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Spatial Distribution and Accessibility Analysis of Senior Scenic Spots in Zhejiang Province

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Abstract: This paper takes the advanced scenic spot in Zhejiang Province as the research object, based on GIS spatial analysis technology, and uses the nearest neighbor distance index, the nearest neighbor distance index, the kernel density estimation and other methods. The results show that there is a significant discrete pattern of distribution of the senior scenic spots in Zhejiang Province, and most of them have a high uniformity of distribution, and the distribution is relatively concentrated only at the transportation hubs. In terms of accessibility, the accessibility of different scenic spots varies greatly, and the overall accessibility shows a decreasing trend from the center to the surroundings, similar to a circle distribution.

Keywords: Scenic spots; Spatial distribution; Accessibility

1. Shaoxing

Tourism spots are important carriers of regional tourism development, and their spatial distribution patterns and accessibility have long attracted academic attention[1] . Domestic and foreign scholars on the research content of tourist attractions is relatively rich, research scale, including macro-scale national spatial structure, medium-scale urban cluster region, micro-scale municipal research[2-4] ; research methods, the use of multivariate models,, variance functions and other methods; research content, involving the spatial distribution of scenic spots, structural types, pattern evolution and other aspects. In general, the research on the accessibility of scenic spots is comprehensive, but the research area has not yet covered the "Yangtze River Delta". Therefore, this paper takes Zhejiang Province as an example to quantify the spatial distribution pattern and accessibility of high-level scenic spots in the province, with a view to providing scientific reference for future scenic spot layout planning.

2. Study Area Overview

Located on the eastern coast of China, Zhejiang has 798 senior scenic spots, including 18 5 senior scenic spots and 217 4A spots. Zhejiang Province has convenient transportation and abundant tourism resources (as Figure 1).

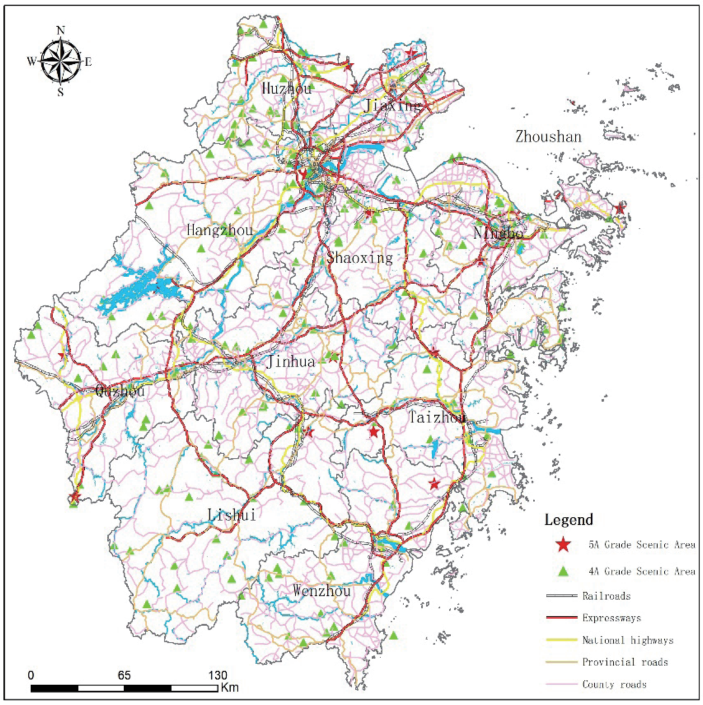

Figure 1 Distribution of senior scenic spots and traffic in Zhejiang Province

3. Research Methodology and Data Sources

3.1 Research Methodology

3.1.1 Nearest Neighbor Distance Index

The nearest neighbor distance index is an important indicator that intuitively reflects the spatial distribution characteristics of the study object, and is widely used to measure the mutual proximity of two elements in spatial distance, with the following formula.

$$R = \frac{\bar{r}_1}{\bar{r}_e} = 2\sqrt{D} \times \bar{r}_1$$

$$\bar{r}_e = \frac{1}{2\sqrt{n/S}} = \frac{1}{2\sqrt{D}}$$

Where $\bar{r}_1$ is the average value of the distance between the nearest neighboring scenic spots, and $\bar{r}_e$ is the nearest neighbor distance under ideal condition.

3.1.2 Functional analysis method

The function is mainly used to analyze the spatial distribution pattern of the study object. The formula is as follows.

$$K(t_s) = A \sum_i \sum_{i \neq j} I \ (t_{ij}) \ /M^2$$

Where: M is the number of scenic spots. I (t_{ij}) is the object of a study as the center, with t_s as the radius of the circle excluding is the number of scenic spots outside itself.

3.1.3 Kernel density estimation method

Kernel density analysis is used to calculate the density of an element in its surrounding neighborhood. The formula is.

$$F = \sum_{i=1}^{n} k \ (\frac{d_i}{n}) \ /nh^2$$

Where is the kernel density, and i is the first i object of study, and d_i is the search radius.

3.1.4 Gini coefficient

The Gini coefficient is often used to express the degree of equilibrium of things owned by the subject of the study, with the formula

$$G = \frac{1}{2n^2\mu} \sum_{i=1}^{n} \sum_{j=1}^{n} |x_i - x_j|$$

$$D = 1 - G$$

Where: μ is the average amount of regional attractions, and D indicates the degree of uniform distribution.

