

Constructing Geographical Ontologies for Integrating the National Map Data

Abstract:

With the increasing availability of geographic data and increasing demands from a wide range of applications, data modeling in traditional layered-based maps is not efficient for fast data retrieval and sharing. Feature-based solutions model features, the combination of entities and their digital representation on the maps, by placing the geographic features in a spatial, temporal, and thematic context. An ontology explicitly describes a consensus specification of conceptualization towards a domain of interest among a community of observers by modeling the taxonomy and partonomy and entities with great enhancement in semantic representation. An ontology significantly improves data standardization and transparency.

Communities build geographic ontologies based on their cognition, interpretation, and purpose. In constructing ontologies for integrating *The National Map* data with the “build once, use many” principle, the transportation theme was selected to study theoretical and practical ontological problems related to *The National Map* project. Existing data standards, such as the Spatial Data Transfer Standard (SDTS), and feature inventories, such as the Digital Line Graph—Feature (DLG-F), were selected as the basis to determine features, classification, and levels of detail for *The National Map* data. Primary progress focuses on selecting proper features and modeling the properties and interrelations by exploring the Web Ontology Language (OWL) tools and Entity Relation Modeling (ERM) concepts. The next step will focus on data storage and population problems for practical implementation. These initial studies will clarify issues in building ontologies for *The National Map* data and pave the path towards automatic or semi-automatic data integration.