

Research on Campus Public Space Behavior Based on Thermal Map

-- Taking Neijiang Normal University as an Example

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Abstract

With the advent of the era of big data, the Internet has brought earth shaking changes to all aspects of the whole society. As the most active place to spread advanced social culture, university campus has a great influence on it. The influence of teaching means, thinking mode and college students' behavior mode is extremely far-reaching. Therefore, in this context, the change of College Students' behavior and activity mode has a very important reference significance for the planning and construction, spatial layout, functional zoning and so on. This paper analyzes the temporal and spatial characteristics of crowd activities in campus public space through Internet thermal map. Taking Neijiang Normal University as an example, the school space is divided into living area, sports area, landscape area and teaching and research area to study the population density of these areas in different periods of time. Then according to the relative number of people in each district, the population activity of each district is analyzed. Finally, on the basis of theoretical research results, the paper analyzes the characteristics of space-time law of crowd activities in campus public space, summarizes the problems, and puts forward relevant planning improvement suggestions.

Keywords

Big data era; Thermal map; University Campus; Behavior style.

1. Introduction

In the era of big data, all aspects of society are greatly affected. The popularity of the network has a direct impact on the traditional behavior and activities of the university campus, and has a far-reaching impact on the campus function zoning planning, campus behavior and activities, teaching means and thinking mode. The planning and layout, landscape greening and design scheme of university campus have been seriously challenged. The rapid popularity of the Internet, on the one hand, has injected fresh blood into school education, on the other hand, has brought great changes to the behavior of students in public space. The Internet has changed the way people behave in public space, and also provides data support for public space planning and design. Therefore, this paper will mainly discuss the changes of campus behavior in the network era. [1]

Through the use of Internet thermal map and ArcGIS to collect relevant behavior data, this paper analyzes the spatial behavior habits of contemporary college students, and then according to the results of spatial behavior analysis, it effectively analyzes the contradiction between campus planning layout and spatial behavior activities, and puts forward targeted improvement schemes for the planning layout and landscape greening of university campus. This paper takes the Internet thermal map as the means, takes the university campus as the

research object, and studies the characteristics of campus spatial behavior, which has the following significance:

From the primitive society to the agricultural society and then to the industrial society, new productive forces have appeared in every era to replace the previous productive forces, and each leap has brought profound changes to all aspects of society. Nowadays, the network era brought by the third industrial revolution has had an unprecedented impact on the society, bringing positive impact, but also putting forward more severe challenges for the new era. Nowadays, students, as one of the main users of the network, make the campus classroom not limited to the traditional teaching mode, but extend to the whole network covered campus. As an important carrier of education, university campus is an important place for the country to spread advanced culture, cultivate higher talents and conduct scientific research. With the opening of university education to the society, the connotation of education has changed a lot. University campus not only plays an important role in the field of education, but also plays an important role in social development and the future of the country. Therefore, it is of great significance to study the spatial behavior of university campus. The traditional campus living environment is impacted by the network era, there will be a series of problems: the changes of the existing behavior and activities, the rationality of the current campus planning... This series of problems are of great significance to the development of the campus, therefore, the field research on this problem is carried out.

2. Overview of the Study Area

Research object: This paper mainly studies the general law of campus space behavior in the era of big data. Taking Neijiang Normal University as an example, this paper studies the changes of College Students' campus space behavior activities on weekdays and rest days. [2]

Research scope: under the background of big data era, research on campus space behavior, planning field and landscape greening. And it only studies the spatial behavior of college students on campus, not the spatial behavior of teachers and their families, logistics personnel and other related staff.

