

An Object-Field Ontology for Topographic Eminences

Gaurav Sinha

Department of Geography, Ohio University, Athens, OH 45701 USA

There is considerable gap between intuitive cognitive models of the natural landscape features and data models used to represent the landscape in geospatial information systems. For example, most geographic data dictionaries, gazetteers, and national map standards merely list feature types (e.g., mountain, hill, butte, and mesa) in lieu of representing the semantics of feature types commonly recognized by people. Specification of the semantics of some popular feature types is limited to simplistic definitions not useful in any kind of taxonomy or ontology development. This can be addressed by developing ontologies facilitating the delineation and characterization of landscape objects. We developed a cognition based framework for extraction and characterization of topographic eminences, a subclass of landforms. This paper will discuss our integrated data modeling strategy that explicitly links field and object data models through a scale dependent, three tier ontology. The first tier specifies topographic fields such as elevation, slope, aspect, curvature); the second tier focuses on delineation of geomorphometric features (e.g., peak, pass, crest, ridge) and their role in the delineation of eminence objects from the fields. The uppermost tier of the ontology specifies the various properties of topographic eminences. This tiered ontology ensures a seamless integration of the semantics of higher level objects, the process of their realization from lower level features, and the role of the topographic fields with respect in object based terrain modeling. This approach also facilitates object generalization as changing the geographic scale of analysis is possible for any tier through variation of input parameters.