Establishment on Information System Data Base of Provincial-level Farmland Quality Management

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Abstract. Data standardization and unification is the necessary condition of establishing basic data base of farmland base, if we want to use one data base, the same standard and model to manage farmland quality and data of each country as well as realize data sharing of farmland quality, we must use data standardization and unification.

Introduction

The standardization and unification of data is the necessary condition of establishing data base of farmland base, the basic data managed by this system is from each country, it must have uniform principle on data standardization. Farmland grade chart is the result on evaluation of farmland resources it also must have geographical element such as administrative division map, road and water area, so that it reflects the distribution condition of attribute data in each country. For standardization of attribute data, we should possibly use requirement of data dictionary of farmland land fertility evaluation, reduce work load of standard data, which is favorable for system generality.

Data base of space

Space data base is the storage place of GIS space data, design and realization of one space data base with rich content and reasonable structure is the key factor [2-8] of the whole system. This system is the 5-level information search system of province, city, country, town and village, of which provincial-level administrative division map and city-level administrative map is the foundation framework of space data, management of farmland quality uses country-level as basic unit, adopts search model of country, town and village, including farmland quality chart, country boundary map and village boundary map.

Space data base uses MS Sqlserver 2005 as closed basic data base, space data uses Krassowski eliipsoid of 1938 as parameter, Beijing 54 Coordinate System, 6 degree zone projection of Gauss Kruger, Yellow Sea altitude of 1956, and vector data is the shp form of data base of relationship type.

Tab.1The Description of spatial data layers

Name of layer	English name	Map pattern	Element type	Description
province	province	Vector	Line	Provincial-level administrative division map
city	city	Vector	surface	Provincial-level administrative division map
county	county	Vector	surface	Provincial-level administrative division map
town	town	Vector	surface	Provincial-level administrative division map
village	village	Vector	surface	Provincial-level administrative division map
road	road	Vector	line	Road, railway
water area	water area	Vector	Line or surface	River, swag
farmland	farmland	Vector	surface	Evaluation outcome of soil fertility

Property data base

Property data base is used to store all the farmland nutrient content, abundance and deficiency grade and quality grade of farmland quality etc. According to demand of management information of provincial-level farmland quality, it makes detailed analysis and design on property data in the system. Design of each data table is as follows:

(1)Provincial-level administrative division map(sys_province) is used to describe city (state) and space position structure in Sichuan.(table 2).

Tab.2 The Provincial-level administrative divisions map attribute description

Field name	English name	Data type	width	decimal place	description
Province name	province	character	20	0	
Boundary type	Boundary	character	2	0	Provincial-level is 1

(2)City-level administrative division map(sys_ city) is used to describe space and position structure of each country in province(table 3).

Tab.3 The City-level administrative divisions map attribute description

Field name	English name	Data type	width	decimal place	description
City name	city	character	20	0	
Boundary type	Boundary	character	2	0	City-level is 2
Province name	province	character	20	0	

(3)Country-level administrative division map(sys_ county) is used to describe space and position structure of each province and city (table 4).

Tab.4 The Country-level administrative divisions map attribute description

Field name	English name	Data type	width	decimal place	description
Country name	county	character	20	0	
Boundary name	Boundary	character	2	0	City-level is 2
Province name	province	character	20	0	
City name	city	character	20	0	

(4)Town-level administrative division map(sys_ town) is used to describe space and position structure of each province, city and country(table 5).

Tab.5 The Rural locations in the map attribute description

Field name	English name	Data type	width	decimal place	description
Town name	town	Character	20	0	
Boundary type	Boundary	Character	2	0	City-level is 2
Province name	province	Character	20	0	
City name	city	Character	20	0	
Country name	county	Character	20		

(5)village administrative division map(sys_ village) is used to describe space and position structure of each province and city. (table 6).

Tab.6 The Location of the village community property description

Field name	English name	Data type	width	decimal place	Description
Village name	village	Character	20	0	
Boundary type	Boundary type	Character	2	0	City-level is 2
Province name	province	Character	20	0	
City name	city	Character	20	0	
Country name	county	Character	20		
Town name	town	Character	20	0	

(6)Road(sys_ road) is used to describe road structure of each province, city and country (table 7).

Tab.7 The location of property described in the road

Field name	English name	Data type	width	decimal place	Description
Road name		Character	20	0	
Boundary type		Character	2	0	
Province name		Character	20	0	
City name	city	Character	20	0	
Country name	county	Character	20		

(8)Water area(sys_ water area) is used to describe water area structure of each province, city and country (table 8).

Tab.8 The property description waters on map

Field name	English name	Data type	width	decimal place	description
Water area name	water area	Character	20	0	
Boundary type		Character	2	0	
Province name		Character	20	0	
City name	city	Character	20	0	
Country name	county	Character	20		

(9)Farmland quality(sys_ farmland), it is used to describe farmland position and property structure of each country, town and village(table 9).

Tab.9 The land quality attributes described

Field name	English name	Data type	Width	decimal place	Description
Province name	province	Character	20	0	
City name	city	Character	20	0	
Country name	county	Character	20		
Town name	town	Character	20	0	
Village name	village	Character			
pH	pH	Number	4	0	PH value
effective phosphorus	ap	Number	4	1	mg/kg
available potassium	ak	Number	4	1	mg/kg
organic matter	al	Number	4	1	g/kg
total nitrogen	tn	Number	4	1	g/kg
alkali-hydrolyzable nitrogen	nt	Number	4	1	mg/kg
pH grade	pH l	Character	20	0	Evaluation grade
Grade of effective phosphorus	apl	Character	20	0	Evaluation grade
Grade of available potassium	akl	Character	20	0	Evaluation grade
Grade of organic matter	aol	Character	20	0	Evaluation grade
Grade of total nitrogen	tnl	Character	20	0	Evaluation grade
Grade of alkali-hydrolyzable nitrogen	ntl	Character	20	0	Evaluation grade
square	area	Number	8	1	acre
Grade of soil fertility	f1	Number	4	0	National 10 grade

Conclusion

Data base is the core and foundation of system, including space data base and property data base. When making design of data base, we should use space data base as core, combine with property data base and model base, the program design idea faced with object. In the process, data in the data base should refer to content standard established by software engineering, which guarantees data sharing, information visit in provincial-level area, secondly, it requires consistence and completeness of data, it makes design according to object theory and observes standardization, completeness, expansion and practicability principle [9-14]of software engineering.

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