2.1. Overview of Neijiang Normal University

2.1.1 location overview

The school is located in Dongxing District of Neijiang City, which is located in the southeast of Sichuan Province, the "land of abundance". It is located in the center of Chengdu Chongqing Economic Zone, the fourth pole of China's economic growth. It is located on the bank of Tuojiang River with outstanding people, rich culture and elegant atmosphere. It is an important transportation hub and logistics center at the junction of Sichuan, Chongqing, Yunnan and Guizhou, It is known as the hometown of Daqian and the hometown of painting and calligraphy. [3]

2.1.2 property overview

Neijiang Normal University is a provincial undergraduate Normal University sponsored by Sichuan Provincial People's government and supervised by Provincial Department of education. It is a public university. The school's predecessor was the junior high school teacher training class in Sichuan Province, which was founded in 1956 with the approval of the Ministry of education. Later, it was renamed Neijiang Normal College and Neijiang junior high school. After it was closed in 1962, some teachers separated and established Neijiang Teachers' training school, which implemented two brands and a set of leading groups with the regional education administrative cadre school. Neijiang Normal College was rebuilt in 1978 and renamed Neijiang Normal College in 1992. In 2000, Neijiang Normal College and Neijiang Institute of Education (including Neijiang art and sports normal school, founded in 1905 and merged in 1998) merged

to form Neijiang Normal College. In the past 62 years since higher education was held, especially since it was upgraded in 2000, the university has fully implemented the party's educational policy, adhered to the socialist direction of running a school, took personnel training as the foundation, took serving the society as its own responsibility, continuously explored and innovated, forged ahead, and gradually developed into a normal education and non normal education coexisting, with distinctive characteristics, complementary advantages, and independent education Coordinated development of local colleges and universities.

2.1.3 professional overview

The school now has the College of liberal arts, Fan Changjiang School of journalism, School of mathematics and information science, School of physics and electronic information engineering, School of architectural engineering, School of chemistry and chemical engineering, School of foreign languages, School of politics and public management, School of Marxism, School of geography and resources science, School of economics and management, School of physical education, Zhang Daqian Academy of fine arts 18 secondary colleges, including Conservatory of music, College of computer science, College of educational science, College of life science and College of continuing education, offer 55 undergraduate majors, including 16 normal majors and 39 applied non normal majors, covering 10 disciplines including literature, science, engineering, agriculture, law, education, management, history, economics and art. The school covers an area of 1005 mu, with more than 350000 square meters of school buildings, nearly 200 million yuan of teaching and scientific research equipment, more than 1745000 books and materials, 1379 Chinese and foreign periodicals and 46 electronic resource databases. The university enrolls students from 28 provinces and municipalities in China. In 2011, it began to train graduate students jointly with Sichuan Normal University. [4]

2.1.4 environmental overview

The school is close to the Tuojiang River, with pleasant environment and good atmosphere. It is suitable for running school in both natural and humanistic environment. Natural environment: it is located in subtropical monsoon climate zone, with moderate temperature, abundant precipitation and humid air. It is located in Dongxing, Neijiang City, with flat terrain, little fluctuation and good surrounding environment. The vegetation coverage rate in the campus is high, and the green space rate is about 45%; In terms of Humanities: Neijiang City has a profound cultural heritage and a large number of talents. The reputation of "hometown of thousands" and "hometown of painting and calligraphy" makes the whole campus be rendered with such atmosphere. Traffic, the school belongs to the main urban area, all kinds of traffic in all directions, coupled with the opening of high-speed rail to make traffic and convenient. [5]

2.2. General Situation of Students in Neijiang Normal University

2.2.1 Basic situation of students

The basic situation of students is mainly divided into three aspects: the total number of students in school, the ratio of male and female students, and the age of students. At present, there are more than 18000 full-time students, including 44 master's degree students and nearly 100 foreign students (including language students). As the school is a normal university, the ratio of male to female is about 3:7. It is a common phenomenon that many boys and girls are in normal universities. The age of students is mainly 18-23, and some of them fluctuate in the range of 1-3.

3. Research Methods and Data Sources

3.1. Research Methods

3.1.1 overview of Internet thermal map

Internet thermal map is mainly a product of the development of modern science and technology, which serves people's urban life and mainly reflects the different density of people's flow in a certain area over time. Usually, the color from light to dark indicates that the flow of people in the area is from sparse to dense, which can clearly reflect the living and working habits of people in a certain area, and provide great convenience for the choice of business location, travel mode, destination and other aspects.

3.1.2 summary of main research methods and routes

Summary: summarize the data obtained by the software, combined with the field functional zoning for comparative analysis, summarize the behavior mode of campus public space in the era of big data. [5]

Case demonstration: Based on the thermal map, this paper makes a specific case study of Neijiang Normal University, and summarizes the changes in the behavior mode of campus public space in the era of big data.

