

Study Land Use Situation of Xianghe County Based on Satellite Remote Sensing Image

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Abstract

Aiming at the survey of land use status in Xianghe County, this paper provided a method based on remote sensing. Firstly, the Landsat8 OLI image was selected to be the data resources, and then, the remote sensing image of Xianghe County was separated from the original image by using vector data as a tool. According to typical land use types, samples selected from images to form a training set through visual judgment, with the help of this training set, this paper used the maximum likelihood method to classify all the images rigorously, at the end, the land use classification results of Xianghe City was obtained.

Keywords

Image process, Supervised classification, Remote sensing.

1. Introduction

Land is one of the most important resources for a city or county development. Both people live and economics needs land, so the scientific use of land is very necessary. For the society and government, land use situation is significant reference for their decision. The usual method of exploring land use situation is field survey, with the help of measuring instruments, the land use status of each city or county can be quantified. However, this method has three familiar weaknesses: it needs a lot of time to complete the survey work because heavy workload; second, due to the need for a lot of field work, there are certain security risks; third, the accuracy of the results is not high. In order to avoid these three problems, this paper proposes a method to obtain the land use status of Xianghe County by using satellite remote sensing images as data sources.

2. General Situation of Study Area

Xianghe County is located in Hebei province, which is in north China. Since it is 50km nearly to Beijing, a lot of people who worked in Beijing choose to live in Xianghe County, that can save much cost for living. Because of the arrival of this sort of people, Xianghe has become a county with more and more residents and more prosperous economy. By 2021, the common population of Xianghe County has reached 500 thousands. These conditions pose a challenge to the land use of Xianghe County, so it is very significant to rigorously obtain the land use status of Xianghe County. Map of Xianghe County was expressed by Figure 1.

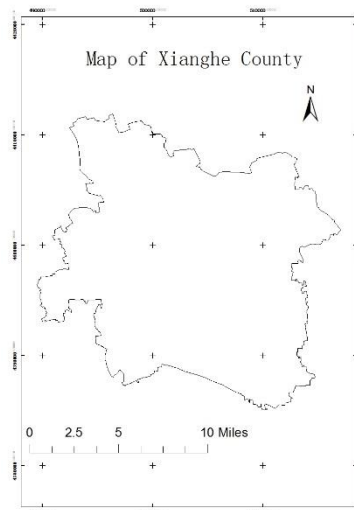


Figure1: Map of Xianghe County

3. Data and Method

Most countries launched satellites in order to observe features on the surface of the earth, in the observation of nature resources, Landsat series satellites which launched by America are very successful. Nowadays, Among Landsat series, OLI image witch gathered by Landsat8 were widely used by researchers and scholars from every country. OLI image data was supplied for researchers and scholars for free, it includes 8 spectral band, can be used to identify multiple feature information.

This study took Landsat8 OLI images as data resource, OLI images include surface information all over the world, therefore, first step of data procession is obtaining image of study area: Xianghe County. According to geo-position of Xianghe County and basic setting of Landsat8, the image column and row number of Xianghe County is 123-32, with this number, the ultimate data can be downloaded from NASA or other open source websites. Landsat8 OLI image of Xianghe County was shown in Figure2.

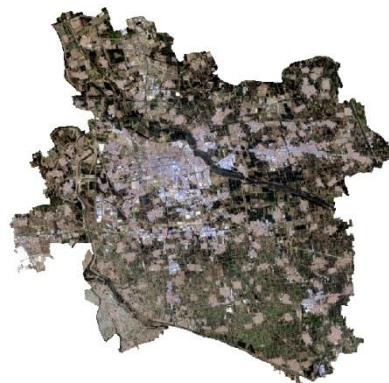


Figure2: Landsat8 OLI Image of Xianghe County

After the OLI image of study area was obtained, the necessary pretreatment needs to be completed, it mainly include atmospheric correction and geographical correction, with the parameter supplied by NASA and ENVI, these necessary pretreatment can be completed. Then, the land use status of study area can be extracted from the OLI image, this work can be implemented by supervised classification.

Supervised classification means classify the features to different types through the training sample, so build the training sample is the first step work. In this study, according the reference

of land use type supplied by government, we set 4 types of land use status, they are village, farmland, vegetable plot and industry land, and we set water as the extra type. Based on the setting types, every type need enough elements to compose a sample. In ENVY, which software we used in this study, these sample called POI. With the field survey conference, we can select about 50 spots for every type of land use from the OLI image, then the training sample was built. After training sample was built, ENVY was used to complete supervised classification, it will scan all pixels of the OLI image of study area, compare them with training sample, then classify every spot into the fit type. The results of supervised classification was expressed as Figure 3.

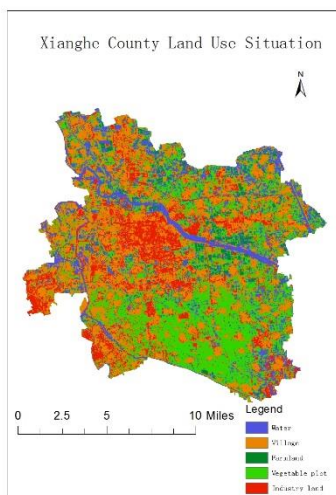


Figure3: Xianghe County Land Use situation

4. Results and Discussion

After pixels in OLI image were classified into fit types, area of every type, which means area of every type of land use can be statistic, because each pixel of OLI image corresponds to the field area of 900 square meters, so the number of grids multiplied by 900 square meters is equal to the area of each type of land use. Statistics of land type was expressed in [Table1](#).

Table 1: Statistics of Land Type

Land Type	Pixels	Area(Km2)	Percent
Water	78616	70.7544	15.79
Village	169544	152.5896	34.05
farmland	13948	12.5532	2.8
vegetable plot	150524	135.4716	30.23
industry land	85255	76.7295	17.13

According to the statistics results, in Xianghe County, the main land use type is village, Its area has reached 152.5896 square kilometers, accounting for 34.05% of the overall area , and land use type of vegetable plot is second, reached 135.4716 square kilometers, accounting for 30.23%, the third type is industry land, for the 76.7295 square kilometers and 17.13% share, area of water is 70.7544 square kilometers for the 15.79% share, and the minimal type is farmland, its area is 12.5532 square kilometers for the 2.8% share.

5. Results and Discussion

This study explored land use situation of Xianghe county by using satellite remote sensing image, and according the process and results, the following conclusion can be summarized:

- (1) It is a feasible and rigorous method to use remote sensing image as data source for natural resources investigation and research on a large scale, such as county, city or larger scale. It can be cheaper, safer than field mapping, and its accuracy can also meet the requirements of natural resource survey.
- (2) When extracting land use information from satellite remote sensing images, the supervised classification method can be used to complete this work.
- (3) When the supervised classification method is used to complete the extraction of land use information, the accuracy mainly depends on two points, one is the quality of the sample, the other is the selection of the supervised classification method. Therefore, if you want to improve the accuracy of land use information extraction and classification, you can increase the number of samples and improve the separation between different types of samples, as well as adopt more advanced classification methods
- (4) The use of remote sensing images as data sources and the use of supervised classification to obtain land use status information can provide effective references for the rational use of land resources, scientific urban planning, and sustainable development. The methods and conclusions studied in this article can provide assistance for the development of Xianghe County.

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