Geographic Visualizing Some Municipal Data of Chengguan District

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***Abstract*-Optimizing information management play an important role in safeguarding administrative functions for city government. Meanwhile, integrating service data with fundamental geographic data is an important way to construct digital city. This article focuses on the geographic visualizing methods of several important municipal data, which improve the operable of digital city construction.**

Keywords- Digital City; Smart City; Geographic Information System; Geographic Visualizing; Municipal Data Processing

I. INTRODUCTION

At present, digital city and the level of constructing digital city based on the smart city are important symbol of urban informatization and modern management [1]. City digital information, which correspondingly contains huge data at any time, has been improving scientifically classify methods step by step, and enlargeing the micro and macro to meet growing demands for urban construction and management [2, 3]. It provides support for the management and application of digital city and intelligent urban mass data with framework based on fundamental geographic information. With ordered indexing on spatial location of mass digital urban information, timely achievement of the required information can be got to meet various application needed by intelligent city.

To meet the needs of smart city under the framework of visualization of geographic data, sometimes some municipal data need to be turned into a data structure that is compatible with the basic geographic data [4, 5]. Software environment of geographic information integration platform of Chengguan district in Lanzhou city of China is ArcIMS geographic information network platform with Oracle relational database, which integrates various informations from public facilities such as urban monitoring devices, alarm calls, and various government databases on population topics. It is significant to municipal management as well as visualization and analysis geographic information related with total district. Through analyzing and processing both several typical urban features and geographic data, we can obtain main contents of municipal geographic information visualization.

II. MAIN WORKS

A. Geographic Visualization of Monitoring Data

Most cities' monitoring systems have been building gradually and maintaining continuously by different construction departments in different ages [6]. These monitoring systems are often managed by different government departments in accordance with their respective needs. In daily use, some departments use and manage monitoring facilities through purpose-built, dedicated personnel and monitoring integration platform, while some departments rely on leasing monitoring facilities which were built and maintained by special communication departments. Therefore, city's various monitoring facilities are built in different periods, owing to which, different formats monitoring information are produced by various management platforms at the same time. In order to enable the government to unify the management and usage of the city's public monitoring resources under the framework of the wisdom of the city, we need to regulate the use of the unified deployment of the city's public monitoring data, and require all monitoring departments to report their monitoring equipment lists with positions and calling interface respectively.

Information of monitoring facilities is based on tabular report form, and the correct point feature layer of monitoring facilities is established at first.

– Excel table data import. Monitoring facilities registration forms are tabular data. In addition to the identification information of the monitoring equipment, there are two special fields filled with geographical coordinates of corresponding device. ArcMap import function can be used to import these table data.

– Establish a monitoring point layer. In ArcMap data list, right-click the imported control table, select "shows XY data" in the pop-up interface and associate geographic coordinates in the table fields with corresponding XY field, click "Import" button, tabular data can be automatically imported into monitor layer.

– Coordinate transform. Monitoring location data are mainly geographic coordinate values in WGS84 coordinates, while the basic geo-data for treated are in the local coordinate system. These coordinates can be transformed uniformly with

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available coordinate conversion parameters, with which monitoring point features can be matched correctly with basic geographic data.

– Data checks. As coordinate transform bound by strict mathematical relationship, monitoring point features can basically meet the requirements to reach the wanted position accuracy. But a small part of monitoring points deviate largely, without considering part of the collection coming with GPS information monitor geographic coordinate values which may be collected in the field by some staffs, so there will be some data collected by human error. Combined with basic geographic data, evident individual error about positions of monitoring point features can be corrected by ways of indoor editing, searching data, field surveying and other ways, to ensure accurate and reliable information points to meet the requirements.

– Code surveillance video viewing pages. Two steps are implemented in geographic information integration platform based on elements of the control point viewing and controlling real-time video surveillance. First, select the target element querying function monitoring feature using available query methods such as point query, range query, or SQL query to select the target monitoring elements (Fig. 1); and then we can get the corresponding surveillance video viewing and have control of functions resources in a popup window (Fig. 2) by clicking the hot link of the selected elements returned from query results.

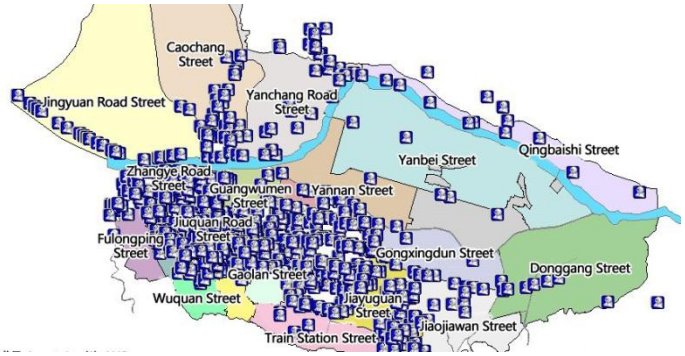

Fig. 1 Location and distribution of surveillance cameras

Fig. 2 Discover surveillance video using map query

B. Constructing of a Quarter of an Hour Service Circle Function

To improve the level of government services and achieve fine management, a quarter of an hour service circle is an important measure to reflect the actual needs of the government relative to people. According to the types of service, the service information is divided into five categories, which re peace circle, living circle, health circles, sports circle and government affairs circle. The system needs calculation to get a specific target service information within specified distance range. Service circle function is actually the GIS buffer analysis which needs to build service punctuate feature layer to meet the requirements. Data sources for the neighborhood offices report elements of service information table in Excel format. In the table, we can get detailed service elements' names, detailed types, owned offices, road names, house numbers, etc., rather than the geographic coordinates data. The work we need to do for the service circle data source is as following:

– Create a service circle point feature layer and point features in the layer corresponding service information table. In ArcMap, according to the house number and other basic geographic data layers we have got, we find each actual geographic position corresponding to each piece of information in service information table, and then create these new point features at the location in the layer;

– Edit attribute values of point features. Input the information of service element information table into the corresponding attribute fields of point feature;

– Add and edit field of service circle type, by which we can distinguish the service circle type of each point feature in service circle layer. A "service circle type" field is specifically added in service circle layer when we edit attribute data, and the appropriate value is filled in this field according to feature's type information;

– Coding buffer query page. In the integrated platform, if there is an effective element in the selected state, service circle queries can be activated, and then the user selects a service circle query parameter input page, enter the service type and distance service graph queries, then the desired service circle inquiry results can be got eventually (Fig. 3).

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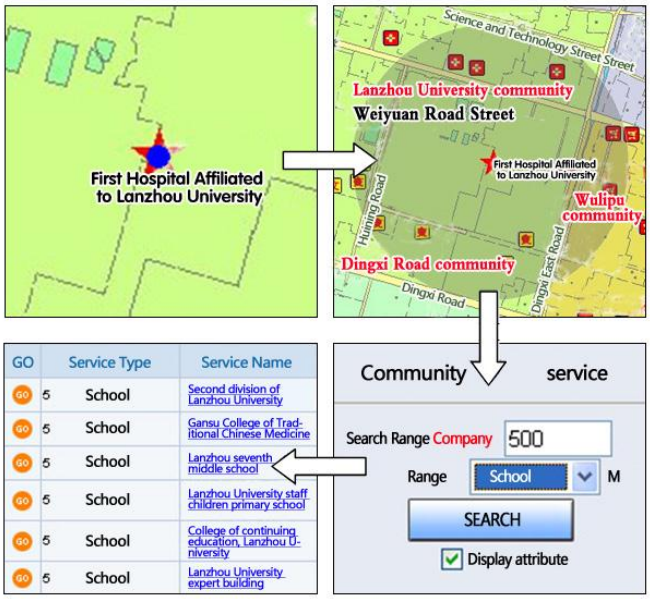

Fig. 3 Query results of 500 m sports service circle

Due to data sources lack of geographic coordinates, it took more time and human resources to process service circle data and build a service circle feature layer. It shows that service circle data standards should be standardized during pre-acquisition phase, so that the required data reported in line with the geographic data can be certificated and auto-imported, therefore unnecessary duplication of efforts can be avoided.

C. Enhance Spatial Visualization of Special Populations Data

In the municipal work, classification management and query analysis to urban flow of special populations represented by personnel or difficulties relief workers are important civil affair work. To optimize query, display and improve the efficiency of data analysis and intuitive of data mentioned above in the database stored in a table, we need to associate them with the basic geographic data together as the image of a more intuitive graphical form manifested. According to characteristics of special populations data, do as the following.

– Establish relationships with existing geographic data. Special populations tabular data themselves do not have spatial coordinates of geographic features, while information existing in tabular data contains rich geographic information such as streets, communities, housing and other property house number of special persons, which have strong correlation with the appropriate geographic data already stored in the system. There is no doubt that it's possible for us to find the way to get geographic positions by persons' information or vice versa.

– Enhanced real-time statistical analysis of special populations. Tabular data which are vulnerable in natural optimization data show that they have the ability to enhance the visual representation of data of special populations and increase the real-time statistical analysis of such data. Either for SQL database query, map query from special populations information or people get peer review, the functions of statistical analysis to special populations are all strengthened. Furthermore, by using more flexible charts to visualize the performance of the resulting data, the system can help us to grasp knowledge contained in special populations as soon as possible.

D. Case File Data Integration and Display

The case file referred to the huge event archive information is formed from government hot-lines. Each case file contains wealth information and case information related to the event, in addition to geographical location, the case of the occurrence of the event category and time, streets and communities, receiving unit and advice, as well as other related personnel information. For case files, analyzing and visualizing timely classified data can facilitate to sum up experience, improve government ideas, and optimize resources allocation. The system enables both categorized searching and visualizing case files' information integrated with geospatial data, which enhances the system in assisting government decision-making functions.

III. CONCLUSIONS

Digital city is a large and complex systemic engineering, it is no wonder that this article just discusses classification analysis and spatial visualization methods of several types of typical municipal management data to better them effectively and comprehensively apply and integrate them into digital city system. Municipal data are also essentially a huge flow of information in real time to generate complex types of data, compared with many municipal organic integrations of data within

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the framework of the digital city. Digital City is to improve the information management capabilities, to generate greater social benefits. Therefore, geographic visualization works of municipal data should also be improved and enhanced to meet the evolving demands of municipal management in the future.

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