

## Analysis on Agglomeration Degree of A-class Tourist Scenic Spots in Dezhou

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**Abstract:** The tourist scenic spot is the core element of tourism and the central link of tourism industry chain. The quality grade of tourism scenic spot in China is divided into five grades. The A-level scenic spot has become the focus of research because of its representativeness and attractiveness. Based on the analysis of the spatial distribution of the A-level tourist attractions in Dezhou, Shandong Province, this paper keeps the agglomeration degree as the core, aims to analyze the overall spatial distribution characteristics of the scenic spots by calculating of the nearest neighbor distance index. The results show that the spatial distribution of the A-level tourist attractions in Dezhou has the characteristics of low aggregation, partial aggregation, and the combination of equilibrium and random. Through analysis, this paper can provide reference for the future development of tourism in Dezhou by studying the impact of spatial distribution characteristics of the A-level tourist attractions on regional tourism.

### 1. Introduction

Tourist scenic spot is an important source of attraction of a tourist destination and the material basis for the development of tourism. Spatial structure analysis of tourist scenic spot is an important basis for the development of tourism resources and the study of spatial development of scenic spot, meanwhile, the analysis of agglomeration degree is the foundation of the study in spatial structure of tourist scenic spot[1,2,3]. The nearest neighbor analysis method was first proposed by ecologists Grieg, Smith, Clark and Evans[4][5]. Pinder and Witherick put forward a linear nearest point analysis method to modify the conventional nearest point analysis, which can be used to study the linear layout of highways, rivers and coasts, and has special value for the study of the distribution of tourism enterprises along a highway or urban street[6]. The method of measuring the spatial distribution pattern of point targets mainly uses the nearest distance to calculate[7]. The tourist attractions are regarded as point targets. Generally, there are three spatial distribution patterns of point targets: random distribution, uniform distribution and cohesive distribution. Based on the theory of tourism spatial structure, this paper uses the nearest point analysis method to analyze the spatial distribution characteristics and spatial structure types of A-class tourist attractions in Dezhou, so as to provide a scientific basis for optimizing the spatial structure of tourist attractions in Dezhou and find the best measures to optimize the spatial structure of tourist attractions.

### 2. Data and Methods

#### 2.1 Source and Selection of Data

The data of A-class tourist attractions in Dezhou are from the website of National Tourism Administration and Dezhou Tourism Bureau (all data are as of January 2018). The longitude and latitude of tourist attractions are inquired by using online map longitude and latitude query website (<http://www.gpsspg.com>), and tagged on Google Earth software. Finally, the location data of tourist attractions are imported into ArcGIS for image analysis. Through Baidu Map, Google Map and other network map software, the actual nearest distance between each measuring point is calculated (the shortest route is the numerical statistics). 58 A-class tourist attractions were selected as the research objects.

By investigating the grade-scale differences of A-class scenic spots in Dezhou, it is found that the middle class 3A and 2A scenic spots account for the largest proportion, accounting for 86.51% of the total number, while the high class and primary scenic spots at both ends are very few, forming a spindle-shaped structure with large middle and small two ends, and generally existing in the whole country as well as in the traditional pyramid-type scale distribution. The prominent phenomena of 4A and 2A scenic spots basically coincide. The scarcity of 4A-class scenic spots and the lack of 1A and 5A-class scenic spots also indicate that there is room for further optimization of the spatial structure of Dezhou A-class scenic spots.

In addition, all districts and counties in Dezhou have been working hard to renovate and grade the tourist attractions in recent years. According to incomplete statistics published by Dezhou Tourism Bureau, 10 A-class tourist attractions have been added to Dezhou as of January 4, 2018. Among them, Oderman Vineyard Eco-Park in Decheng District and Guyun Zaoyi Scenic Spot in Leling City. Two scenic spots in the district (former Longyue Eco-Park) were rated as Class 3A scenic spots, while the Dasun Township Eco-picking Garden in Leling City was upgraded to 3A scenic spots; the Chinese Golden Jujube Culture Museum in Leling City, the Taste Town in Leling City, the Liangzi Heitao Museum in Dezhou Economic and Technological Development Zone, Qingyun Watson Pastoral Health and Leisure Tourism Park and Qingyunding Ding Lizao Museum, Qingyun Dingli Jujube Ecological Park, Jinzhuang Lobster Tourism Park in Lingcheng District, and Cuiyang Cultural Scenic Area in Ningjin County were rated as Class 2A tourist attractions. So far, there are 68 A-class tourist attractions in Dezhou. Since these ten A-class scenic spots have not been listed or updated to the list by the Texas Tourism Bureau, the research and analysis is based on the original 58 A-class scenic spots.

## 2.2 Data Processing

The process of data processing is mainly as follows: tagging Google Earth according to the results of longitude and latitude queries; making 58 A-class scenic area distribution sketches using tourism resources of Dezhou (Fig.1); calculating the location of scenic area using Baidu Map and Google Map; processing the data with the nearest point index and calculating.

