

Construction and Application of the Socio-economic Statistical Geographical Information System in Hangzhou

Du Guozhong

Deputy Director

Metropolitan Bureau of Statistics of Hangzhou

Zhejiang Province, China

Tel: 86-571-85252705

Fax:86-571-85252735

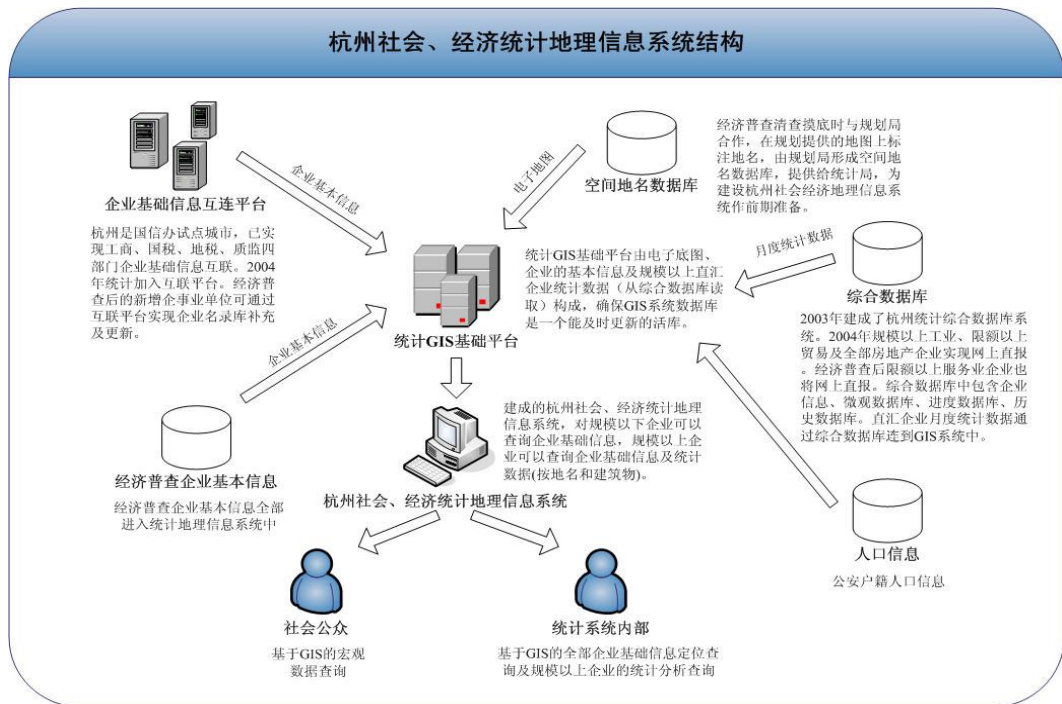
E-mail: dgz@tjj.hz.gov.cn

【Abstract】 : The Socio-economic Statistical Geographical Information System in Hangzhou is constructed on the bases of the Geographical Information System(GIS) technology. It is based on the standard statistical index and general statistical standards. By combining the geographical data of the city with the Economic Census, the unit directory storehouse, the registered population data base, and the comprehensive statistical database system, Hangzhou's socio-economic SGIS has established a corresponding socio-economic statistical data warehouse. It applies the "space location function" and the "analysis and inquiry function" of Hangzhou's statistical basic unit information and provides, this way, a convenient and intuitive statistical service to the public. With its powerful statistical analysis and space analysis ability, the system can provide helpful information on specific themes for decision-making, thus offering a source of information for the sustainable development of Hangzhou.

【Key words】 : GIS, statistics, GIS application

The Systematic Framework of Construction

Basic sources for the Socio-economic Geographical Information System are, on the one hand, the electronic urban map of Hangzhou and the store of location names, and on the other hand the information on enterprises from the Economic Census supplemented by the 4 departments' real time network. In combination also with data from Hangzhou's comprehensive statistical database system, the SGIS provides complete and updated information. The framework of the system shows as follows:



The Sources for Updating the System

I. Unit information: The Economic Census provides new information on economic enterprises and other institutions. It is updated and supplemented regularly by information from the enterprise directory of the common platform of the 4 departments, i. e. the Industrial and Commercial Bureau, the Bureau of State Taxation, the Bureau of Local Taxation and the Bureau of Quality Control and Technical Supervision.

