

# Urban Population Geographical Information System

LIN Zongjian    JIN Yimin    LI Chengming

(Director of Chinese Academy of Surveying and Mapping)

[cml@casm.ac.cn](mailto:cml@casm.ac.cn)

**Abstract:** China is the biggest population country, according the estimation of journal of World Population, in the year 2040 will exceed 1,500,000,000. So, in China researches on population and population management are very important. In this paper, Geographical information system was introduced for managing population, and discussing how to establish population GIS in urban area. Via the population GIS for making policy and analysis and data mining technology were also discussed in this paper.

## 1、 Background

China is a country with biggest population number, according the estimation of "world population", in the year 2040 it will exceed 1,500,000,000. Especially, with the development of economy, the flow of population is faster then ever, furthermore it includes 56 nationality, the rural areas and the urban areas are difficult to distinguish and the makeup of population is quite complex. Although the population problem is biggest problem in China to cumber the economic development, the level of population management lagged behind the development countries such as America, England etc.

From 1996 our academy began to pay attention to this field. The technology of Geographical information system was used in population management. Because the China is very big country, to establish population all over the country is almost impossible. So, the energy was focused on urban area. This paper was settled as follows: part one introduced the purpose and importance of the paper, part two analyzed the actuality of population geographical information system. The basic line of PGIS(population geographical information system) was given. At last, how to making use of PGIS was also introduced .

## 2、 Actuality of Population

Geographical information system is computer software, which could collect, manage and analyze spatial data. It can back to 1966. However, the technology of GIS was used in population management several years ago.

### 1) abroad research in this field

The United States had developed TIGER system, which was used in America census, it has four virtues:(1) is a wonderful map published system, (2) has wonderful statistical and tabulate functions , (3) has common geographical units, (4) economize 20% census outlay. In England, population GIS is considered as a basic tool for census, during the process, some software were used, for example, SASPAC(Small Area Statistics Package) , ACORN、 PiN、 MOSAIC、 Super Profiles etc. Almost at the same time, most of countries in Europe, under the consideration of England's experience, the population GIS were developed for their special applications.

### 2) Population GIS in china

There exist two methods to get population information in China, one is registered permanent residence, the other is census. Before 1996, the technology was not used in the two areas. In fact because the method to collect data were different, two data sets have differences, we don't know which is more precisely, due to without a common spatial basis, two data can't compare each other.

Moreover, the census districts plotted out using sketch map and often changed, so 1990 census data can't compare with 2000 census.

The above leads many problems, for example: (1) Each time of the census can't be compared, because the changes of geographical unit, (2) the geographical analysis of population can't be carried out, (3) The registered permanent residence(RPR) population data and census can't check each other.

So, after 1996, our academy started to consider establishing population GIS in urban areas, it was called Urban Population GIS.

## 3. The basic idea of Urban Geographical Information System

China is a large country, some cities have new maps, however some cities only have

old maps, even 10 years ago. So, Urban Population Geographical Information System in China has own characters. Some experiences of foreign country only can be as used for reference, it must suit for the situation of China. The basic line of establish population GIS was divided into the following steps:

1) Design Logical Model of Urban Population Geographical Information System

How to connect population information to spatial information is a very important task in urban population GIS. In this paper, the doorplate number is the tool and key factor to connect the registered permanent residence population data, census and spatial information.

Furthermore, because the vector spatial basis is very old in some area, in china the aerophoto and remote image are used as spatial basis.