Literature support: extensive reading of many domestic related journals, books, excellent master's and doctoral dissertations, providing sufficient knowledge and theoretical reserves for each stage of the research. [6]

3.2. Data Sources

In order to collect data, two sunny days in spring were selected for the survey. Considering people's living habits, Monday's working day and Saturday's rest day were selected for comparison. Firstly, we need to obtain the behavior change data of public space from 8:00 a.m. to 9:00 p.m. in two days through the Internet thermal map. Through the thermal map, we can intuitively understand the population density of a certain place at a certain time, but it has no specific data, but we can estimate its percentage value, and then locate it in the plane map drawn by Arcgis through coordinates. In order to understand the flow of people more intuitively, the school space is divided into several different areas to study the degree of flow of people in different time periods. Functional areas include teaching and research area, sports area, living area and landscape core area. Finally, by comparing the relative density of people flow in different regions, we can analyze the population activity of the whole region over time, and get the data.

4. Analysis of Public Space Behavior of Neijiang Normal University

"Picture urbanism" mainly studies people's intention of urban space based on network pictures. Based on this theoretical basis, the temporal and spatial characteristics of public space behavior of Neijiang Normal University are analyzed by using Internet thermal map.

The first analysis is the population activity of teaching and research area (see Figure 1), from which we can see the change of population activity from 8:00 to 10:00 on rest days and working days. At 8:00, 11:00, 17:00, 20:00, there will be a high peak, and at 12:00, 13:00 and 21:00 after the night break period continued to appear low peak. And the flow of people in class on weekdays is significantly higher than that on rest days. However, no matter on weekdays or off days, the values at 12:00, 13:00 and 21:00 in the evening and 22:00 are very close. It can be roughly considered that students choose more autonomous learning and scientific research activities in this period.

