3 Population Density Map of Chengdu

Appropriate population density is one of the staple factors to ensure good living and sanitation in the area. The outdoor fitness environment is also affected by population density. In high-density areas, the corresponding basic services may not keep up with the needs of the people, which may lead to the loss of sports population.

From the above table, we can see that the highest population density (mathematical density) in Chengdu is Wuhou District, and the lowest is Dayi County. In order to better ensure the fairness of public services, the corresponding public services should also keep up with areas with higher population concentration. This also reflects from the side why the construction of parks in areas with higher population density such as Wuhou District is slightly higher than other regions. But from the perspective of overall urban development, the balance of various indicators is the most ideal situation.

4. Conclusions and Recommendations

4.1 Conclusion

The distribution of outdoor parks in Chengdu is unevenly distributed, which has a certain connection to the distribution of politics, economy and population. Nevertheless, from a regional perspective, some areas have problems including limited service coverage and insufficient accessibility.

After a series of measures taken by the national government, the air environment quality in Chengdu is developing in a stupendous state, which is a positive signal for outdoor fitness and can strengthen the publicity of outdoor fitness. Due to geographical conditions, Chengdu has numerous rainy days, which will affect people's participation in outdoor fitness to a certain extent.

The national government attaches importance to national fitness and people's physical fitness. The Chengdu Municipal Government is also hosting large-scale international and domestic competitions to encourage people to participate, improve

health awareness, and promote the effective development of national fitness.

With the current rapid increase in urban population, the environment is facing the same pressure. At the same time, the number of park services and the radiation range are limited. When the two point conflicts, people choose places that are not suitable for fitness, such as roads, which is not conducive to sustainable development.

Most residents choose non-consumer places nearby home to exercise. With the continuous development of martial arts fitness activities, the number of participants continues to increase. A suitable environment is a powerful guarantee for the healthy, sustained and effective development of martial arts activities.^[6]

4.2 Suggestions

The location of urban parks needs to be considered in an all-round way, and public sports services are one of its primary factors. Chengdu currently has the problem of uneven distribution of parks, and more consideration needs to be given to the construction of non-urban centers. This can better promote the comprehensive development of the city and the development of fitness martial arts in various regions. For communities with a small number of parks and low-quality fitness environments, indoor martial arts fitness activities can be organized.

Construction of a fitness network platform should be promoted, relevant trends should be released in time. And the publicity of fitness and martial arts health knowledge should be strengthened, and it's better to encourage people to exercise in an outdoor environment with fresh air. Strengthen the formation of martial arts fitness atmosphere, promote the harmonious coexistence of the environment and people, and play a synergistic effect are what we should be working for.

Although the current air environment is gradually improving, it is also in the pollution stage for some time. In the face of this situation, people should avoid exercising in outdoor places with environmental pollution. It's optional to choose a ventilated room and choose martial arts exercises that take up a small space for exercise, which can also exert fitness effects.

The healthy development of fitness martial arts is inseparable from the support of the government, the trust of the people, and the long-term persistence of the martial arts people who are keen on it. In order to better promote the orderly development of fitness martial arts, it is necessary to strengthen the popularization of fitness martial arts scientific knowledge, help people disentangle truth from falsehood, improve the participants' fitness and other values, so that the martial arts can gain a foothold in diversified sports and the ever-changing society.

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