Management and Application of Attribute Data based on Real Estate Spatial Data

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Abstract In this paper, we studied the management, analysis and application of attribute data based on some spatial data of real estate object. We proposed and implemented the structure design and the combination method of spatial data and attribute data of real estate object. Then, for the management of attribute data of real estate, we mainly proposed the management method of its attribute data based on some spatial data, and implemented the retrieval of its attribute data based on some spatial data and spatial geometry data based on object name. We also performed the overlay analysis and attribute data statistics of real estate objects.

It was possible for us to implement database access of red estate objects, management and statistics of real estate data in "ㄷ" area, and develop and introduce geography information system of real estate(REGIS) according to these methods.

Key words real estate management geography information system (REGIS), real estate management, data structure

Introduction

The great leader Comrade **Kim Jong Il** said.

"**By developing our science and technology to world standards as soon as possible, the intellectuals should make a great contribution to increasing production rapidly and developing the economy.**"("**KIM JONG IL** SELECTED WORKS" Vol. 10 P. 196)

Real estate data is a kind of spatial data with its position and attribute. It is common comprehension that the value and potentiality in real estate business is fundamentally determined by its position. The information management system which can input, analyze, manage and apply the real estate data with its spatial position by using GIS is the geography information system of real estate management(REGIS)[1－9].

The geography information system of real estate management has not only the characteristics and capability of the geography information system but also its intrinsic characteristics. In order to perform the real estate management business, the first the users must entry spatial geometry data of real estate data and thematic attribute data corresponding to it and implement thematic or regional management and analysis by using the associated relation between the data. The geography information system(GIS) can be effectively used in management, analysis and application of these real estate data. For real estate management business, the real estate management GIS can be effectively managed and analyzed the real estate data and play an important skill in grasping and

managing the real estate objects of the state and region in a unified way. Therefore, several countries are making every effort to develop the exclusive real estate GIS(REGIS) for real estate management business and they have achieved some success.

We have studied the management, analysis and application of the attribute data based on spatial data of the real estate, which were proposed as an important issue in developing and introducing the geography information system of the real estate management.

1. Structure and Combination of Spatial Data and Attribute Data of Real Estate Object

Data of real estate object are managed with spatial and attribute data. In the development of real estate GIS for registration and management of the real estate data, the content of current business should be correctly reflected and the reasonable design issue of database for implementing the effectiveness of the data management, analysis and application should be resolved.

Manipulating real estate object data need to access separately spatial data base and attribute database as well as in GIS application software to resolve the current business problem. Because when the users managed the attribute data by using Shp and dbf data file of ArcGIS, there was the complexity in the data management and difficulties in adding the new attribute data table and field or in input, management and update when including all kinds of thematic data which occurred in the management and process of large amount of data from the characteristics of real estate business.

We proposed the following principle in order to reasonably proceed statistics, data retrieval, analysis per region, per thematic, per agency-enterprise necessary to real estate management business combining with spatial data and attribute data.

① We organize and combine database for real estate management by dividing into spatial data base through data file of Shp and attribute data base through MySQL.

② The spatial database file and the attribute database file to use in combining the spatial data and the attribute data must be corresponded and the link code of real estate object, the object code of Shp must be unique and equal. It means that the Shp file to compose the spatial data and the attribute file must have map into 1 to 1, and the object code data value of Shp data to reflect the same object in both files must be equal.

③ In the spatial or attribute database the data recorder must be uniform and the database consistency the primary key or the foreign key mustn't have the empty value and etc should keep.

④ When you entry the spatial data and the attribute data to real estate object , the value estimation automatically must be achieved.

According to these principles, the structure of both spatial data and the attribute data of real estate object were designed as follows.

1.1. Structure design of spatial data

Spatial data element performs a major role in the implement of real estate management business.

The spatial database of real estate were conformed into data files comparable to admin boundary, industry, agriculture, water area, building, forest, road, special and etc by reflecting the regional

sort and real estate object sort content of real estate current business.

Generally, we can construct the real estate spatial data as follows.

$$spcObject = \{shape, spcProperty, Shp\_ID, \cdots\}$$

where, spcObject is the spatial data of real estate, shape is the coordinate value of spatial object, spcProperty is the characteristic value (area, perimeter and etc).

In the design of Shp spatial database field, we easily analyzed and took statistics per region or per thematic by setting unique identifier, Shp ID for combination of attribute data.

1.2. Structure of attribute data

Attribute database were constructed into industry, agriculture, water area, building, forest, road and special as well as in spatial database.

