Documented Maps or How to merge a Hypermedia System and a Geographic Information System

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Actually, in most hypermedia systems, media (e.g., geographic maps, sound, images, videos) are considered as passive types. Their management is reduced to the minimum: they can not be handled, neither modified or queried. Moreover, their specific semantics is not taken into account. To solve the problem of passive geographic map media and to provide the user with the whole semantics of a geographic map media, we propose the conceptual merger of a Hypermedia System (HS) and a Geographic Information System (GIS).

A GIS is an information system dedicated to handle geographic data (i.e., data located on the earth - town, forest -). Geographic data has two components: a semantics component and a spatial component. The population of a town and the name of a forest are examples of semantics components. The world wide coordinates of a town and the shape of a forest are examples of spatial components. In GIS, maps are built from a certain arrangement of spatial components of geographic data and are thus handled as a composite type. The basic idea is to introduce this composite map type in the HS. Therefore, geographic maps are not any more considered as passive types, but as composite types. Consequently,

geographic maps can be characterized by their specific content; spatial analysis and queries are provided on the geographic data contained in maps. For example, the query language provides the opportunity to define queries such as "Which documents contain a map showing the forest part of a town?", including the spatial intersection operator between two geographic data (i.e., a town and a forest).

Hypermedia data are usually modeled with typed nodes (e.g., a castle-typed node). Each node contains relevant information concerning one idea or one concept (e.g., the name, the erection date, the description and the picture of a castle). However, some hypermedia data may also have in the real world a significant location (e.g., a castle). These particular hypermedia data are called geo-document data. These geo-document data might be referred on a geographic map, but they do not have a precise spatial information. We propose to increase the expressive power of geographic maps by adding geo-document data on them. To do this, the concept of hypermedia link is used; geographic maps are added with reactive icons roughly locating geo-document data and linking them to their corresponding typed node(s). These extended geographic maps are called documented maps. Consequently, a documented map (1) not only contains geographic data (with exact spatial information), but also geo-document data (with rough spatial information) and (2) permits the linking between geo-document data contained in a map and their associated information node. By this way, a virtual spatial information is provided to geo-document data and spatial relationships can be approximated between geo-document data and geographic data. Geo-document data belong to documented maps, which guarantees, in case of operations applied to documented maps (e.g., zoom, windowing), the spatial consistency between geographic and geo-document data contained in a documented map. Thus, queries such as "Which documents contain a map showing an XVIth century castle in a forest?" can be managed. This query involves the spatial inclusion operator between geographic data (i.e., a forest) and geo-document data (i.e., a castle).