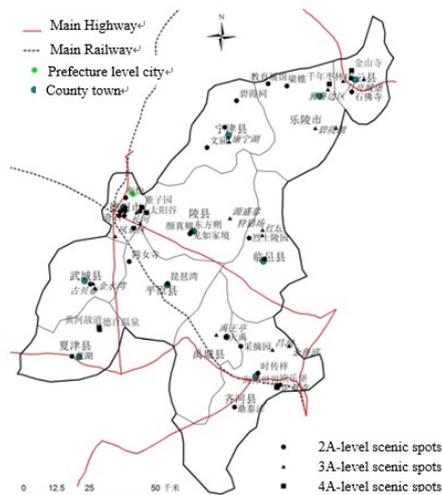


Figure.1. Distribution of A-class Tourist Scenic Area in Dezhou

## 3. Analysis of Agglomeration Degree of Tourist Attractions

Nearest Neighbor Point Analysis (NNPA) is a geographical index of the degree of proximity of point objects in geographic space, which is widely used in the study of tourism spatial structure. The distance between each point and its nearest neighbor is  $r$ , and the average value of these distances is  $r_i$ , which means the average of the degree of proximity (abbreviated as nearest neighbor distance). The formula for calculating the nearest point index is as follows:

$$r_E = \frac{1}{2\sqrt{\frac{n}{A}}} = \frac{1}{2\sqrt{D}} \quad (1)$$

$$R = \frac{r_i}{r_E} \quad (2)$$

In formulas (1) and (2),  $r_E$  denotes the theoretical nearest distance,  $A$  denotes the area of the studied area,  $n$  denotes the measured points, and  $D$  denotes the density of the points. The nearest point index  $R$  is expressed as the ratio of the actual nearest distance to the theoretical nearest distance. The calculation method is shown in formula (2). The accumulation effect of tourism resources reflects the degree of concentration and dispersion of spatial distribution of tourism resources. It can be quantitatively characterized by the nearest neighbor index  $R$ , which reflects the distribution nature of spatial things.  $R < 1$  indicates that there are several distribution trends, and  $R = 0$  indicates complete concentration.

### 3.1 The A-class Tourist Scenic Area Agglomeration Degree in Dezhou

According to the spatial distribution of A-class tourist attractions in Dezhou, it shows that the area of A-class tourist attractions is 10356 km<sup>2</sup>. According to the formula (1)  $A = 10356$ ,  $n = 58$ ,  $r_E = 6.68$  km, and the theoretical nearest distance of Dezhou is 6.68 km.

Table.1. Statistics of the Shortest Distance between A- class Tourist Scenic Spots and Their Nearest Points in Dezhou

Scenic spot	Nearest point	Distance	Scenic spot	Nearest point	Distance
The Sun Valley	Aodele Park	3.0	Ocean World	Oule Park	0.51
Cahnghe Park	Aodele Park	2.3	Oule Park	Ocean World	0.51
Botanical Garden	Peachblossom Park	4.2	Dinghui Temple	April Park	2.0
Dongzi Yuan	Aodele Park	1.9	Dingtaifeng Farm	Ocean World	22.9
Vehical Distance Summation:382.25km		Average Vehical Distance:6.59km			

By using relevant software to measure accurately, the average  $r_i$  of the actual nearest straight line distance (Table.1) between grade A tourist attractions in Dezhou is 6.59 km. According to formula (2), the nearest point index  $R$  of A-class tourist attractions in Dezhou is  $0.99 < 1$ . According to the theory of the nearest point index, when  $R$  value is less than 1, the distribution is agglomerative; and the closer  $R$  value is to 0, the higher the degree of agglomeration is proved; when  $R$  value is equal to 1, the distribution is random; when  $R$  value is greater than 1, the distribution is uniform; and when  $R$  value is larger, the distribution of points is more uniform; when  $R$  value is equal to 2, the distribution is completely uniform. From the  $R$  value, Dezhou A-class tourist attractions are clustered, which makes the connection between the tourist attractions in Dezhou closer, this is conducive to the development and utilization of tourist attractions, it can reduce the travel costs of tourists, and it is more conducive to the integration of space tourism resources. But in fact, 0.99 has approached  $R=1$ , which means uniform distribution. It can be seen that Dezhou A-class tourist attractions as a whole are still showing a trend of agglomeration and development to uniform distribution. This uniform distribution makes the overall competitiveness inadequate, and the attractiveness of characteristics is far from enough. This kind of uniform distribution is more reflected between districts and counties, and the uniform distribution of tourist attractions between districts and counties costs more than the agglomeration distribution in the development of special tourist routes, tourist routes and tourist transportation.

### 3.2 Agglomeration Degree of A-class Tourist Scenic Spots in Districts and Counties of Dezhou

In addition, the shortest distance between A-class tourist attractions and the nearest point in Districts and Counties of Dezhou is calculated separately, and the calculation results are shown in Table.2.

