SPATIAL MULTI-CADASTRAL INFORMATION AND THE TECHNIQUE OF THE IMPLEMENTATION OF THE SYSTEM

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ABSTRACT:

On the basis of the variety characteristic of the cadastral information，the cadastral time-space data structure and its model of topology relation are established，and the dynamic alteration of cadastre is realized in this paper.

0. INTRODUCTIONS

The cadastre information system has the characteristics of great capacity, the data frequency renews and distinctness in time, which makes the application of time-space data structure very necessary. So in the cadastre information system, the establishment of time-space data structure and the operation relevant with time is included to establish practically cadastre information system service.

The fundamental unit of cadastre management is the piece of land, which is the natural land surrounded by the boundary, including its attachments above, relevant subjection and use attribute [1], which are not invariable, but possibly change along with the time. After the renewal is carried on the cadastre material, the original cadastre material becomes the historical material. The preservation of the historical material and current information has the extremely vital significance.

1. THE DATA STRUCTURE OF CADASTRE INFORMATION SYSTEM

When we construct the cadastre information system, the characteristic of the level structure, frequency renews and its great capacity must be fully considered. The traditional geographic information system database is difficult to competent the establishment of the cadastre information system. In order to resolve this problem, the time GIS technique must be adopted to establish the data structure of the level model (the time-space data structure), develop the access and visit technique based on the data model, and study the mechanism of the homologous search and function-reason logically. The time GIS technique is centered on the time-space data structure, in which the main function is realized in its foundation. A good data should be advantageous for the function realization of the system, saving space to resolve the problem that cadastre information has great capacity.

The land plat and the cadastral map have the typical polygon sketch data characteristic. We can establish topological data structure by the coordinate data (database) and the land piece constitution information which can be obtained by the cadastral investigation To the storage of the layer subtype data, a quite direct-viewing plan is to take the different time data as a data level for memory separately .When the number of the data level of structure is not very large, this method is a kind of effective choice. In actual circumstance, the cadastral information data is far more complex than the above situation, and usually proceed the renewal everyday. At this time if still adopt the above method, documentary quantity and total length will fly to increase soon, therefore this kind of method is not realistic, we must look for the more effective path.

The method of the time marking is one of current methods commonly used to establish the time space data structure. When this kind of method is adopted to store the cadastral information, both boundary data and establishment and disappear times of each piece of land have been recorded, in the attribute recording of which has also recorded the valid time and the invalid time. Like this, the boundary of land piece and its attachment which all once appeared in very long time may save in a spatial database, but all land pieces and all attribute record save in an attribute database. When some place change, we only mark time ended to the corresponding record in the spatial database and the attribute database and increase some new record change to complete the data renewal.

The merge and the decomposition of land pieces are two kinds of important renewal forms of the cadastral data. The establishment of data structure must be easy to the two kinds of operations; simultaneously the inquiry of development history to any land piece can be carried on. This article has used the space-time data structure to store cadastre information data which combine time sign with the merge and the decomposition of land pieces, which is shown in figure.1.

1.1 Data Structure

Cadastre material includes cadastral plot and kinds of form material. Generally speaking, cadastral plot includes the following several kinds of basic cadastres essential factor: (1) boundary spot; (2) boundary line ;(3)land piece; (4) point thing; (5) linear thing.

1.2 Data Structure of Attribute Data

Analyze the data characteristic of cadastre attribute data and the attribute data document format according to 《Regulations of Cadastre Investigation》and 《Rules of land Register》, studies the essential key data item means, type and length, describe etc in the database.
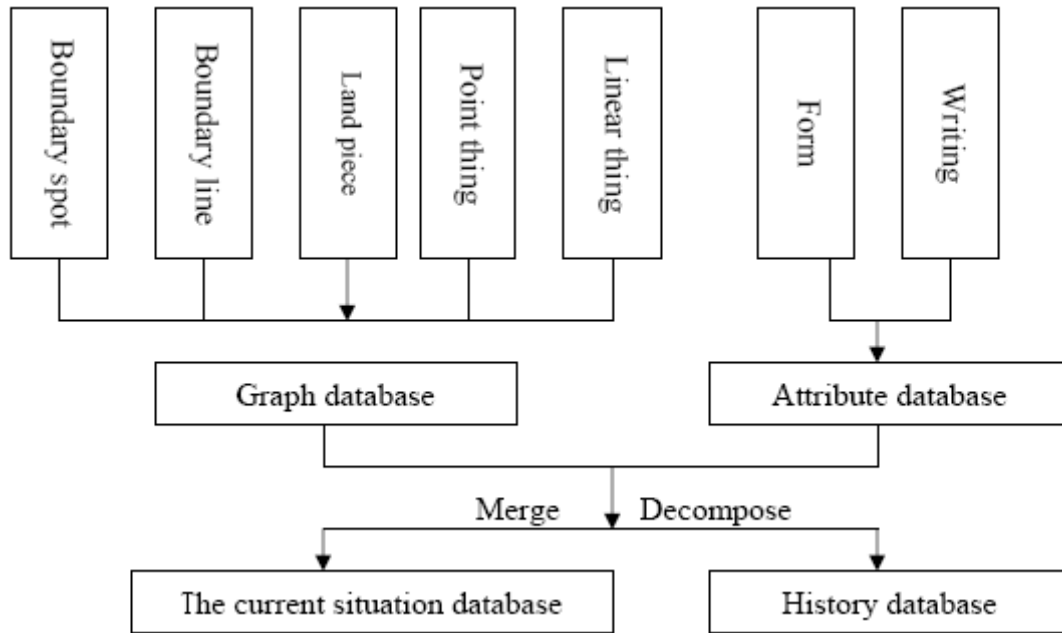
Figure.1 Time space data construction