II. Electronic map: The electronic urban map of Hangzhou and the store of location names are constructed and updated regularly by information from the Bureau for Planning,

III. Statistical information: Statistical data of industrial enterprises above designated size can be updated by Hangzhou's comprehensive statistical database system at regular intervals.

IV. Population information: The registered population information of Hangzhou city is exchanged to Metropolitan Bureau of Statistics of Hangzhou and added to the SGIS through the Information Interchange Centre of Civic Card, and updated synchronously by information form the registered population information management platform of the Public Security Bureau.

The Means of Construction

House-numbers are the main basis for tagging enterprises' geographical location, thus comes a key problem, that is how to establish one-to-one relationship between the electronic map and the house-number.

In order to develop a corresponding relationship between them, we teamed up with the Bureau for Planning to improve the electronic map. Firstly, the Bureau for Planning printed out all district-maps. Then, census

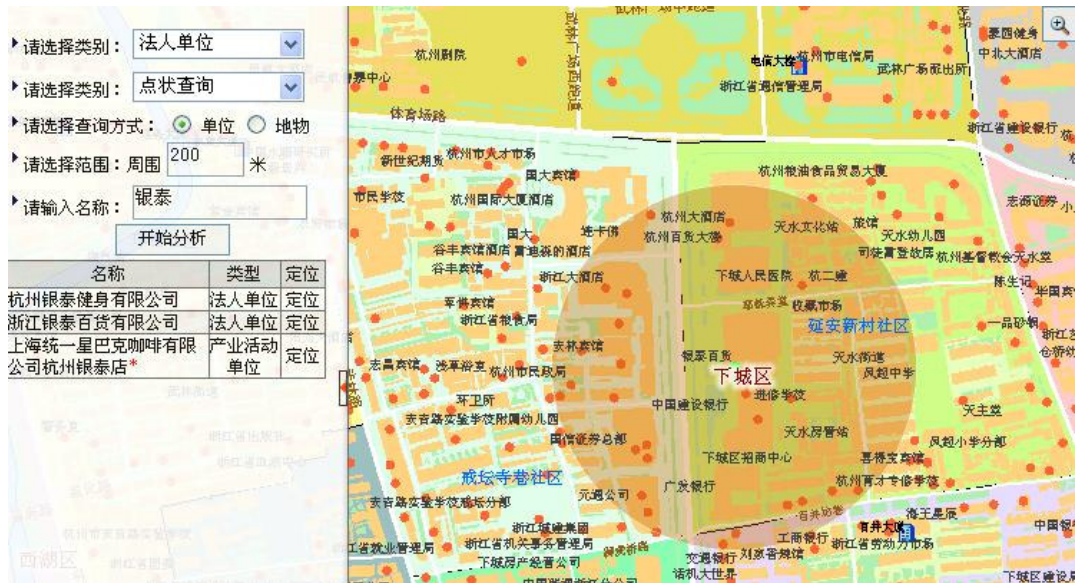
enumerators checked up on all units with these paper maps, and tagged house-numbers on maps synchronously. Lastly, we returned the paper maps to the Bureau for Planning. The Bureau for Planning brought up the original store of location names by processing the maps, and identified community boundaries. Then, we processed the names and house-numbers to bring out a standardized store of location names with the help of the Bureau of Civil Affairs (Geographical Names Office), and fixed each house-number's location point by coordinates. Through the technique of address matching on the store of location names, we located all statistical units to corresponding positions on the electronic map, and established relations between the Geographic Reference System and GIS.

