THE FUTURE OF SCIENCE AND TECHNOLOGY

Forecast: Process models will dominate innovation on the Geospatial and Semantic Webs

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Description:

While the recent flurry of interest in Web-based cartography as an interface to diverse (and often disparate) data-sets has enjoyed significant attention in very recent years, process models for the Geospatial Web have been relatively overlooked. Put succinctly, these are the algorithms, heuristics, models, and services that will act upon users' queries (via geosearch and/or more vanilla types of search behavior), will perform operations on geo-data, and will geocode and spatialize non-geographic data. Process models were a fixture of the early foundations of Online GIS. Product's like ESRI's ArcIMS (Internet Map Server) delegated much of the heavy-lifting that a desktop or enterprise GIS would normally perform to the server-side, resulting in a clean exchange to a front-end browser-based cartographic client. This could involve simple spatial queries to the database to retrieve files relevant within a map buffer, but could equally involve complicated data-mining or data-farming in support of scientific visualization. Interest in geospatial process models will likely resurge in the near future. Some of the novelty of the recent evolution of Online Cartography is in the relatively recent surge in pilfering, parsing, and reconstituting diverse data sources into novel mash-ups, as well as the breadth and depth of innovation in client-side interfaces that users can conjure from the relatively limited functionality of available map APIs. What novel solutions will emerge when the same set of volunteer geographers begin to hack geospatial processes?

Geodata, Geographic Information Systems, and expert systems driven by geospatial AI will fuse on Web 2.0

We are already seeing a fusion of GIS, geodata, and AI-driven bots on the Web. Geoagent architectures have been developed in varying forms for many years, to catalog digital libraries of geodata [1], and to facilitate search and retrieval [2, 3]. This is going to become a crucial service in the near future, as diverse sets of geodata require reconciliation, comparison, transformation, projection, and particularly rectification (stitching-together of aerial or satellite images is already showing widespread problems in many popular Online mapping APIs) before passing them to the client for display. The potential for more sophisticated and useful GI-oriented expert systems for the Geospatial Web is a hugely untapped market.

Process models will be developed to harness floods of data from locative technologies

The increasing commercialization of mobile locative hardware suggests other scenarios for processing and the Geospatial Web. The software and CPUs in most of these devices are at least minimally powerful enough to perform basic GIS processing on-the-device (transformations, projections, buffering, shortest path algorithms). These could be used to generate a suite of device-side routines that would act as contextually-aware (and positionally-aware) interfaces to the Semantic Web. Existing location-based services centered on GPS feeds all have access to the same positional data. Their business models may soon be differentiated by what they do with or to those data. The mind boggles when one considers the possibilities when these devices network wirelessly to form ambient geoprocessing grids or volunteer sensor networks. At the moment, the user-interface (map) is what differentiates mobile positioning products, at least for commercial consumers. The sophistication of their GI-process algorithms could differentiate them in the future, much in the way that the algorithms behind the slew of available search engines differentiate that market today.

Spatial ontologies will be critical in building a location-aware Semantic Web

The utility of the Semantic Web is only as good as the ontologies at its foundation. This is also true of the Geospatial Web, which needs to be able to determine how far "far away" is, how near "near me" is,

what defines or encapsulates a neighborhood, when a hill becomes a mountain, and which of LA's downtowns is downtown? Design of ontologies for in-car navigation systems is already an active topic for academic research and development, but in this instance the scope of objects to be classified is relatively limited; standards and metrics for a host of systems and phenomena will likely emerge in the future as geospatial technologies grow in applied value across new industries.

References

[1] Alexandria Digital Library at the University of California, Santa Barbara and the National Center for Geographic Information Analysis
[2] GeoAgent project, Department of Geography, San Diego State University
[3] Yu, Chaoquing (2004). "GeoAgent-based Knowledge Acquisition, Representation, and Validation", Proceedings of GI Science, 2004

Signals:

Cataloging geodata: Alexandria Digital Library
GeoAgent (SDSU)
GeoAgent-based Knowledge Acquisition, Representation, and Validation

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