

REMOTE SENSING IMAGE BASED EVIDENCE SAVING FROM DAMAGE REAL ESTATE GIS

Qiu Li

School of Resources, Hebei University of Engineering, 056038 Handan, P.R. China-lprui@eyou.com

KEY WORDS: Remote sensing (RS), Spatial data, Real estate, Geographic Information System (GIS), Evidence saving from damage (ESD), Spatial vector database, Attribute database

ABSTRACT:

Extracting geographic information from aerial RS image has a character of economy, high efficiency and low cost, it is mostly means of renewing spatial data. This paper discusses the concept of evidence saving from damage (ESD), and its application in real estate dismantling. The 1/2000 aerial orthographic image has been used as data sources to set up Spatial vector database of research area using ERDAS imagine. Setting up relationship between Attribute database and spatial vector database, and implementing real estate dismantling GIS with RS image background. We test our methods for the Sun Palace in Beijing. The results have confirmed the effectiveness of aerial RS-based approach.

1. INTRODUCTION

With the development of economics, urban construction grows up rapidly. The old city district rebuilding and the joint of urban and countryside have already become hot place of the real estate company. At these areas, there are many temporary and floating population, public and private houses are intermixed, temporary and illegal buildings are everywhere. The topographic map has not updated for many years. The general ways of mapping topographic map are hard in a short period of time, and the costs are high. It is hard to know everything clear. Such as house property, local resident population, temporary people, registered population, numbers of returning persons, etc. This makes real estate company can't go ahead. The emergence of GIS provides an effective technical means for solving this problem. Currently, most of the real estate GIS concentrate their attention on the later management. Nevertheless, the former investment evaluation, old city zone house dismantle, and evidence saving from damage (ESD) are considered less(Chen, 2003). Most of the strong big real estate company have the ability of opening up a large area of several blocks which covered with many old houses. The old houses have been dismantled that means the extinguishments of original houses evidence. How to save the full evidences of the existence of old houses is an urgent problem to be solved, long time has passed, but less man come in. RS image has the characters of objectivity and authenticity. In this paper, RS image based concept of ESD was proposed, and has been used in the application of real estate dismantling GIS. Beijing has abundance of remote sensing (RS) images. The 1/2000 aerial images update every year, which possess better actuality, high resolution, etc. In this paper, mining GIS management and analysis needed spatial data based on aerial image is proposed. The spatial vector database of the research area (Sun Palace) is set up by using ERDAS imagine(Dang, 2002, Fang, 1998), which contains seven thematic layers: background layer, boundary layer, buildings layer, road layer, and land use layer, dismantling layer. Data mining area is about 5.45 million square meters. The detailed and accurate attribute data is obtained by field investigation, and setting up the attribute database related with spatial geometric data. An ESD real estate dismantling GIS with aerial image background is implemented.

2. EVIDENCE SAVING FROM DAMAGE

In the day life, some of the evidence maybe extinguished or it is hard to obtain late because of the affection of subjective and impersonal factors. For avoiding these things occur, it usually has been fixed up in all forms, to keep its objectivity, authenticity and validity of the evidence, so that it can be used to solve dissensions in time well and truly, and to vindicate the legal rights and interests of the party. Therefore, most of the country's law set up the system of ESD.

2.1 The Concept of ESD

The regulation of rule 74 of code of civil law: "Under the conditions of evidence maybe extinguish or it is hard to obtain, The lawsuit attendance can apply people's court for ESD, The people's court also can take saving measures."(Fan, 2001). The tiptop people's court puts in force some regulation of evidence of civil action, in which rule 24 regulates the methods of ESD as follows: "When the people's court carries through ESD, it can take the way of sealing up, distraintment, taking photos, recording, kinescope, copy, authenticating, investigating, and taking notes."

