RESEARCH OF PRODUCING AND MANAGING TOPOGRAPHIC MAPPING AND BUILDING DATA IN ONE SYSTEM HARMONIOUSLY

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ABSTRACT:

Data for building topographic database (DLG) and data for mapping are two kinds of data which connected each other, as well as different each other. Though DLG data can be transformed to mapping data by symbolizing and adjusting, it costs more time and can not realize two kind of data update in one time. In order to settle the problems, we began to research in data producing system which support the two kinds of data producing in one time. Main content include: discussing uniform model system for topographic mapping and building data, discussing technical method for realizing the model system, proposal for uniform data set definition, etc. Now we are practicing the system, and we think it is working.

1. INTRODUCTION

Mapping data and digital vector graphic data (DLG) are two standard data forms for Chinese basic graphic information data. For DLG, geometric integrality and coherence of the geographic features are concerned. For mapping data, relationship of symbols and vision effection are concerned. Obviously, there are conflicts between the two kinds of data. In data production process, DLG data are limited to satisfy the space position accuracy. But mapping data can be exaggerating, moving or editing in certain scales in order to satisfy our eyes. Symbolizing DLG data to transform them to mapping data is not satisfied until now. In fact, we must producing two sets of data. Management and update harmony become difficult between the two. Not only they cost more money, but they cause complex technical methods, repeated working, and inconsistent information. Thus, we try to propose a resolve plan from data model, realizing model, and data management.

2. ENTIRY MODEL FOR MAPPING AND BUILDING DATA IN ONE CONSTRUCTION

The main difference of mapping and DLG data are in the inconsistent relationship of symbol and position. The core problem is to reach an entity model which connected the two in one. To build an entity model is the key. We propose an open to object model system, which contain symbol objects, geometry objects, and attribute objects.

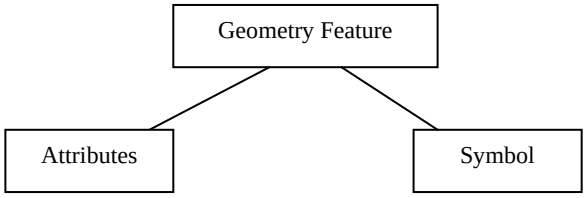

Fig 1 Traditional GIS data model

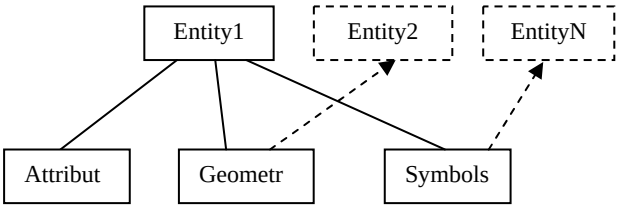

Fig2 New GIS data model

The differences between our new model and traditional model include following aspects.

A. Open to objects. In tradition GIS, data are colleted, processed and saved in points, lines and areas—the traditional GIS data model. Some integrated information of features has to be separated in different cells or layers. For example, annotations of features are often saved in a single layer, not along with the features they denote. But a feature itself is often regarded as a whole entity when it is used. Open to objects model will integrate all the information of a feature to one model, then it is unique, and the symbol relationship and space relationship will connect each other in one system.

B. Symbols, geometry and attributes become parts of entity
In traditional GIS, features are regard as geometry objects, and attributes are their describes ion. Line types, patterns and colors are basic elements for symbolizing geometry objects. In our new model, geometry, attributes and symbols are regard as three separated parts of an entity, and they are in same level. The three parts are independent, and not belong to each other. That means the mapping symbols will not be limited to geometry objects. Thus, the symbol of an entity is not defined by its geometry feature in theory.

C. Geometry and symbol of an entity have weak relationship
Symbols are connected to geometry by entity, but they don't have direct relationship. We name this relationship as weak relationship. In weak relationship, symbols can be generated by geometry position and shape, but won't be fixed by geometry feature. As geographic information's expression, mapping symbols need adjusting and editing. In this process, geometry features don't need to change,

including position and shapes. Symbols are separated with entity's geometry feature.

3. USING ENTITY MODEL DEFINE FEATURE CLASS AND GENERATE FEATURE

Using the entity model we can define feature classes, and we call them stencil-plate. Using stencil-plate we can generate features. In OO concept, stencil-plate corresponds as class, a instance of class is a object or a feature. In database concept, stencil-plate is definition of data table, including fields' type, name, etc. A feature is a record, which is fulfilled according to fields definition.

3.1 Entity stencil-plate

Entity stencil-plate consists of attribute table, geometry type and symbols. Attribute table defines record construction of entity stencil-plate. Symbol stencil defines symbolizing methods of entity. An entity could have multi symbol stencil. For example, railway entity may have different rail distance or different scale symbols, annotations, etc.

3.2 Symbol stencil-plate

We name symbolizing method of a certain feature a symbol stencil-plate. According to some parameters' setting, symbol stencil can generate a symbol. Symbol stencil is different with traditional symbolizing, which uses blocks, line types, colors etc. to generate visual geo-space information. Symbol stencil is generation formulae of geo-space information's symbolizing.