1.3 The Establishment of Topological Relations in the Cadastre Information System

Graph in the cadastre information system adopts layer management, in which the special-purpose map is obtained by overlay according to needs. The attribute information of land piece is mainly connected with its distribution map, but the cadastre essential factor contains linearly, the shape mark, ground sign, building floor and area etc. The distribution map may be produced through the topological data structure, that is, the distribution map can be seen as is graph from the point, the line and the plane. Therefore, the establishment of topological relations in the cadastre information system need use the constitution information and the boundary coordinates information of the land piece. So the distribution map can be divided into three basic levels of structures like this, namely the boundary spot, boundary line, the land piece (surface). The points constitute the lines; the line constitute the surfaces, and the points is decided by the coordinates（X, Y）. Homogonously three databases is produced, namely, the point database, the line database and the surface database. In the cadastre information system, the basic relation is relation of the line - point, the surface - line, the surface – spot and the surface -surface relations. The surface - point relation can directly be made by the boundary spot, but the surface-surface relations describe the surrounding neighbors of land piece.

The establishment of topological relations can be a street district or an administration district, in which the scope can be chosen according to the size of data. The two source document to establish the topological relations are the land piece constitution information file and the coordinate's document of boundary spot. We must guarantee the number of boundary spot in the same district is unique. Make use of the land piece information document and the statistics boundary spot of the transition document of the adduction number of times, plus originally already exists that surface- spot, spot - X, Y coordinates relations can immediately completely describe the topological relations in the cadastre information system.

2 .CADASTRE CHANGES

The main contents of cadastre changes is the merge, partition, adjustment and the increasing new land piece in the original land piece distribution map. Obviously the change above will change topological data structure of the land piece distribution map; meanwhile it will inevitably change the content of the corresponding attribute database. The processing method is: (1) for the land piece merge, the partition and the adjustment situation, first we will move the graph and the attribute information of the original land piece in the historical database ,then directly append the change declare, investigate, verification etc. data information through the input surface to the corresponding attribute database, after the processing above, the cadastre change will be allowed to sum up for deletes and increases or a several land piece graph in the original land piece map, the processing method can be done one by one. (2) Graph processing may be revised by the software of establishment of topological relations, also may be done directly by hand.

The cadastre change is divided into the two major type totally: One type is the shape change of land piece, accompanying with the attribute change. After the merge of the land piece, the area and related four change inevitably. Another type is the attribute of land piece changes, but the graph land of piece itself did not change, like ownership transfers register etc. From the analysis of the change rule of the land piece graph, we can summarize the land piece map shape change for the land piece merge, the division, the mix division, the public boundary adjustment and the independent boundary adjustment etc. Five kinds of basic change can be seen as five events, which have the topological relation in time, namely basic alteration affairs take place in same alteration, they inevitably have the successively combination relations with the time. Other changes can be regarded as the basic change to the topological combination with the time.

3 .REALIZATION TECHNOLOGY OF MULTI-DIMENSIONAL CADASTRES INFORMATION SYSTEM

3.1 Data Renewal Problem in the Cadastres Information System

A data renewal of land piece is an important content, which involves the operation of the document of land piece, the attribute document of land piece and the boundary spot document .The land piece is encircled by boundary line or boundary spot. When the boundary spot defined for the land piece changes, the boundary spot should not only be carried on the renewal, but also should simultaneously increase the new record in the land piece attribute to record the change; when the boundary spot for the land piece does not change, or the land piece attribute changes, the document in the land piece need not add the new record, some modification to the record only need be done.

1) The input of the new land piece ①input the new boundary spot of new land piece in boundary spot document. ② increase a new record in the land piece document, and input its serial number, marking code, boundary spot etc.. ③ increase the corresponding attribute to record the attribute of new land piece in the attribute document.