The Bureau of Civil Affairs is responsible for updating the store of location names, and the Bureau for Planning is responsible for updating the electronic map.

The main functions of the system

In addition to some of the commonly used inquiry&positioning functions, such as searching and positioning by topographic features (i.e. XX Road, XX Building), by names of impersonal entity, by statistical index, by districts, and by thematic maps, the most unique feature of the system is the buffering function. We can select an arbitrary polygonal region to conduct a buffering inquiry for impersonal entities, and get a list of all units within the locked region; also we can click on a certain unit to locate the position, and get the basic information of the enterprise and all the statistical information, thus we can have a comprehensive grasp of the information of its production and operation conditions; furthermore, it can be filtered by referring to different kinds of industries in a certain area, thus provides basic information on a certain kind of industry, such as the number of enterprises, the aggregates of the main statistical index, the population, and other related grouping information. The inquiry methods are as follows:

I. Buffering inquiry based on point features: To select a certain point(the location or house-number of a unit), and draw a circle with a random radius(such as 200 meters), the system then analyses and provides information within this area.



II. Buffering inquiry based on align features: To select a certain street, and buffer both sides of it. For example: To input “Jiefang Road, 100 meters on both sides“, then the system provides basic statistical information within 200 meters on both sides of Jiefang Road, such as unit information, numbers of enterprises of different industries, analysis of GDP and micro-data.



III. Buffering inquiry based on polygon features: To buffer a certain area around a water system. For example: To input “the West Lake, 200 meters“, then the system provides basic statistical information within 200 meters around the West Lake, such as unit information, numbers of enterprises of different industries, analysis of GDP and micro-data.



IV. Buffering inquiry based on arbitrary user inputs: To draw a polygon on anywhere of the map, then the system provides basic statistical information within this polygon, such as unit information, numbers of enterprises of different industries, analysis of GDP and micro-data.

In a word, the system has improved the limitation that statistical inquiry and analysis are limited by statistical administrative area codes. It provides intuitive statistical analysis of an arbitrary selected area on the electronic map without any secondary data-reduction.

A Case of Applications [Economic analysis of Wulin Central Business District (2.5 square kilometers)]

2007, Xiacheng District Government in Hangzhou City planned to make out *Development Planning of Wulin Central Business District*, and the government requested the Bureau of Statistics of Xiacheng District to provide relevant statistical data about Wulin CBD, such as major industries sales, the number of enterprises, and so on. The core region of Wulin CBD is: With Wulin Square as its center, it has Fengqi Road standing its south, the Nangyingjia River standing its north, Zhonghe Beilu Road standing its east, and the Beijing-Hangzhou Grand Canal and Huancheng Xilu Road standing its west. The map is shown as below:



Unless taking a carpet inventory, or we can almost do nothing with the statistical analysis within such an irregular region with the traditional statistical methods, and a carpet inventory is time-consuming and costly. Fortunately, with the help of the socio-economic SGIS, the government quickly got basic information on enterprises and other institutions on request, such as the number of impersonal entities (3088), and the number of industrial units (674). According to statistical standards, the classification is shown as follows:

结果页面	
杭州市统计局社会经济统计GIS系统	
单位分类统计(该区域法人单位：3088家 产业活动单位：674家)：	
房地产业 127 家	工业 42家
公共管理与社会组织 312 家	建筑业 54家
交通运输、仓储和邮政业 41 家	教育 69家
金融业 30 家	居民服务和其他服务业 93家
科学研究、技术服务和地质勘查业 239 家	农、林、牧、渔业 3家
批发和零售业 1120 家	水利、环境和公共设施管理业 8家
卫生、社会保障和社会福利业 25 家	文化、体育与娱乐业 63家
信息传输、计算机服务和软件业 99 家	住宿和餐饮业 109家
租赁和商业服务业 645 家	

Thereinto: 42 industrial enterprises, 17 industrial enterprises above designated size, 69,161,000RMB current monthly gross industrial output value, and 64,889,000RMB current monthly gross industrial products sales.

