An Object-based Spatial Data Search Engine

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Abstract

It is now nearly 40 years since the Internet was first established. During the last 15 years many Internet users have been exposed to increasing amounts of information. Most of the information consists of text or images. As such, most search engines use text criteria to find web-pages containing relevant information. Therefore, in order to find spatial data one can only search web-pages using keywords, as there are few spatial concepts that have been readily adapted to enable the identification of spatial data on the Internet; But most spatial data users prefer to use spatial concepts rather than simple keywords to find spatial datasets. Concepts such as within, adjacent, near are vague further confounding one's ability to search spatial features and datasets. These concepts demand a basic understanding of geometric space and spatial data model rules in order to be implemented within an Internet framework. Besides, representation of spatial data requires data models that maintain coordinate systems and other relevant spatial data characteristics.

New Internet technologies such as SVG, VML and Java applets make it possible to represent spatial data in an object-based or object-oriented way. But representing spatial data is not the only benefit. These technologies can be used to design interfaces that can apply spatial relationships during the process of searching for spatial data. SVG is a vector-based mark-up language for describing images and maps on the Internet so that they can be stored, managed and displayed as object-based spatial data. Objects can be represented independently; which can improve the quality of visualization when compared with raster-based images and maps. The ability of SVG to describe object data is an advantage for designers in that they can apply various spatial relationships and / or concepts to the objects. SVG maps differ greatly from simple image maps on the Internet, as they contain spatial coordinate systems and can store and display features with various spatial, non-spatial and cartographic characteristics. They can also contain interactive or animated content that make use of script programming languages such as JavaScript or ECMAscript for improved visualization.

This paper is the result of using such a technology for development of a spatial data search engine. The search engine consists of four components: an interface for users to register spatial data sets via their metadata; a DBMS to store and manage registered data; a server that extracts data from database and makes all components compatible, and an interface that allows users to search for appropriate data sets.

This implementation allows spatial data user's to search and retrieve spatial datasets that meet their needs from different sources using spatial tools, and provides prospective users with both a producer and consumer view of the data in an attempt to simplify the selection of the most appropriate data for a given problem. Future improvements to this system will include enhancements to collect metadata directly from a range of data formats, and additional spatial operators that can be used to narrow the spatial search domain.