Computer Aided Urban Master Planning of Huangshi City in China

Chen Jun, Shi Wenzhong, Wan Youchuan, Sun Yuguo, Bian Fulin
Department of Photogrammetry and Remote Sensing
Wuhan Technical University of Surveying and Mapping (WTUSM)
39, Loyu Road
Wuhan ,People's Republic of China
Commission IV

ABSTRACT

The urban master planning of Huangshi city in China has been assisted by the author, using existing graphic and image processing system and our developped application software.Urban landuse evaluation,urban envireonment evaluation and urban road and traffic planning were the main subjucts of this work.The master planning was based on the quantative,qualitative and comprehensive data analysis.

I. The establishment of the urban planning data base

To meet the needs of the data accessing,processing and analysis in Huangshi urban master planning work and later urban planning and management , a urban planning data base was set up first which was used to store the urban maps and alpha_numeric data via the geographi _cal coordinates or thematic classification.
All available maps and alpha_numeric data in the planning areas (about 600 kilometer square) were collected , including topographic maps, geology maps,mineral resourse location maps, enginnering geology maps,hydrology maps ,urban landuse maps,administration devision maps, zoning maps and envireonment maps etc.,and population,economic, house,traffic survey _ing data etc.. All maps were digitized one map sheet by one map sheet via the digitizing table,and were then edit according to their thematic classifrtion , so far the digital maps were generated and a geographic data base was set up. Through further processing of these maps , the new digital maps were reproduced , such as population density map ,building density map, building quality map ,and housing level map etc. .Economic and traffic data etc., which were mainly alpha numeric_data, were input to relational data base via key board.
The urban information were provided to urban planner in the form of tables, maps and data files etc.,based on the established data base. New maps in different scales , colors or classification can be reproduced ,and area,lenth,volume of specified object or class can be measured.

II. The multifactor fuzzy weighted evaluation for urban planning

Based on the above urban planning data base , the non_built up land of Huangshi city were evaluated for its construction suitability and constrution priority by fuzzy weighted evaluation method . And the quality of the urban current enviroment quality and the explo _ited degree of the built up area were also evaluated.
The raster data struture has been used in multi factor analysis .Digital maps stored in the data base in the form of points (i.e.urban noise points),lines (i.e. contour lines , cliff lines) ,areas (i.e. engineering geology map stored in polygon data struture) were tranformed to the raster data file using the vector to raster transform program , photogrammetric interpolation and other programs developped by author.The grid size of the overlay analysis is 50m by 50m on the ground. As far as fuzzy weighted evaluation method ,matrix product instead of fuzzy product was used to overcome the shortcoming in the fuzzy comprehensive evaluation mehtod.The corresponding programs developed by author can work in an interactive mode.The multifactors selected by the user can be easily overlayed and eva _luated according to the pre_defined evaluation ranks.The origial data and results can be

displayed on the image screen in time. This makes us easily to adjust and modify the data or parameters.

The optimisation of construction conditions and construct priorities were considered to select and evaluate the factors which had the influence to the urban land selection in Huangshi city .

a. Three factors, i.e. altitude, slope and ground bearing capacity, were used for the suita bility of the built_up land evaluation.

b. Five factors, i.e. the time distance, three conditions(traffic , power and water providing), administration zoning affect, landuse and district compact degree, were used to evalu _ate the land construction priority.

c. All the eight factors were used to evaluate land suitability.

The evaluation results showed the phisical characteristics and the suitability degrees for the non_built land. Thus, the suitabale land for urban construction could be easily selected . It provided a reasonable basis for urban planning. Seven natural and social factors , including atomsphere, noise, water pollution, population density , building density , building quality and housing level were considered to evaluate the enviroment quality . Two evalua _tions were carried out. First, atomsphere, water pollution and noise were used for the enviroment quality evaluation ; next , all seven factors were used for the integrated enviroment quality evaluation. The result showed the pollution situation of the urban area . and showed the exploited degree in the built area. These provide a reliable basis for the study of the urban enviroment pollution, and the result was used to make the best use of the built up area.

III. Computer aided urban road and traffic planning

The urban traffic planning software , developped by author , had been used to assist the integrated traffic data , analysis and future traffic volume forecasting.

1. The urban traffic characteristics and problems were first studied via traffic surveying data processing and analysis. The geographic and time_varing properties of both person trips and goods vehicle trip characteristics were studied.

2. Based on the above results, the traffic zoning , person trip in current case , future population , the traffic generate and attract volume of all traffic zones were used for the calculation and forecasting for the person trip in the future. The forcasting of the goods vehicle was based on the relational data base . Two kinds of distribution models were used.

3. Using traffic zoning and parameters , the traffic volume were assigned by 0-1 assignment model for both person trip and goods vehcile trip. The assigement results were later modifed according to the road functions and capacities and landuse planning. The results were presented in the form of traffic distribution charts and traffic assignment charts for the both person trips and goods vehcile trips.

IV. Conclusion

1. The urban master planning of Huangshi city in China was based on the quantitive, quali _tive and geographic data analysis, because of using geographic data processing and special urban data processing . It is now much appreciated by the chinese planners.

2. The methodology and techniques used in this work is also applicable to the other chinese cities . The software will be transplanted to the super microcomputer in the near future.