Geoinformation Retrieval Based on Ontology and Its Application in Disaster Geoinformation Service

Liu Jiping
Chinese Academy of Surveying & Mapping
liujp@casm.ac.cn
China

Geoinformation has been one of the sources of natural disasters handling information service, and plays an important role in disaster prevention and reduction work. As same with other information retrieval, geoinformation retrieval also has the problem of low recall ratio and precision ratio. Geoinformation itself is large and is not associated with special event, both of these make geoinformation retrieval not satisfied with users.

This paper is towards with the need of natural hazards emergency handling information service, introducing ontology to automatic associating, extracting, and processing the spatial information and various thematic information that relative closely to natural disaster events, and displaying the data in the way of government users' needs. Ontology is the formal explicit specification of sharing concepts. It builds the semantic model of one field, and solves the data heterogeneous problem from semantic level, thus improving the recall ratio and precision ratio of information retrieval. In the paper, we build four ontologies, user ontology, task ontology, geographical object ontology, and natural disaster ontology, and each of them plays an important part in the different phases of geoinformation retrieval. User ontology builds a semantic model for government users, which are also the users of the system, including users' interesting and information displaying habit. Task ontology includes the data processing tasks in information retrieval, such as buffer and overlay analysis. Geographical object ontology contains geographical features, such as river, lake and road, and administrative region, which are relative to natural disaster.

Natural disaster ontology includes various natural disaster concepts, such as earthquake, flood and landslide, and their relationship with geographical objects. Using these ontologies, we make semantic annotation for spatial data and various thematic data to make them have semantic information, thus associating the ontology with data. After the natural disaster happens, users put the event as query condition to retrieve relative information. System will find corresponding concept in geographical object ontology and natural disaster ontology, and query annotated spatial data and thematic data according to the matched concept. After process the data with task ontology, system will filter the result and display it individualization in the light of user interesting template obtained from user ontology. Then the whole process of composite information retrieval based on ontology is completed.