ISSN: 2664-9640

Preparation of a Thematic Map of Land Use Status in Dachang County

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Abstract

In response to the requirements of land resource development and management, this article firstly studied the corresponding data sources and then selected satellite remote sensing images as the basic data. Based on the geographical location of the research area, the corresponding remote sensing image numbers were determined. After obtaining the remote sensing images, a series of preprocessing was carried out on the images. Then, a sample dataset was established and quality indicators such as the separation degree of the sample dataset were tested, then, the supervised classification method was used to classify the pixels in the study area, obtaining the results of the current land use situation in the study area. Finally, ArcGIS was used as a mapping tool to complete the production of a thematic map of the current land use situation in Dachang County, which has effective reference for the land development and management work in Dachang County.

Keywords

Thematic map, Remote sensing, Supervised classification.

1. Introduction

Land resources are one of the most important basic resources for economic development and human life. Reasonable and efficient utilization of land resources is a necessary condition for sustainable development. Against the backdrop of the continuous development of geographic information systems and remote sensing technology, using these two technologies to monitor land use status in real-time and provide feedback on relevant information to guide rational planning of land use is an important method for efficient utilization of land resources and environmental protection. This article uses remote sensing technology as the foundation, combined with geographic information system technology, to collect data and extract information on the land use status of Dachang County, and produces a map of the land use status of Dachang County, providing reference for the rational use and sustainable development of land in Dachang County.

2. General Situation of Study Area

Dachang County, subordinate to Langfang City, Hebei Province, is located in the north central part of Hebei Province, at the northern end of North China Plain, and at the southern foot of Yanshan Mountain. The county borders Sanhe City to the east, north, and northwest, Xianghe County to the south, and Tongzhou District of Beijing across the Chaobai River to the west and southwest. Together with Sanhe City and Xianghe County, it is surrounded by two directly administered cities, Beijing and Tianjin. The county covers an area of 176 square kilometers and has a permanent population of 171366 (as of the end of 2020). In 2019, the regional GDP is expected to reach 11.5 billion yuan. The map of Dachang County is shown in Figure 1.

ISSN: 2664-9640

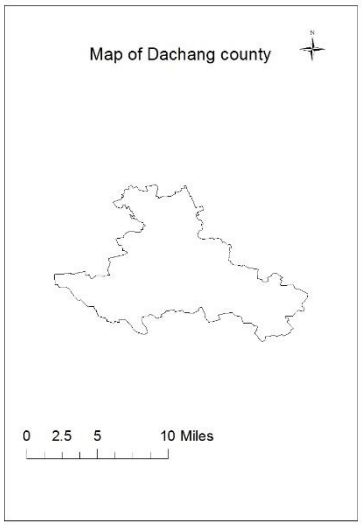

Figure 1: Map of Dachang county

3. Data and methods

3.1. Data collection

In order to achieve Earth observation, various countries have launched many satellites. Based on the research content of this article, Landsat series satellite images are selected as the basic data. Landsat images are sorted by row and column, and their row and column numbers can be determined based on the geographical location of Dachang County. After obtaining basic image data, use ArcGIS software to create a vector map of Dachang County. Based on this vector map, use the image cropping function to obtain the image of Dachang County, and the results are shown in Figure 2.

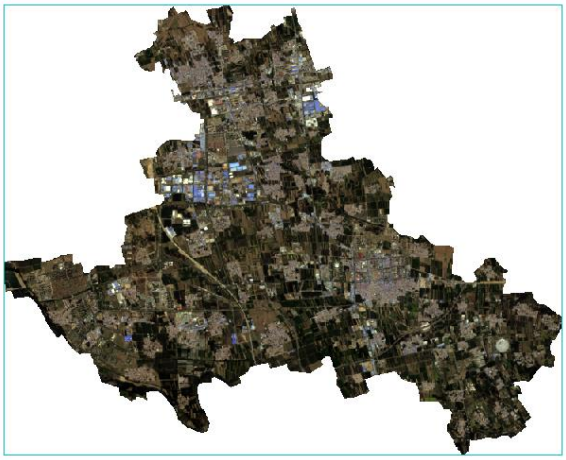

Figure2: Landsat8 Image of Dachang county

3.2. Methods

This study adopts supervised classification as the main method, and the core of supervised classification includes two aspects: the establishment of training sets and classification. Firstly, based on the actual situation of the research area, four main land use types are established: residential land, industrial land, cultivated land, and others. Then, using the POI function in ENVI software, 30 sample points are selected for each type of land use type to construct a supervised classification training set. After the training set is established, ENVI software can use the Maxlikehood method to classify all Pixels in the research area.

ISSN: 2664-9640

4. Results and discuss

After completing the supervised classification, the land use thematic map of Dachang County was obtained using the mapping function in ArcGIS software, as shown in Figure 3.

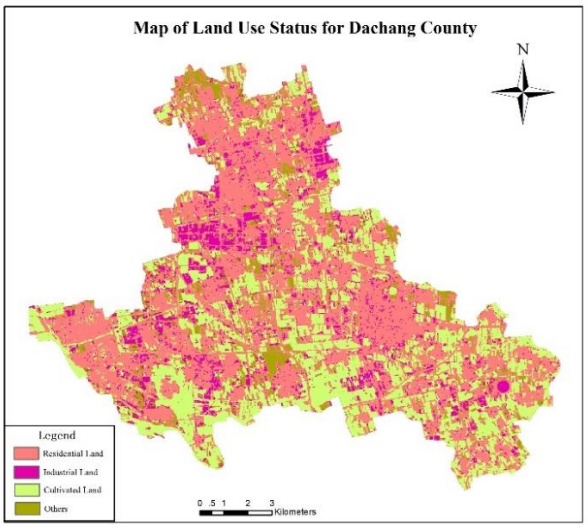

Figure3: Thematic map of land use status for Dachang county

And, ENVI software can obtain the number and area of Pixels for each type of land through the Pixels statistical function, and the statistical results are shown in Table 1.

Table1:Statistics of land use type

Type	Pixels	Area(Km2)
cultivated land	60397	54.3573
residential land	103043	92.7387
Industrial land	19054	17.1486
others	12717	11.4453

5. Conclusion

According to the work of this study, we can draw the following conclusions:

(1) Landsat8 images covered all over the earth surface, so it can be used as the basic data for the research of nature resources, especially land use situation research.

(2) When take Landsat8 images as basic data, it should be pre-process at first, usually include space correction and radiation correction. Spatial correction can ensure the correct spatial position of data, while radiometric correction can ensure the accuracy of data in terms of values, this if very important for the research results.

(3) Supervised classification is a reliable method for land use classification. When using supervised classification, attention should be paid to the quality of sample data, especially the degree of separation between different classes. At the same time, the quantity of sample data also has a significant impact on the quality of the final result.

(4) Taking remote sensing image as data source, using supervised classification method to classify pixels by land use situation, and then using ArcGIS as tool to map, this method can quickly and high-quality obtain the thematic map of land use status of the study area, which can provide an effective reference for land development and management.

ISSN: 2664-9640

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