4.1. Analysis of Spatial Behavior Change

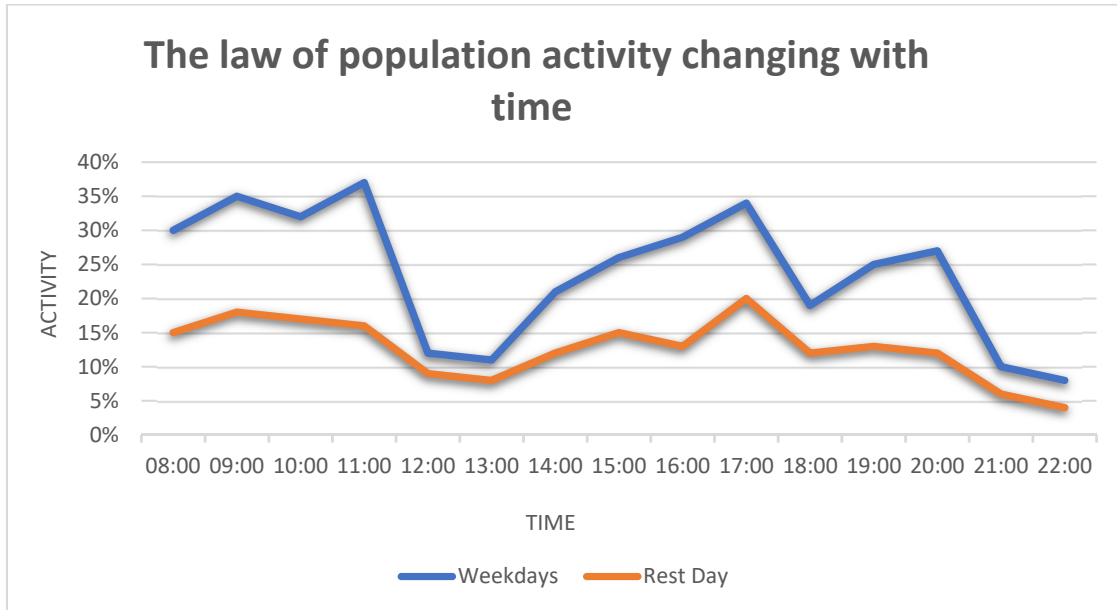


Figure 1. Analysis of population activity in teaching and research area

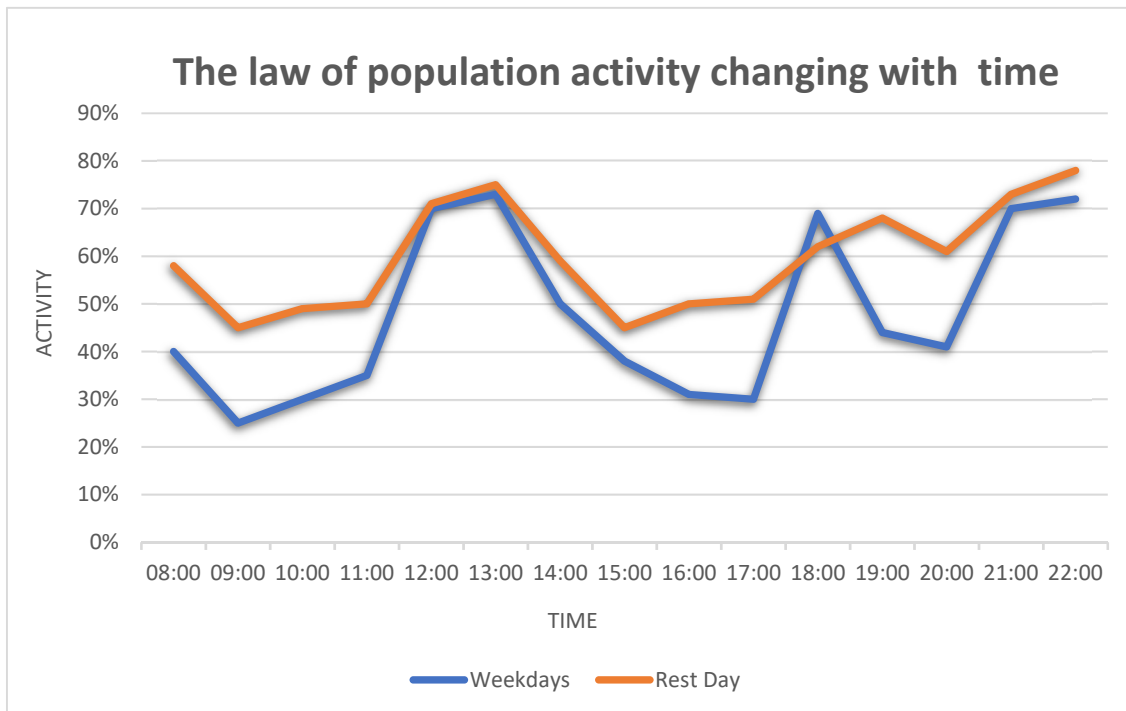


Figure 2. Analysis of population activity in living quarters

Figure 3 is the data of the living area. It is very intuitive to see that the peak of people flow activity in the living area is mainly concentrated in the rest period after 12:00, 13:00, 18:00 and 21:00. There will be a low peak at 9am and 5pm, when most students are still in class or extracurricular activities. Generally speaking, the population activity on the rest day is significantly higher than that on the working day, because students are tired after a week's course and usually like to rest in the dormitory on weekends. [7]