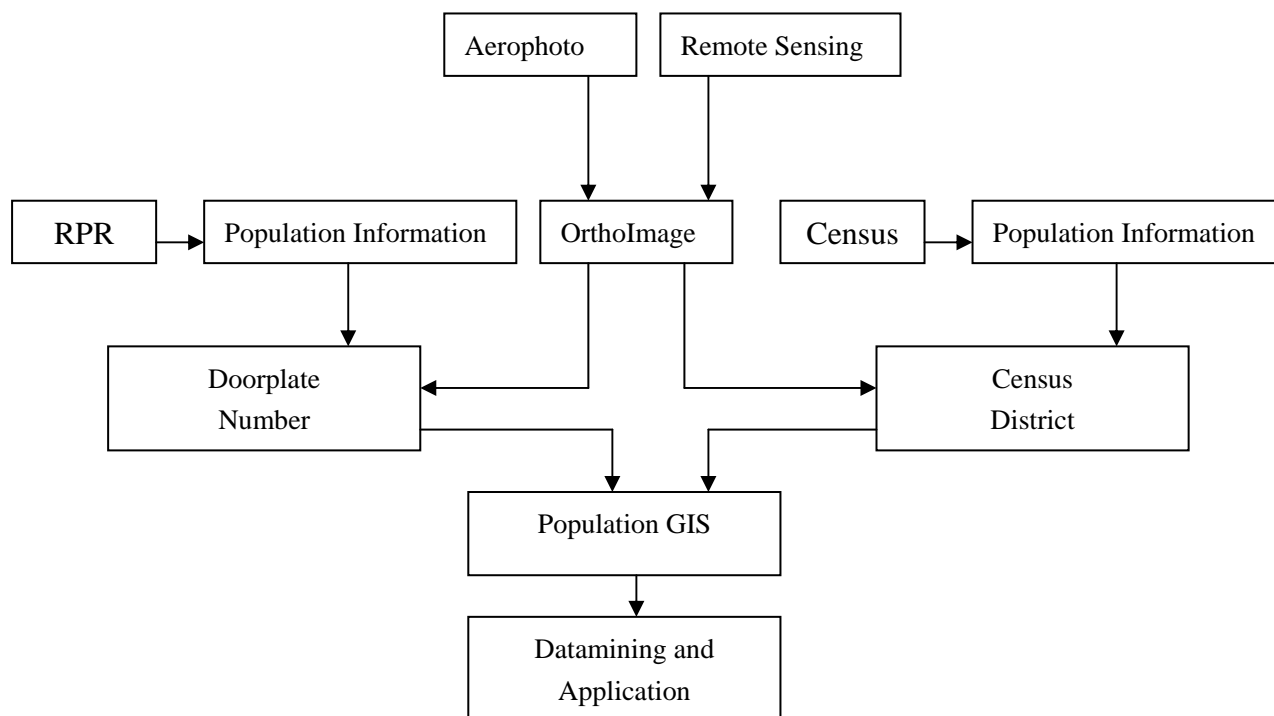


Fig.1 Logical framework of Urban Population GIS in China

2) Methods for establishing spatial basis using orthoimage

On the spatial data, every house image was given a popint, which represent the house, the popint has a attribute data base, including doorlate number. The annotation including doorlate is the connection between spatial information and population information. In one word, the spatial data with a annotation data base including doorplate number was called spatial basis.

### 3) Establish the population GIS

While the spatial basis was finished, several kinds population information can be put on, the social economical information etc. also can be put on the spatial basis, that is to say in this system, it includes population information, social information, economical information and spatial information. It is a suitable tool for spatial analysis, supporting policy making. Figure 2 is an example how to use the doorplate number to connect the population information and spatial information.

### 4) Methods of data mining and application

How to use population GIS is very important, otherwise the purpose of establish PGIS is not finished. So, in UPGIS, the data mining technology was introduced for making use of the integrated data. The data mining was divided into three levels: (1) From data to data, (2) From data to model, (3) From data to knowledge

## 4. Conclusion

According the experiences of estimation of several city population GIS and the theoretical analysis in this paper, the remarks on UPGIS in China can be gotten: 1) According the characters of Chinese population, the suitable logical model for Urban population GIS in china was proposed. 2) Using orthoimage as spatial basis to establish Urban population GIS in China is sound. 3) Making using of data mining methods, many new applications can be developed, which can't be finished only using GIS or only using population database. 4) The equations with spatial distribution are more accurate than before for estimating and analyzing population problem.

## Reference

1. LI Chengming, 2000, Technical Report On Urban Population GIS in City Langfang, 2000.
2. JIN Yiming, 2000, Methods to Establish Population Geographical Information System, Ph.D thesis of Wuhan technical university of surveying and mapping.