A GIS application of clearinghouse framework for the union catalog of Taiwan digital archive program

Cheng-Lien, Fan Hsiung-Ming Liao Kun-Chi Lai
Computing Centre
ACADEMIA Sinica
128 Sec.2, Academia Road, Nankang, Taipei 115 ,Taiwan
Tel: (886)-2-2789-8012 Fax: (886)-2-2789-9949
E-mail: fango@gate.sinica.edu.tw veevee@gate.sinica.edu.tw
east0122@gate.sinica.edu.tw

Taiwan

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ABSTRACT:
The Digital Archives Program of Taiwan has accumulated a colossal amount of spatial and temporal GIS data. It becomes critical to set up a GIS environment and a comprehensive platform, through which spatial databases created by various participating organizations can be integrated and cross-referenced in a union catalog with spatial indexing capability. It is essential for the comprehensive platform to be accessible to all digital archive users and be effective in retrieving data with cross tabulation and indexing. The application of GIS concept and techniques enables the comprehensive platform to provide powerful spatial querying and referencing functions which are not feasible in traditional cataloging system. The clearinghouse framework for the union catalog of Taiwan Digital Archive Program is developed by using ArcGIS Server, which provides necessary functionality and flexible architecture for future expansion.

1. INTRODUCTION

In the last decade, due to the rapid development of internet service, the internet-commercialization and the use of WWW have become more and more popular. The technique for the Web-GIS has also improved significantly. Nowadays, users just need an internet browser to be able to acquire plenty of map information on internet. The internet service is different from the stand-alone system which requires high-level equipments. The maps and the spatial information can be acquired easily by integrating the map server engine and the internet service.

At the same time, Academia Sinica's experiences in executing the Union Catalog of National Digital Archives Program have contributed to a larger and larger volume of digitized data. Among these data, there are many that are related to temporal and

spatial properties. For example, the distribution of animals and plants, the archaeological ruins, maps and remote sensing data and etc. all contain temporal and spatial data. To effectively retrieve data, the method of setting up metadata information structure is a key point. The traditional data retrieving method is not effective in integrating data with spatial and temporal information. In this program, we have set up the Union Catalog of National Digital Archives Program to implement a temporal and spatial infrastructure to retrieve data across different fields. Users do not have to input a key word to retrieve data; instead, they can just click to choose the classified structure of the archives, which helps narrow the searching range and helps retrieve and browse data efficiently. Up to now, we have established 5 classified structures: Content theme, Temporal, Geographic, Digitized object type and Institutional Projects of major content holders. In every piece of datum exported to the Union Catalog, we have to mark to which classified structure it belongs.

2. METHOD

2.1 Geographic structure

To set up the geographic structure, we extracted information related to geographical positions from the metadata database. Then, we used Web-GIS technique to convert all of these geographical data into Geographic coordinate. Our query interface is easy to use. Users simply need to draw an AOI box on the map, and the data fallen in the designated region will be promptly selected. The database exported to the Union Catalog should be in the format of XML structure. Thus, the data retrieval structure was set up through the geographic data in the database and the interface development.(shown in Figure)

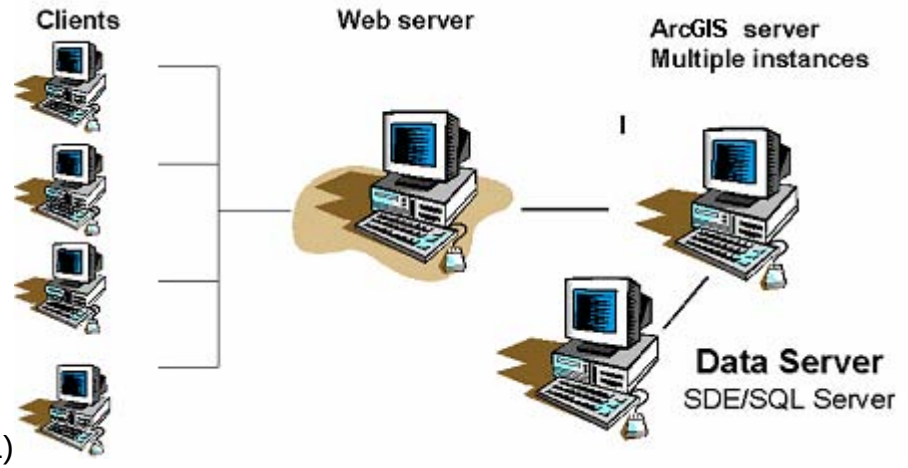

Figure 1. Geographic data retrieving structure

2.2 Spatial and temporal data attributes

The sources of archived data come from various fields and are in a large number. The data from different fields usually have some common properties such as the clustering of data in time or space. Spatial data in GIS have attributes of point, line and polygon. Therefore, under the operating mechanism of the Union Catalog system, the geographic attributes play an important role in restriction. The data

retrieval can be regarded as a spatial range indexing. The retrieving procedure, which is from rough to detailed, helps us query the data effectively and efficiently. In this system, we use the geographic coordinate system (latitude/longitude) for the base-framework. The contents of the digital archives span thousands of years. The designs of the spatial and temporal structure in the Union Catalog system can narrow down the retrieving range.

3. RESULTS

We have designed a retrieving interface for spatial data (shown in Figure 2), and an indexing interface for temporal data (shown in Figure3). The retrieving interface for spatial data offers the general GIS software functions, such as “zoom in”, “zoom out”, “pan” and “select”, by AOI box. Users just need to draw an AOI box on the map, and the data will be selected in the Union Catalog database. The indexing interface for temporal data is based on 1D structure. Users can set a temporal range which will narrow down the searching range. The data fallen in this range are what the users are interested in.

Figure 2.The retrieving interface for the spatial data

Figure 3.The indexing interface for the temporal data

4. CONCLUSIONS

In this study, temporal and spatial indexing has been successfully integrated into the Union Catalog system of Taiwan National Digital Archives Program. To retrieve a large number of data, it is appropriate to distinguish data type by temporal and spatial attributes because many archived data are related to time and space. Therefore, our methods of adding restriction on temporal and spatial attributes can improve the overall efficiency of data retrieval.

5. REFERENCE

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