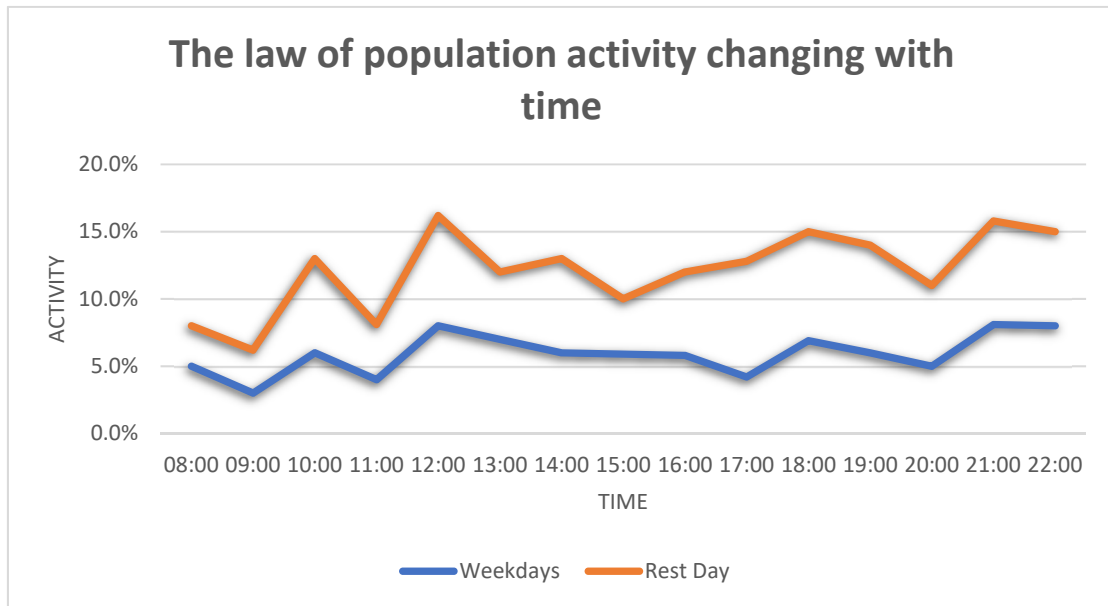


Figure 3. Analysis of population activity in sports area

The activity of the motor area is not high compared with other areas. It can be seen that the population activity of the sports area on the rest day is significantly higher than that on the working day, and its highest point is no more than 10%. Considering the small area of the school sports area, the limited space and the limited flow of people, nowadays people's sports mode is more diversified, so they do not necessarily choose the sports area for activities. So there is little difference in the flow of people. The rest day is slightly higher than the working day, which shows that the students like to use the weekend time to exercise. During the week, the curriculum arrangement of the students is tight, the students have less spare time, and fewer people choose to exercise.

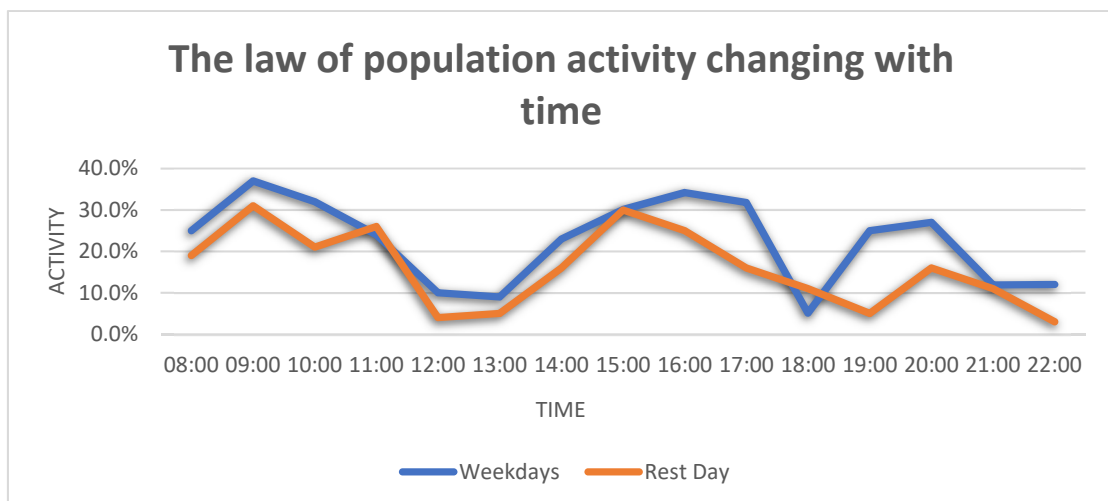


Figure 4. Analysis of population activity in core landscape area

Figure 4 shows the population activity of the core landscape area. It can be clearly seen that the population activity on the rest day is higher than that on the working day. Just like the sports area, considering that students have less time in the week and more weekends, they will have more time for leisure and entertainment. At 9 am and 15 pm, the population activity in this area is the highest, and at 12 noon, 13 PM and 18 PM, there are low peaks. Considering that the students at this time belong to rest or meal time, there are few people in this area. [8]