Generally, we can construct the real estate attribute data as follows.

$$attObject = \{AdminCode, RestateCode, EnterpriseCode, Shp\_ID, ObjectName,$$
$$InventoryArea, ShpArea, LandSort, LandLocation, FirstValue, \cdots\}$$

where attObject is the attribute data of real estate, the AdminCode is the admin district sort code of object, the RestateCode is the objective sort code of the real estate, the ObjectName is the object name, the InventoryArea is the inventory area, the ShpArea is the geometric area value of the Shp, the LandSort is a land sort(industrial land, commercial land, populated land, etc), the LandLocation is a land position (central, neighborhoods, etc), the FirstValue is a first value.

In MySQL attribute data base real estate data firstly gave the code per region, the sort code of real estate object, the sort code of the institution and enterprise principally regarding with classification and management according to per region, per real estate object sort, per institution and enterprise sort code, and Shp_ID to combine with spatial data, professional attribute according to real estate business and thematic in addition.

The value of ShpArea is stored in attribute database when saving while estimating feature area to Shp data of spatial data automatically and keeping it with attribute value. This shows the variation state of real estate object in comparison with the inventory area.

1.3. Combination of spatial data and attribute data

The combination of spatial data and attribute data principally is implemented as layer name and Shp object code.
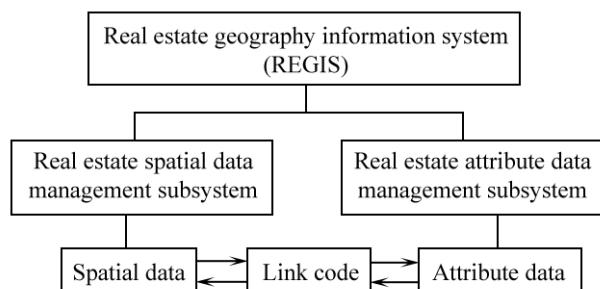

Fig. 1. Combination of spatial database and attribute database

Where, the layer name may be considered as the file name and Shp object code as the foreign key (Fig. 1).

In the entry of real estate object data of any theme on the system interface, the user firstly selects corresponding layer on the layer dialog, and entry geometric data of object by using high-resolution satellite

image on the main window, and then input the corresponding to attribute data and if user give the command to save, spatial data may be input Shp data and attribute data into MySQL with the same value of Shp ID.

2. Attribute Data Management based on Spatial Data of Real Estate Objects

Real estate management business has a vast mount of data, and both its spatial and attribute data have complex characters. We implemented second data entry of theme and attribute data on real estate as data establishment to guarantee spatial attribute data consistency of data corresponding to database to design above and it enabled the user to implement effective data retrieval.

When selecting the digitized Shp geometry on main interface of real estate management GIS, this system may enable to retrieve and display it. This process may recorder retrieval process of attribute data values corresponding to MySQL for Shp_ID of Shp geometric data on the main interface. The retrieval process was illustrated in Fig. 2.

When using the attribute retrieval tool of MapObject, it is impossible to input data such as to modify and to append data. Therefore, we constructed attribute retrieval tool to enable these data entry.

We might enable to input it into attribute database automatically selecting the object according to per region, real estate object sort and per institution and enterprise sort. Regional information, real estate sort information consisted of digital code value in attribute database but we might enable to display appropriate content on suitable part of attribute check dialog gearing with the admin district table, the real estate sort table, the institution and enterprise sort table.

In addition, we enabled corresponding thematic attribute values to display in attribute table of the below part and to append new data and to modify old data.

We implemented either attribute data retrieval based on spatial data of real estate object fundamentally

Fig. 2. An attribute data retrieval flowchart of the object based on the spatial data

or spatial data retrieval base on attribute data, i.e. when specifying real estate object name, twin-direction retrieval that could enable to retrieve and display corresponding spatial geometric data.
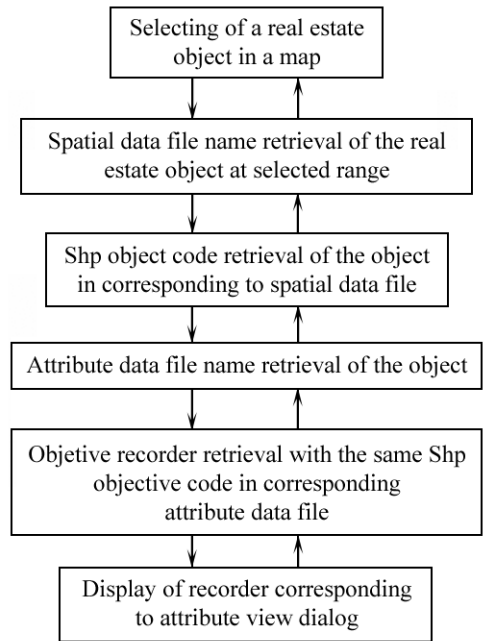
3. Overlay Analysis and Data Statistics to Real Estate Object

Here, we chiefly carried out an overlay per theme, per region to real estate object and a data statistic. It fundamentally carried out the overlay between an area object and some area object.