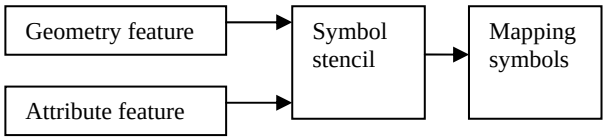

Fig 3

3.3 Feature generation process

First, generate feature and its attributes according to entity stencil. Second, choose geometry objects as feature's geometry from geometry sets. Third, generate symbol from symbol stencil according to feature's geometry and attribute. The process is just showed below.

The characteristics of the stencil system including:

A. The stencil system is consistent with entity model. Stencil is the bridge of abstract model and feature class.
B. The stencil system ensures consistent of geographic information and mapping symbols in feature classes and feature describes ion.
C. Symbol definition depends on entity model, not on symbolizing method (blocks – line-types – color filling). Symbol is regard as a feature of entity, that's the key of the system.

4. DATA COLLECTING AND EDITING IN ONE SYSTEM IN PHOTOGRAMMETRY CIRCUMSTANCE

In photogrammetry circumstance, collecting and editing geo-space data and mapping data in one platform, the key technologies are showing below.

4.1 Multi type data integrated editing circumstance

A. Models management circumstance
Stereo models connect with graphics. They should be input and output easily, and can be add, delete or change.

B. Models editing circumstance
Editing data include stereo models, geometry objects, entities and symbols, even include DEM. Editing circumstance should process all the kinds of data.

4.2 Data producing flow and managing methods in one integrated system

In the integrated circumstance, data producing and managing, quality control, production checking, etc. can be simplifying, as we show in Fig 5.

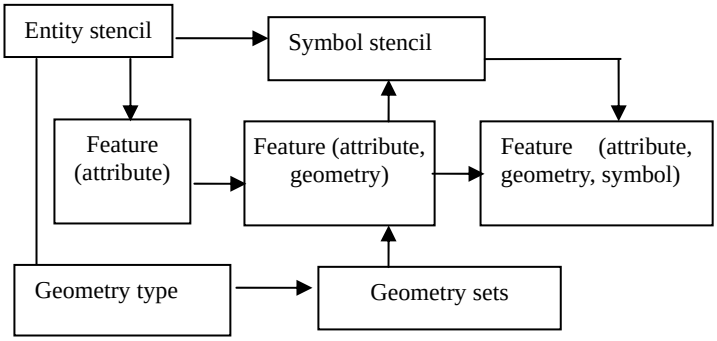

Fig 4

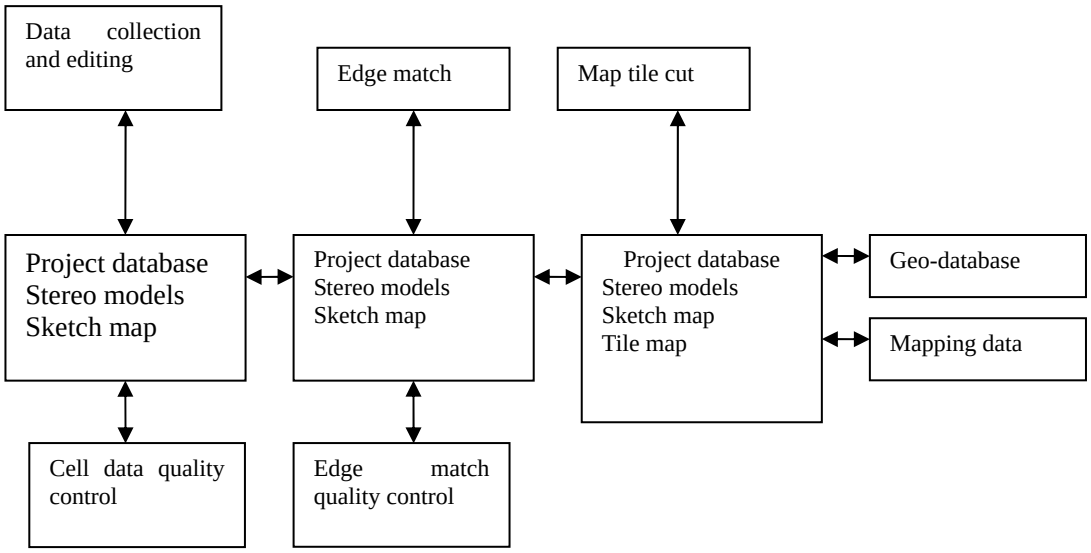

Fig 5

Interpretation:

Project database: including all the stereo models that should be processed. Map tile is setting, and keep relationship with correspond stereo models.

Data collection and editing: collecting geometry data in stereo model, and then editing data to build entity objects. Quality controls include accuracy and integration. Also support image matching and create TIN.

Edge match: matching data around edge of stereo model, including features geometry, attributes and symbols.

Map tile cut: data are divided into tiles, as defined before. Then transform data format to what is demanded. Different information is keeping according to demand data type, topographic mapping data or building database.

The characteristics of the above flow are:

A. Data format consistent: data format is consistent in different producing steps, which avoid data losing in transformation.
B. Data backdate available: because data is consistent in the system, it can flow forward or backward. Data can be easily adjust and update.
C. Processes simplify: data producing has minimum middle results, and management is easy to do in this flow.

5. CONCLUSIONS

Topographic mapping and building data producing and managing in one system harmoniously is a puzzle in surveying and mapping. This article gives a system from model, platform technique and data producing flow, which can primarily settle the problem. Using the system can not only promote producing and updating efficiency, but also increase the consistent between geo-database and mapping data. That is feasible according to our practice.

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