4.2. Time Behavior Change Analysis

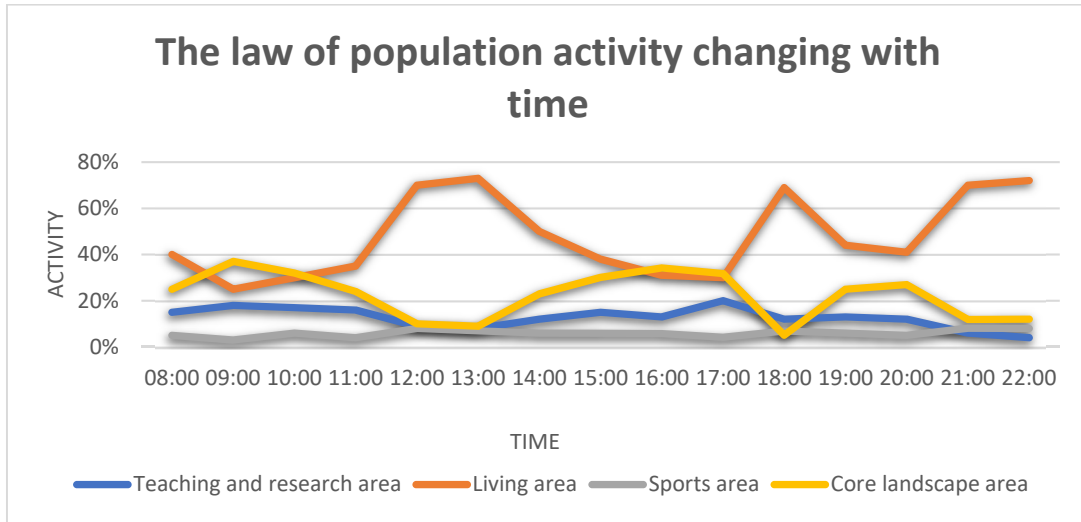


Figure 5. Analysis of population activity in different districts on weekdays

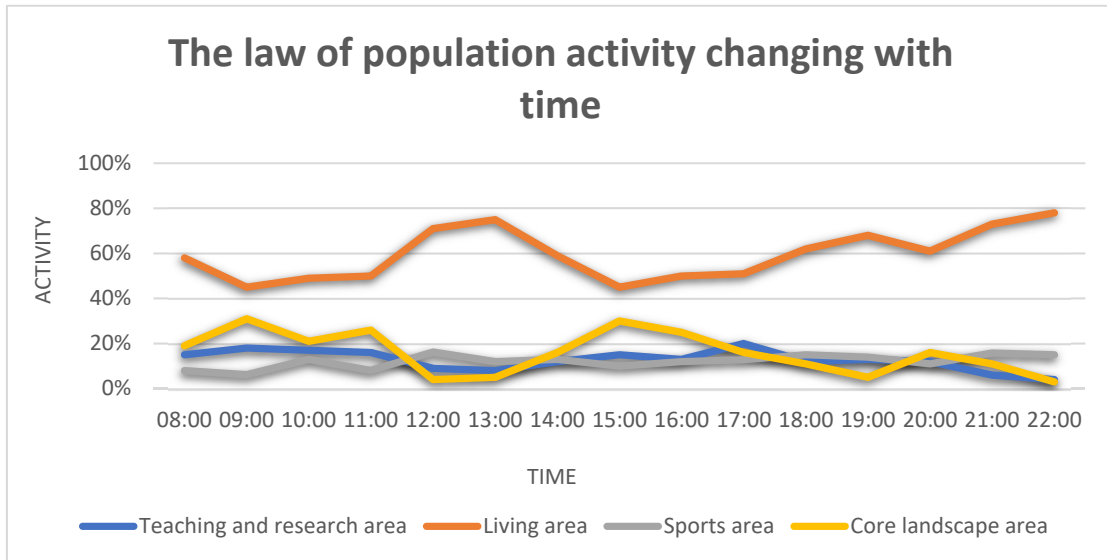


Figure 6. Analysis of population activity in different districts on rest days

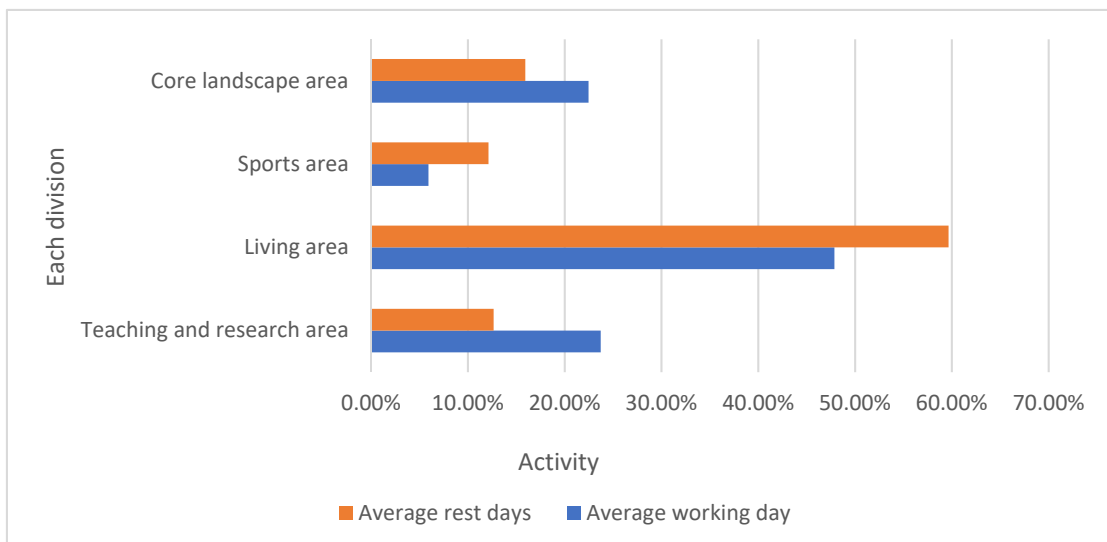


Figure 7. Analysis of population activity in different districts on rest days and working days

Finally, we superimpose the population activity of each district, and compare the activity data of each district on working days and rest days. It can be concluded that there is little change in sports areas on rest days and work days, the population activity of rest days in living areas is higher than that on working days, and the working days in teaching and research areas are much higher than that on rest days. The population activity of the teaching and research area is basically the same as that of the core landscape area, which is opposite to that of the living area, because students take classes from the teaching area of the living area, while students concentrate in the living area during the rest time. By comparing the activity of different periods, we can get the overall order: living area > core landscape area > teaching and research area > sports area.

5. Conclusion and Suggestion

5.1. Conclusion

5.1.1 Research scope of College Students' behavior style in school

Behavior is a very broad concept, which includes people's life, work, leisure and entertainment habits, living conditions and the life mode of social groups under certain environmental conditions, and is influenced by social development, cultural values, regional environment and folk customs for a long time. Thus directly or indirectly affect the ideology and values of college students. However, in the era of big data, the development of the network is undoubtedly the most important factor that can not be ignored. As one of the most active groups in the Internet age, college students' campus lifestyle has also undergone earth shaking changes.