Finally, new element to aim from main thematic layer could be obtained overlapping more than two elements(map theme) of the same zone under the condition of the same coordinate system while carrying out an overlay analyze and it might enable to reflect all of attributes original double layers have.

① Attribute retrieval and statistic according to object name

For instance, the numerical information and the rate to the total area of an object, its building area and other site area mainly may be obtained into several units(km^2, m^2 or ha) in the area attribute retrieval of object.

② Attribute retrieval and statistic according to theme

For example, the total area of the industrial areas within a zone may be gained into an overlay analysis. Also, it can make output with several units.

③ Attribute retrieval and statistic according to the region

Here, the retrieval and the data statistic might be performed per province, city, county (district), Ri (Dong).

The main class UML diagram to implement the spatial and attribute data management method of the real estate object described above is illustrated in Fig. 3.
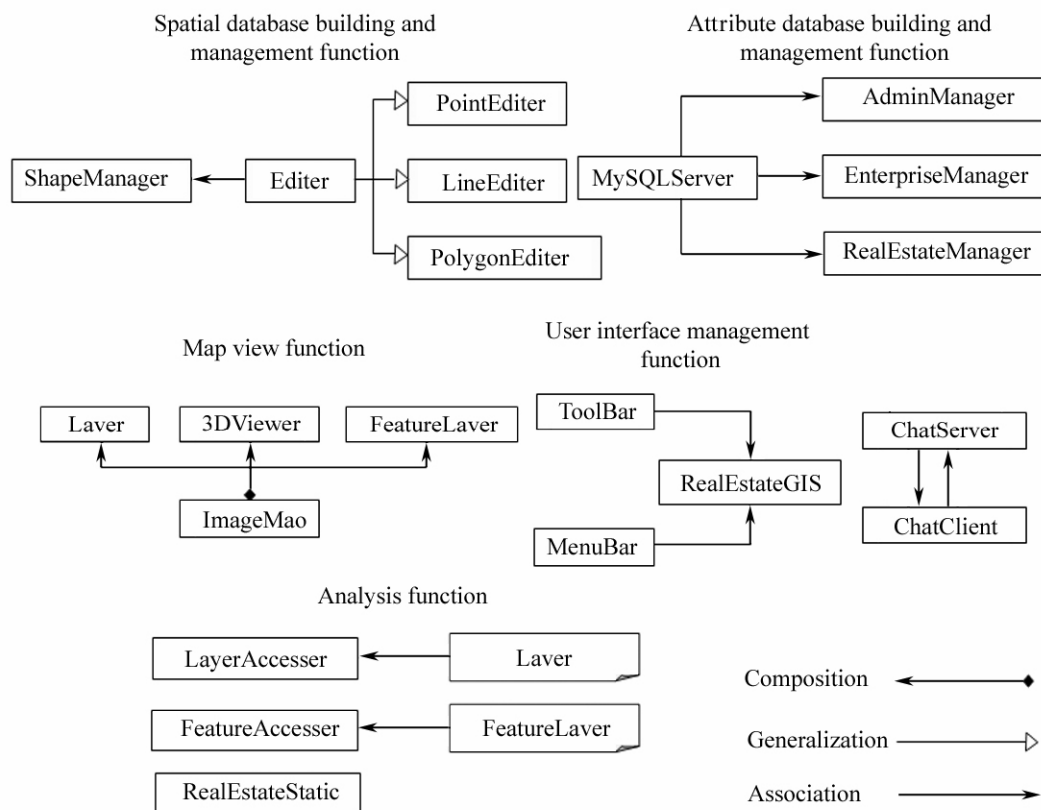

Fig. 3. A main class UML diagram for implementing attribute data management based on spatial data in REGIS

Conclusion

In this paper we proceeded the study on the management, the analysis and the application of the attribute data based on the spatial data of the real estate object to develop and accept real estate management geography system (REGIS).

The contents resolved in this paper are as follows.

First we implemented the construction and the combination of the spatial data and the attribute data for real estate object.

Second we also implemented the attribute data management based on the spatial data of real estate object.

Third we proceeded the overlay analysis and statistics of attribute data based on the spatial data of real estate object.

The contents resolved in this paper have been used to access the database, to manage, to analyze, to implement the statistic of the real-estate object of "ㄷ" area. The software for REGIS is developed by JAVA language, MapObjects for JAVA and it is efficiently used to implement the real-estate registry, and management by being introduced real-estate management business.

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