SARS Situation Management and Publishing For Ministry of Health

System Introduction

In 2003, the outbreak of a new epidemic called Severe Acute Respiratory Syndrome (SARS) in China and worldwide menaced the people's life. As SARS spread fast, the epidemic grew like a weed in a number of large cities in China. Beijing is one of the cities with most affected people. New scientific technology manners are needed to control and analysis the spread situation of SARS.

Beijing SARS control and alarm information system was built based on GIS technology, presented the epidemic data spatially and displayed the spatial distribution of confirmed SARS cases, especially the spatial distribution of people who have stayed with confirmed case patients but have not been isolated, so that decisions can be made to control the spread of SARS. Meanwhile, this system takes full advantage of GIS spatial analysis function, the user can query and analyze confirmed and suspected cases according to time and spatial position, and perform classification and statistics according to different indices and spatial positions. In the system, forecast can be made on potential affected area and the result can be displayed with both images and text, which can help government departments to make informed decisions, and provide information for the public to take corresponding measures.

The system is built based on SuperMap Objects and SuperMap IS, and consists of three sub systems: "epidemic data input sub system", "epidemic situation analysis and alarm sub system" and "epidemic information publication system", and the main functions are: input of epidemic data, information analysis and warning and publication of epidemic situation.

Input of epidemic data

In this sub system, each inferior disease control department can input the information of contacts and related patients, and position each contact and patient rapidly (Figure 1 is the epidemic data input interface). Each inferior disease control department can summarize the input data at fixed time each day, perform query, statistical, mapping and analysis, and output, submit and report newly modified data to superior disease control department. The superior department summarize the data submit by inferior departments at fixed time each day, and perform query, statistic, mapping and analysis for more large area.
**Epidemic situation analysis and alarm**

Epidemic situation analysis and alarm sub system (as shown in figure 2) analyze, track and manage SARS contacts information according to input epidemic data.

**Figure 2** Epidemic situation analysis and alarm sub system

1. **Query function**

The system provides four types of query functions to query information of contacts.

Based on the basic information of contacts: for example, query detailed information of contacts according to the name, age, sex, working organization etc.

Based on spatial information: this function queries all the contacts in certain area using GIS spatial analysis function.

Based on both basic information and spatial information: It can query and position the contact on the map or query the detailed information of the contact by clicking on the map.

Based on the patient information: It can query all the contacts that have contacted with the specified patients directly or indirectly according to the name of the patient, and position these contacts on the map.
2. Track function

The system provides the following track functions to track the contacts:

Track direct contacts of specific patient: Known the information of specific patient, it can track the contacts of this patient and display them in a list or on the map.

Track all contacts of specific patient: As the contacts of certain patient may contact with others, this function track all contacts that have contacted the patient directly and indirectly and display the information in tree view.(as shown in figure 3)

Track source of patient or contact: This function track upstream original patient of specific patient or contact to provide clue for epidemiology study.

3. Statistics and mapping function

The system can perform statistic on number of contacts in each district, incidence of the disease of contacts etc. to get multiple useful indices according to the contact information (as shown in figure 4), and displayed it as thematic map to assess the distribution situation of contacts in each district and isolation effect. The following thematic maps can be made:

Contact distribution map
Number of contacts ranges or density map
Incidence of disease ranges or density map
Districts and counties case ranges map

4. Analysis and decision-making function

The system provides the following decision-making function based on GIS analysis function:

Automatic abstract of emphasized supervising region: the system can automatically abstract the region in which contact number is over certain amount and remind related departments to take measures and supervise.

Track and cut of high infected route: Based on the function of contact track, it can find the infected route with highest infection speed, so that decisions can be made on which route should be cut.

5. Web Viewing Module

EFIS offers a number of user-friendly ways for engineers to retrieve their desired facility information. This includes "Tree View" search by navigating the pre-organized the facility categories and locations; SQL enquiry by matching the facility properties; and spatial search
powered by SuperMap GIS technology to locate facilities within a user defined area on a map. The engineers can further turn on / off the facilities to be displayed on the map.

Figure 3 Contact distribution map and dangerous area abstraction

Figure 4 Ranges map of accumulated cases

6. Epidemic information publication

The epidemic information publication sub system publishes the epidemic information in Web manner. The publication data is from the statistical analysis result of epidemic data and various statistic map and thematic map.

Figure 5 SARS information publication website interface