College Students' behavior in school mainly includes three parts: College Students' daily behavior = learning behavior + after-school life behavior + social behavior. The basic function of the university is divided into living area + sports area + teaching and research area + core landscape area. On this basis, this paper studies the college students, and collects the population activity data of each functional area of the campus through the Internet thermal map. The main content of the research is divided into three aspects: first, the teaching related learning behavior in the teaching and research area. Second, the behavior of after-school life in the scope of living area. Thirdly, the social behavior in the core area and sports area.[9]

5.1.2 Learning behavior

The traditional learning behavior is more diversified and spatiotemporal. It is often believed that teachers must face each other in class, go to the library to read books, and go to the self-study room for self-study. Nowadays, the Internet is increasingly coming into our life, which makes the traditional learning methods fundamentally impacted, and the learning time, space and places are more diversified. Even in dormitories, squares, restaurants and other places with networks, we can use fragment time to obtain knowledge. Learning is more purposeful and active.

At present, the credit system, characteristic elective courses and other teaching measures are mostly implemented in Colleges and universities in order to cultivate students' independent ability in learning and show their dominant position in learning. In order to provide students with a wider range of learning resources, the school has done its best to invest in equipment, use multimedia, and promote the software. Classroom activity has been greatly improved, the greatest possible cultivation of students' learning initiative.

