ICDE 2014
2014 IEEE International Conference on Data Engineering
March 31 - Apr 4, 2014 , Chicago, IL, USA

Submission Summary

Track: **Spatial, Temporal, Mobile, and Multimedia Data**

Paper ID: 296

Title: Declarative Cartography: In-Database Map Generalization of Geospatial Datasets

Abstract: Creating good maps is the challenge of cartographic generalization. An important generalization method is selecting subsets of the data to be shown at different zoom-levels subject to a set of cartographic constraints. For example, in a tourist attraction rating system, one needs to distinctively visualize important attractions, and constrain object proximity to allow space for user interaction. On the other hand, in a journalistic piece that maps traffic incidents, maintaining the underlying distribution of data is the most important aspect, but at the same time object density must be constrained to ensure high-performance data transfer and rendering.

Unfortunately, with current tools, users must explicitly specify which objects to show at each zoom level of their map, while keeping their application constraints implicit. This paper introduces a novel declarative approach to cartographic generalization based on a language called CVL, the Cartographic Visualization Language. In contrast to current tools, users declare application constraints and object importance in CVL, while leaving the selection of objects implicit. In order to compute an explicit selection of objects, CVL scripts are translated into an algorithmic search task. We show how this translation allows for reuse of existing algorithms from the optimization literature, while at the same time supporting fully pluggable, user-defined constraints and object weight functions. In addition, we show how to evaluate CVL entirely inside a relational database. The latter allows users to seamlessly integrate storage of geospatial data with its transformation into map visualizations. In a set of experiments with a variety of real-world data sets, we find that CVL produces generalizations in reasonable time for off-line processing and with quality close to optimal.

Created On: 7/14/2013 11:53:19 AM

Modified On: 7/14/2013 11:53:19 AM

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