2) The merge of land piece ①increase a new record to record the merge of land piece in the land piece document, input the row of boundary marking number, in which marking number of the land piece merged is saved. ② add the invalid time for all land piece merged, which is the time when the merged merge occurs. These records contain a marking number after merging. ③in the merged attribute document, add on invalid time in the land piece merged to the attribute record, and add attribute to record the attribute new of the land piece.

3) The decomposition of land piece ①input the new boundary spot which the land piece decomposition needs in boundary spot document. ②add several records in land piece document to record the land piece decomposed, in which all the marking numbers for the land piece are in. their variable ③ proceed the modification to the original land piece document, add the invalid time , records the marking number of all land piece decomposed in its variable. ④add on invalid time for the attribute record of original land piece in the land piece attribute document, and add some new records to record the attribute of the land piece decomposed.

4) The attribute change of land piece. The attribute data renewal is quite simple. Only add on invalid time for the original record and add the new attribute in the attribute document.

5) Search. Based on this kind of time-space database, the search of cadastre information can be realized in time and in space. A kind of typical search can be said with the short language following describes: "manifestation certain place area at some engrave to satisfy at that time a certain belongs to attribute conditional and all land piece ". In particular, when we do not assign any attribute condition, the inquiry result will be this area of the time. In order to realize this kind of search, we must first visit the document for land piece and land piece attribute, and discovers all land piece that assigns the condition in this area, then adjusting with the boundary spot document to complete search results, then transfer boundary spot document to complete the demonstration of the inquiry result. The inquiry

result is not only used in the demonstration, but also may be used to produce the working document, or manufacture hard copy through plotting machine. Moreover another kind of typical model search can be described for:" Lists all land pieces which once existed on time in some region between successively orders ". This kind of inquiry may be done by visiting the land piece document and boundary document.

3.2 Special Problems in Data Alteration

1) The neighboring land pieces do not permit intercross or too small aperture mutually. Through the given tolerance, we can rectify automatically a cross layer after layer within tolerance. For the area cross exceeding the tolerance, the system will report to avoid the belong dispute. In order to protect the state-owned property, disallow the aperture between land pieces theoretically. For small aperture between the land pieces, it should be shared by the corresponding land pieces; for large aperture, it should be alone divided into land piece.

2) The distance between the boundary spots, the line length of boundary; the land piece area can not be too small. Because the boundary has the certain area, boundary spot distribution is impossible to be dense at real surveys. Therefore the boundary point should have the certain distance. In system if the distance between boundary spots is smaller than the given tolerance, we will regard it as the error to eliminate. The corresponding line length of boundary also must be bigger than the stipulation length, and the area of land piece also must certainly be bigger than the tolerance.

3) By the precise renewal of the boundary spot coordinates, graph and attribute data change maintenance synchronization. Usually the new land piece needs to be surveyed and drawn. If we do not make the boundary spot coordinates the precision positions, it can not only affect the data precision, but also can cause the nonessential dispute. The land piece graph change meant the old land piece demise with the new ancestor place production, the new land piece area, four to, or the right person can have the change, therefore graph change at the same time inevitably accompany with the attribute change.

3.3 The Alteration of the Land Certificate

The alteration process of the land certificate is realized by the relating change between the encoding certificate and the outside code in certificate. The certificate encoding increases progressively along with the change of the cadastre essential factor, the outside code (namely the land certificate serial number issued) is only changed at the alteration register. When certificate encoding change, as long as the new certificate is gotten, the certificate encoding is many a relations with the code outside the certificate.

The processing model of the change of land certificate is: according to the land certificate serial number(code outside the certificate), the current project change involves in the complete certificate encoding in the land certificate data record, find out the latest code(namely the biggest value inside the certificate code) inside the certificate, use it as the new code inside the certificate record the land certificate relation record, simultaneously change the date to record in the data record for land certificate relations. In land certificate record, find out the historical code(namely the minimum value inside the certificate code) inside the certificate, record the old code inside the certificate in conduct and actions in code in this inside to land certificate relation record inside, then view which

255

by the present situation land piece surface, the right person's form, the land piece ownership altruistic relations table foundation and the view corresponds to the land certificate content, finally prints the land certificate.

4. CONCLUSIONS

At present, the cadastre management information systems established in different places lack the uniform standard and multi-dimension, which makes the cadastre information confusion to a certain extent, enables the information between the different systems not to be shared, and makes the data quality irregular. In addition, the cadastre information has the characteristic of the bigness and frequent renewal, which makes the space-time data structure extremely important in the cadastre information system. According to the change characteristic of the cadastre information, the space-time data structure and topology relational model is established to solve the operation question of the hierarchical structure data, which makes the information of different times comparable, so as to realize the cadastre dynamic renewal. In the same time, the space data, the attribute data and other management data merge into one organic whole. Through the strict control to the data quality, the multi-dimensional cadastre information system is established to realize the exchange and sharing of the data, thus it will bring into play the social and economic benefit which the cadastre information should have.

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