

An automatic updating method for geospatial data with lightweight network GIS

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1. Introduction

The spatial database is built generally in the method of that is “bottom up” (surveying, adding, linking to database) or “top to down”(following user’s thematic to generalize data). Every action is referred to data types, geodetic control systems mapping. That will take great many costs to calculate. This data accessing architecture makes the updating is very hard , let alone it is updated automatically. As the development of computer networking and programming method theory, the Object Oriented(OO) method , distributed and paralleled computing have gradually become mainframes.

The paper mentions a method of geo-network. It is actually an OO lightweight GIS or a network system. The aim is to separate the topologies data and the real reference data. That makes the GIS update the topological data automatically.

2. Architectures

Firstly, we consider the geographical objects as a network. The larger network contains same small ones until it can satisfied our cognition scale. For the network’s similarity, geo-data has a great of redundancy to compress, then, we use the recursion method to describe it.

Secondly, mapping the geo-topology semantic to formal semantic, we can get computable objects and finally make a searching, classification and automatic updating the geospatial data by suitable algorithm.

3. Data Structure and Methods

Let every described spatial object as a node in the network. We can let “Guangdong province-Guangzhou city-Yellow Flower park-Ticket station” as a tree structure. Every leaf is also a node. Every node has it’s own features and geospatial address (geo-add). The same level nodes are connected by their link degree (0,1) and geo-adds to describe their topological relationships. The upper level nodes in the precedence connected with descendent usually let them become one tree or a forest until the precedence node doesn’t exist. We calculate the traffic volume between the nodes and the single node’s volume is small and node-node(line) is relative is medium and polygon is bigger. Through the

traffic volumes and link degree between nodes we can calculate and reverse the topological relation and line length.

4. Flowchart

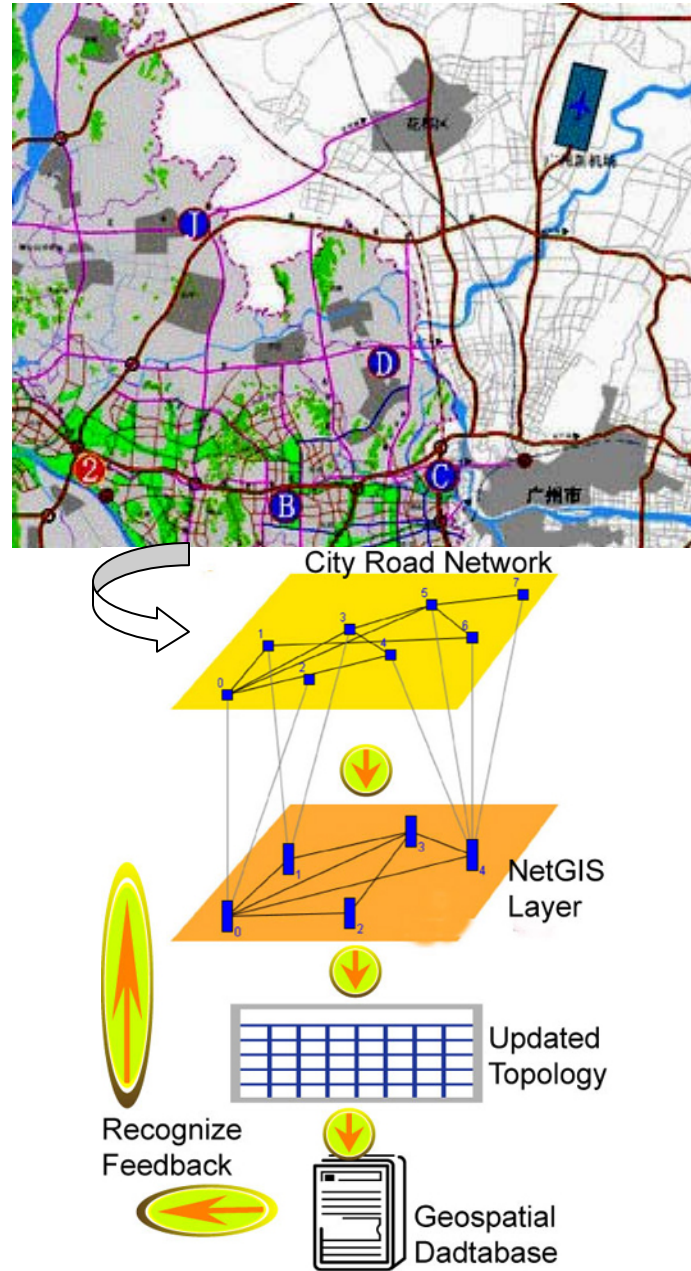


Figure 1: The flowchart: From Real network to Geospatial Database

5. Conclusion

The lightweight GIS in is a self-organized and shared open network. It is recognized as a set of the GIS over networking architecture or GISoverNET. We select the road networks of Guanzhou-Foshan city, South China, as a real network. The traffic volumes can be

digitized from the traffic cameras or traffic control center's recorders in the city and the road weights and parameter are also measured and calculated. Through the traffic volume and link degree, we analyse the topological changes of internal networks and then mapping to external geospatial database. What we last to aim is to update the database automatically.

This network method is eventually extended to the other object layers: waters, underground lines and other social human network's updating.

6. References

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