您选中工业共有42家单位(其中：规模(限额)以上单位17家，其余为规模(限额)以下单位。)

请选择指标名称: 工业总产值

第一期: 请选择年份 | 请选择月份 | 第二期: 请选择 | 请选择月份 | 重置 | 确定

指标名称	计量单位	指标值	
		2007年07月	2007年 01-07月
工业总产值	千元	69161	428518
工业销售产值	千元	64889	428674
出口交货值	千元	30936	215994

Thereinto: 1120 wholesale and retail sale trade enterprises, 145 enterprises above designated size, and 5,885,229,000RMB current monthly sales.

您选中批发和零售业共有1120家单位(其中：规模(限额)以上单位145家，其余为规模(限额)以下单位。)

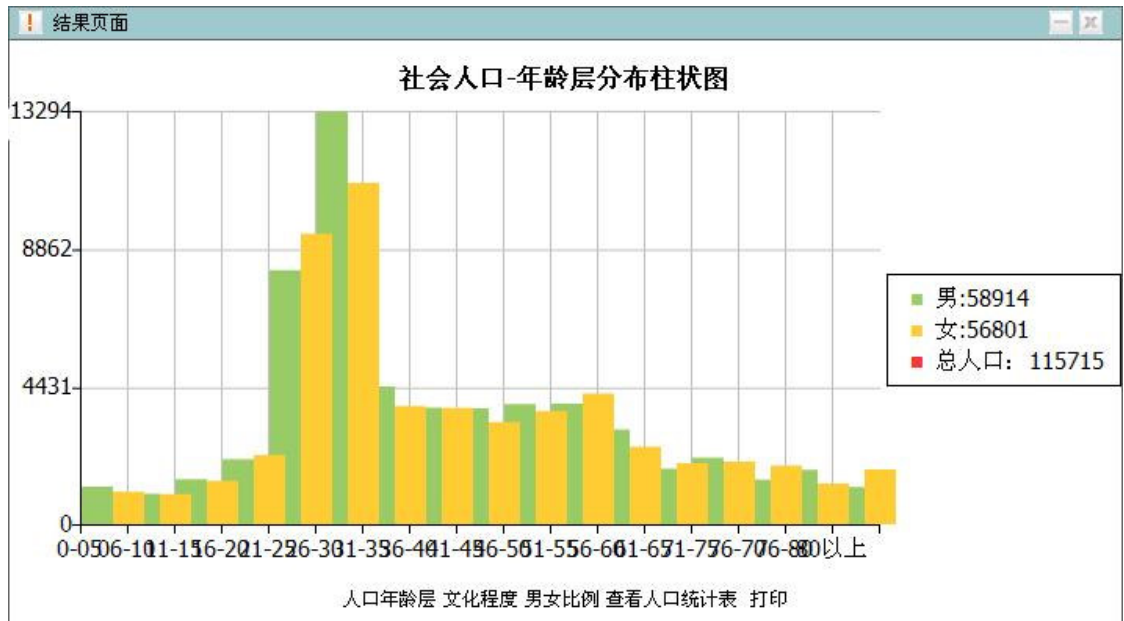
请选择指标名称: 销售合计

第一期: 请选择年份 | 请选择月份 | 第二期: 请选择 | 请选择月份 | 重置 | 确定

指标名称	计量单位	指标值	
		2007年07月	2007年 01-07月
销售合计	千元	5885229	38499564
1.食品饮料、烟酒类	千元	280657	1950029
2.服装、鞋帽、针、纺织品类	千元	761283	4610334
3.化妆品类	千元	19227	164481
5.日用品类	千元	210145	1655044

The statistical search method for other industries is as same as above. In addition to economic information, we can also search for demographic data within a selected region.

The demographic data chart of the selected 2.5 square kilometers (Wulin CBD) is shown below:



There are 115,715 people in the CBD, which 58,914 are men, 56,801 are women. The chart above enables us to be clear about the distribution of all ages at a glance.