2.2 The Role of ESD

ESD plays very important role in solving dissension, so it is called "The first line of defence in preventing civil dissension." The markets of real estate occupy an important status in the country's economy, the development of real estate affects the daily life of hundreds of thousands families. Thus, it can promote the market of real estate run healthy by the ESD. Aerial RS image comes from impersonal thing directly, being impersonal thing directly reflection, it can be used as evidence directly in the lawsuit. It can also open out in the most and reappear the original state of the things waiting to be proved.

2.3 Attentive Problems of ESD

Evidence reality means impersonal existence, that is self-existent impersonal reality, which is not transferred by the human will. The things to be picked-up, fixed up, preserved is self-existent impersonal reality, no subjective suppose and fancy.

3. SPATIAL DATABASE

The design and development of a GIS system is very complicated, the core issue is the design of the database according to the system structure. Including the design of spatial database, the design of attribute database, the relationship between attribute database and spatial database, user interface, gallery management, etc. The system was developed by the ComGIS (Liu, 2003).

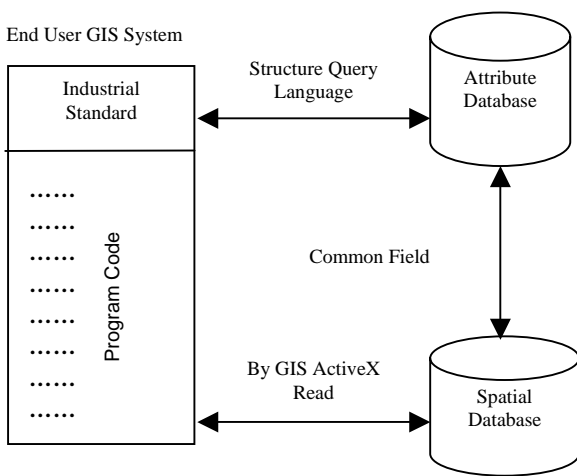


Figure 1. ComGIS Scheme Sketch Map

3.1 Spatial Database

3.1.1 Spatial Data Obtaining: Beijing has many kinds of RS image resources. The 1/2000 aerial orthographic image has 0.2m resolutions, in focus and readability, visualizing and intuitional, content richness, easy to buy and low price. So it is the best data source for obtaining spatial data. The aerial RS image based spatial data obtaining is fulfilled by the ERDAS imagine, and formed three types of file, .shp, .dbf, and .shx. The digital CAD plan map need to be load into ArcGIS to change its format and then it can be used by real estate GIS. The map of land use classification has to be converted into vector.

3.1.2 Design of Spatial Database: GIS adopts layer to organize and manage spatial data, according to different map elements divide the map into different layers, they were superposed together on the screen when the map was displayed, so you feel just look like a map, this is the basic idea of map layers. One layer is corresponding to a database table of one figure object. The principle of dividing layers is completely independent of idiographic application module. According to point, line and face, all the elements on the map should be divided into seven layers. Every layer should be strictly coded according to the information classification coding system, and the points, the lines, the faces should be belong to different

layers. According to the existence spatial data sources, the spatial database includes the following layers.

Layer	Name	Type
Layer1	Background1	raster
Layer2	Boundary1	line
Layer3	Building1	face
Layer4	Road1	line
Layer5	Land_use1	face
Layer6	Layout1	line
Layer7	Dismantle1	face

Table 1. Spatial data layer table

For the spatial data, the system manages them with Shape file format. Shape file format data is a kind of vector data with no topological relations and puts up as the form of map, it is made up of the follow three files: the .shp file including geographic spatial information, the .dbf file including attribute information, and the .shx file including the index relations of the two file. The three-file names must accord with identical together and store at the same directory. Some of the corresponding spatial data file as follows.

Layer name	Data file	Layer name	Data file
Boundary1	Boun1.shp	Land_use1	Land_use1.shp
	Bound1.dbf		Land_use1.dbf
	Bound1.shx		Land_use1.shx
Dismantle1	Dism1.shp	Layout1	Layout1.shp
	Dism1.dbf		Layout1.dbf
	Dism1.shx		Layout1.shx
Road1	Road1.shp	Dismantle1	Dismantle1.shp
	Road1.dbf		Dismantle1.dbf
	Road1.shx		Dismantle1.shx

Table 2. Spatial data file table

3.2 Attribute Database

3.2.1 Attribute Data Obtaining: This work is very hard. You must harmonize relations between departments and governments. The attribute data include: land code, land use, land area, land user, house quality class, doorplate number, area expiation value, family member, householder, etc.