3.2 Data sources

Zhejiang road data source geospatial data cloud, statistical data from Zhejiang Province statistical bulletin, senior scenic spot data from "Zhejiang Province A-class tourist attractions list table".

4. Analysis of results

4.1 Spatial distribution analysis

4.1.1 Nearest Neighbor Distance Analysis

The expected value of the average distance of the scenic spot is calculated $\bar{r}_1 \approx 9409.03m$, the observed value of the average distance $\bar{r}_e \approx 8487.74m$, and the index of closest proximity is $R \approx 1.11$. From R>1 it can be concluded that the spatial distribution type of the senior scenic spots in Zhejiang Province is uniform distribution.

4.1.2 Function analysis

The calculation results show that the senior scenic spot in Zhejiang Province K The observed values and K The expected values gradually tend to overlap, indicating that the dispersion distribution trend of the senior scenic spots in Zhejiang Province is obvious with the expansion of the study scale.

4.1.3 Kernel density estimation method

The results of nuclear density analysis show that there are two high-density areas in the distribution of advanced scenic spots in Zhejiang Province, which are distributed in Hangzhou and Ningbo, and the remaining areas are more evenly distributed (Figure 2).

4.2 Reachability analysis

By calculation, the average travel time of senior scenic spots in Zhejiang Province is 162.33 minutes . Among them, Hangzhou city has the highest scenic spot accessibility with 144.51 minutes; Lishui city has the lowest scenic spot accessibility with 223.26 minutes. It shows that the accessibility of advanced scenic spots in Zhejiang Province varies widely.

4.3 Accessible spatial pattern

By examining the overall spatial pattern of accessibility of A-class scenic spots in Zhejiang Province, which shows a trend of gradual weakening from the central region outward, the accessibility of senior scenic spots in Hangzhou, Shaoxing and Huzhou is higher, while the accessibility of Quzhou and Lishui is relatively lower (see Figure 3).

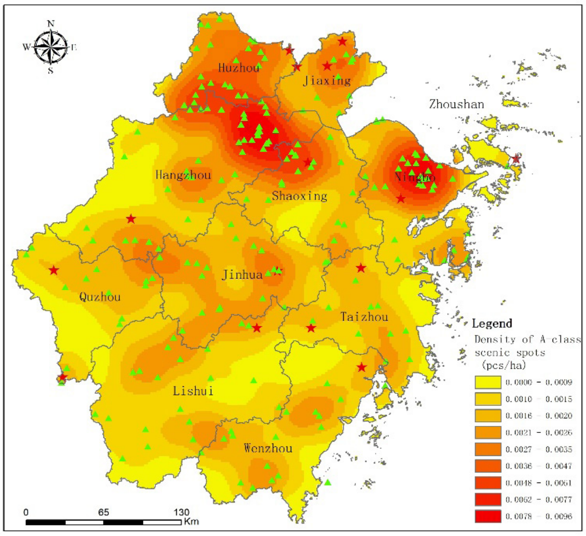

Figure 2 Distribution of nuclear density of senior scenic spots in Zhejiang Province

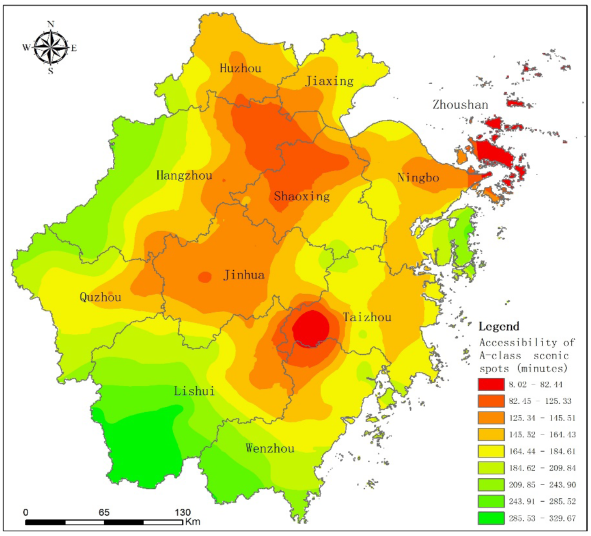

Figure 3 Spatial pattern of accessibility of advanced scenic spots in Zhejiang Province

5. Conclusion

In this paper, by studying the spatial distribution and traffic accessibility of high-level scenic spots in Zhejiang Province, the following conclusions are drawn.

In terms of spatial pattern, the overall spatial layout of senior scenic spots in Zhejiang Province is discrete and evenly distributed in most areas, with relatively concentrated distribution only in the eastern part of Hangzhou and central Ningbo. The number of scenic spots in the two areas accounts for 20.91% of the total; more spots are distributed along the traffic routes, and the aggregation of scenic spots at traffic hubs is obvious. From the viewpoint of accessibility, the accessibility coefficient has an extreme difference of 275 and an average value of 5.30. Among them, the accessibility coefficient of 58 scenic spots is lower than 1, accounting for 25.5%; the accessibility coefficient of 137 scenic spots is lower than 2, accounting for 60.4%. It shows that the accessibility of scenic spots varies greatly.

In this paper, we use the spatial analysis function of GIS to explore the spatial layout of advanced scenic spots in Zhejiang Province, and introduce the accessibility model on this basis, which has some practical significance. However, since the development of transportation road network and scenic spots is dynamic, it still needs continuous attention in the future.

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