Interoperability of environmental data models : an approach based on correspondences between ontologies

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Abstract

Various data models are used in the environmental domain, to perform for example air quality calculation, building energy consumption or water management. 3D city models are special data models issued from 3D GIS (3 Dimensional Geographic Information Systems). Their use is increasing since urban planning and environment management become more and more complex activities. The consequence of an integrated approach is a joint use of different data models : an interconnection is thus necessary to take into account the complexity of the different issues. Environmental models play a central role since they can integrate the whole knowledge related to the different issues.

Ontology-based approaches provide a generic and robust way to interconnect different information models. Sometimes, a direct approach, consisting in establishing direct links between concepts can be adequate. However, in most cases, it is necessary to take into consideration the possibility of computations, or more complex processes involved in the correspondences between the different data models.

In this paper, we focus on the role of correspondence mechanisms between ontologies considered as a tool to facilitate a high level interconnection and interoperability between environmental models.

The first part of this paper provides an overview on various environmental information models, the specificity of the data and the structuring of the data through conceptual models.

We then present the concept of ontologies, their application to the management of the diversity and the complexity of environmental information and knowledge and the mechanisms enabling the development of correspondences between ontologies.

The last section describes some on-going developments on correspondences between ontologies, related to the environmental domain, that can be considered as first steps towards the interconnection of complex data models.