3.2.2 Design of Attribute Database: The dismantling area attribute data are mainly organized by the Microsoft Access 2000, Access is a relation database management system (RDBMMS), it adopts table to organize the attribute data, all the tables were put in a database file, which is easy to manage. Microsoft Jet database engine that Visual Basic adopts is the same with Access 2000, it is easy to call on Access database. For considering the relations with spatial database, the tables should be set up based on the layers, mainly including: land information table, building information table, dismantling information table, road information table, etc. Some of them were shown as follows.

Field name	Data type	Length	Description
Land ID	Num.	10	Key field
Land property	Text	10	State, collective
Land use	Text	10	Greenbelt, etc.

Table 3. Land information table

Field name	Data type	Length	Description
Building ID	Num.	10	Key field
Building area	Num.	10	First floor area
Perimeter	Num.	10	Building perimeter

Table 4. Building information table

Field name	Data type	Length	Description
Serial number	Num.	8	Key field
Householder	Text	10	Dismantling householder
House address	Text	20	Family address

Table 5. Dismantling information table

3.3 Relationship between Attribute Database and Spatial Database

The spatial database and attribute database were put in the database in different forms separately, but they are related. Each layer corresponds to one attribute data file with which to describe the geographic information elements, and every element in the layer corresponds to one record of the attribute data file, the layer unit ID is a key field of the attribute table, the link of the attribute data and spatial data is just depend on this key field. So we can easily search attribute data by clicking the layer, and also we can locate a position by the attribute data, that is layer and attribute bi-directional query.

4. APPLICATION AND EXAMPLE

The system background image is taken in year 2000, a kind of 1/2000 digital orthographic image Taiyangong Beijing. The aerial RS image is the sources of the spatial data obtaining, the base of the visual query and spatial analysis. All the vector layers come from the image by ERDAS imagine. The background image is taken as a basic layer of the ESD of real

estate GIS, it can be superposed with GIS vector layer. If doing so, it deals with two technical problems. The one is how to display the raster background image and vector data at the same time in the memory? And more, is that zooming and roaming with the same scale. The other is location or matching of the raster image and the vector layer. We have a better solution for these questions, and developed the ESD real estate GIS.



Figure 2. ESD real estate GIS

5. CONCLUSIONS

In this paper, the aerial RS image based ESD real estate GIS information query system, has a character of low developing cost, short constructing period, and better practical function in the area of old city district and the joint of urban and countryside. Based on the image to obtain spatial data of GIS, the raster image and vector layer has the best matching in the integration environment system. It is propitious to GIS analysis and query, to find unconformity data and settle dissension problem in time. But the system also exists shortage, such as: network analysis, 3D analysis, high quality map printout, and large memory is needed, etc.

REFERENCES

- Chen, G.L., Wu, L.X., Li, Q., Han, G.J., Ying, W., 2003. ComGIS and its application in real estate information query system development. *Journal of Beijing Electronic Science and Technology Institute*, 11(1), pp. 27-31.
- Dang, A.R., Wang, X.D., Cheng, X.F., 2002. *ERDAS imagine Remote Sensing Image Processing Methods*. Tsinghua University Press, Beijing, pp. 18-58.
- Fang, H.L., Zhang, J.T., Liu, W.G., 1998. *Remote Sensing Image Processing*. Institute of Geographical Sciences and Natural Resources Research, CAS., Beijing, pp. 28-38.
- Fan, C.Y., 2001. *Evidence Law*. Law Press, Beijing, pp. 165.
- Liu, G., 2003. *Geographic Information System Development Course*. Tsinghua University Press, Beijing, in full.

