

Extracting a semantic model from a geospatial database

Abstract:

A database is a structured collection of records that is organized based on a chosen database model, such as relational, object-relational, or object-oriented model. In current geographic information systems, geospatial databases mostly follow the object-relational model, which has integrity constraints in a relational model as well as the flexibility in defining complex objects like geometry. A semantic model abstracts disparate data and knowledge, and consists of a network of concepts and relationships between concepts. A semantic model for a geographic domain models the geographic phenomena and relationships between them while leaving out the detailed data structure information in current GIS. Semantic models are more intuitive and thus more powerful for data exchange and interoperability. In this paper, an approach is proposed to construct a semantic model from a geospatial database using database reverse engineering. Consider a geospatial database modeled by an object-relational database. A relation or a table in a geospatial database is classified as a spatial entity relation, a non-spatial entity relation, or a non-spatial relationship relation. Rules are identified for automatically extracting semantic model components based on characteristics of a geospatial database, relations, and attributes in a relation. This approach will assist in constructing ontologies from geospatial databases. Because this approach handles object-type attributes in an object-relational database, it can be applied to other object-relational databases; however domain knowledge is required to pre-process the database for correct relationships between

relations when needed. The approach is applied to and validated by the geographic data models for *The National Map*.

Key words: database reverse engineering, geospatial database, semantic model, ontology