Another benefit of network popularization for learning is to break the original space-time limit. Its derivative, online education, can be seen everywhere in university campuses. Among them, there are many famous teachers giving lectures. Their main teaching method is online teaching. As long as there are multimedia equipment and power supply, anywhere can be a "classroom". Originally, the only way to acquire knowledge can only be provided by teachers or books, and

the openness of the network and the sharing of information may make it easy for students to obtain the required resources. More and more college students choose to read e-books, watch the teaching videos of famous teachers in famous universities, and find the relevant resources for the examination. The extensive use of the network enables students to study whenever and wherever they want.

5.1.3. After school life behavior

For contemporary college students, the curriculum arrangement is much more relaxed than that of senior high school. After study, they have a lot of spare time. It is said that time is money. How to make better time planning, make full use of spare time, carry out colorful extracurricular activities, make them constantly improve themselves, develop their personality, and constantly improve their comprehensive quality and ability, so as to make full preparation for the future development and lay a good foundation, has very important practical significance. This is not only related to the physical condition, moral cultivation, emotional world and psychological quality of college students, but also affects the future life style and the realization of talent training objectives in Colleges and universities.

Understanding the factors of College Students' after-school life style is an important content of studying their spatial behavior. Factors considered include time, place, interest, funds, etc. For example, most of the weekend choose about three or two friends to go outing, shopping, part-time and other extracurricular activities; Most people choose to rest in the dormitory, soak in the library, play in the core area of the school landscape and other campus activities. However, money and other material conditions seem to be the biggest constraints of College Students' after-school life behavior. College students hope to make their after-school life colorful, so as to improve their spiritual and cultural cultivation. However, due to the constraints of money, lack of skills, resources and other factors, they often can not do so.

The general characteristics of extracurricular activities of contemporary college students are multi-level, diversified, personalized and fashionable. It generally includes extended learning activities (reading extracurricular books, participating in elective courses, training classes and lectures), social practice activities (work study program, part-time job in the company), entertainment activities (visiting parks, traveling, watching movies), physical fitness activities (ball games, martial arts and gymnastics, etc.) Community activities (art, culture, technology and other social activities organized by college students with different interests), negative activities (playing cards, indulging in online games, drinking and playing cards, etc.) and so on.

5.1.4 Social behavior

The original school has no fixed teaching place, a book, a teacher, a few students constitute a communication space, gradually developed to a fixed place on campus, its significance is to provide a place for people's knowledge dissemination and ideological exchange. With the development of the times, the network has penetrated into the campus interpersonal communication, so that its social behavior is endowed with the connotation of the new era.

Before the popularity of the Internet, the way of communication between students was limited to space-time factors. There are three main ways of communication: face-to-face communication, telephone communication and letter communication; Communication channels are mainly through classroom discussions, after class activities, telephone calls, new construction, etc. communication space is greatly affected by time and space. After the popularity of the Internet, the way, place and time of campus communication have changed greatly. The environmental changes brought by the network provide a new platform and power for interpersonal communication, speed up the communication efficiency, improve the communication speed, and save the communication time. At the same time, the increasing diversity of communication groups is also obvious. The communication between people is more convenient and rich than before, and embodies equality and democracy.

Students have a strong sense of independence and communication ability. When they come into contact with the Internet, more and more people also rely on the Internet. Whether it's study and life, it brings a lot of convenience, but also brings a lot of disadvantages. From the conclusion data, it can be concluded that college students like to stay in the living area, while the population activity in the sports area is low. In this way, irregular life and distant interpersonal relationship are not conducive to the long-term mental health and growth of college students.

5.2. Suggestions

In view of the above situation, Neijiang Normal University has the following suggestions: first, in terms of functional zoning, we should pay attention to whether the building area of the campus is reasonable, whether the supporting facilities are perfect, and whether the space type is not perfect; second, As far as the spatial layout is concerned, as far as the convenience of students' spatial behavior is concerned, attention should be paid to whether the spatial arrangement is reasonable and whether the students' spatial interaction is sufficient. In terms of the greening rate of the campus, the overall environment of the campus is good, but the planting of trees is relatively simple. It is suggested to introduce some distinctive trees.

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