Table.2. Statistics of the nearest index of A-class tourist attractions in different districts and counties

District County	Acreage	Vehecal Distance	Scenic Spots	$r_E$	$r_i$	R	Type
Old City District	602	33.9	13	3.40	2.61	0.77	Agglomeration
Lingcheng District	1213	43.38	5	7.78	8.68	1.12	Uniform
Leling	1172	63.08	8	6.05	7.89	1.30	Uniform
Yucheng	930	8	2	1.08	4.00	3.70	Uniform
Linyi	1016	23.7	3	9.20	7.90	0.86	Agglomeration
Pingyuan County	1047	0	1	1.62	0	0	
Xiajin County	882	28.9	4	7.42	7.23	0.97	Random
Wucheng County	748	5.08	5	6.12	1.02	0.17	Agglomeration
Qingyun County	502	25.3	5	5.00	5.06	1.01	Random
Ningjin County	833	18.2	3	8.33	6.07	0.73	Agglomeration
Qihe County	1411	99.81	9	6.62	11.09	1.68	Uniform
Dezhou	10356	382.25	58	6.68	6.59	0.99	Uniform

According to the actual distribution of A-class tourist attractions in Dezhou, the R value is slightly relaxed to  $\pm 0.05$ , which means when the R value is less than 0.95, it is clustered distribution; when the R value is 0.95-1.05, it is random distribution; when the R value is more than 1.05, it is uniform distribution.

In Dezhou, there are three main trends: agglomeration, uniformity and random distribution. Old city, Linyi city, Wucheng county and Ningjin county are clustered, Lingcheng city, Leling city, Yucheng city and Qihe county are uniformly distributed, Xiajin county and Qingyun county are randomly distributed. Although the R value of plain county is 0, it has only one A-class tourist attraction, so this kind of complete clustering has no comparative value.

Agglomeration distribution. Among the four districts and counties with agglomeration type distribution, the R value of Linyi City is  $0.86 > 0.8$ , which is the lowest agglomeration degree among the four districts and counties. This agglomeration degree shows that the distance of each tourist attraction in Linyi City is moderate, but not excessively concentrated; while the R value of the old urban area and Ningjin County is greater than 0.7, which shows that the agglomeration degree of these two districts and counties is the most moderate. The R value of Wucheng County is only 0.17, which is far less than that of the other three districts and counties, indicating that five scenic spots in Wucheng County are too concentrated. Although traffic problems are solved to a great extent, too much concentration will increase competition among scenic spots, and inappropriate treatment will lead to vicious space. Competition.

Uniform distribution. In Lingcheng District, Leling City, Yucheng City and Qihe County, the distribution of  $R=3.7 > 2$  in Yucheng City is very uniform. The R values of Lingcheng District and Leling City are 1.12 and 1.30 respectively, which indicate that the tourist attractions of these two districts and counties are more evenly distributed and not over-concentrated, but there is a certain distance between them. The location of individual scenic spots is relatively remote and the traffic is

relatively inconvenient. The nearest index of 1.68 in Qihe County is very close to the surrounding scenic spots, which enhances the cohesion and overall attraction. Gravity, reducing traffic pressure and travel costs have certain advantages, but this more intensive distribution of scenic spots will greatly increase the competition between scenic spots. In addition, some scenic spots are randomly distributed. Although this random distribution can reduce the spatial competition of scenic spots, it is actually not conducive to the overall tourism planning and the design of transportation network and routes.

random distribution. The nearest indices of Xiajin and Qingyun counties are 0.97 and 1.01, respectively. A-level tourist attractions show a random distribution trend. The distance between the scenic spots is very long, and the distribution of scenic spots is very scattered. For the undeveloped tourism city of Dezhou, spending time on transportation is extremely unfavorable to tourism development.

#### 4. Conclusions

By studying the spatial structure of 58 A-level tourist attractions in Dezhou City, it is found that the nearest point index  $R$  of A-level tourist attractions in Dezhou City is  $0.99 < 1$ . Therefore, the tourist attractions of Dezhou City are clustered in the whole city, but this kind of clustering is not obviously expensive. To some extent, it can be seen as a random distribution of  $R=1$ . This is mainly due to the fact that Dezhou A-level tourist attractions are relatively independent of each other, and Dezhou City has poor traffic accessibility. This requires Dezhou to construct the transportation network and special tourism line between districts and counties when carrying out the overall tourism development and planning, so as to improve the agglomeration of the overall tourist attractions. Aggregation type should avoid vicious competition. The stochastic type should establish the transportation network of tourist attractions, connect the tourist attractions scattered in different areas and counties in series, and increase the accessibility. Several districts and counties with uniform distribution should handle well the connection between scenic areas, establish tourism network of Dezhou City, and realize the benign development.

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