Spatio-temporal map generalizations with the hierarchical Voronoi data structure

Map generalization leads to simplified maps that are needed for specific applications. However, in the map generalization process, the processing of the map objects and the operations applied to achieve this simplified map are usually lost. This is due to the transaction processing systems implemented in commercial GIS systems.

In this research, we used the Voronoi spatial data model for map generalizations. We were able to demonstrate that the map generalization does not affect only spatial objects (points, lines or polygons), but also the events corresponding to the creation and modification of map objects, together with their temporal and spatial adjacency relationships. In this paper, we present new solutions to the problems of spatio-temporal generalizations using the hierarchical Voronoi spatio-temporal data structure. The application of the hierarchical Voronoi data structure presented in this research is in spatio-temporal map generalization, which is needed for reasoning about dynamic aspects of the world, primarily about actions, events and processes.

This provides an advance in the domain of map generalization as we are able to deal not only with the cartographic objects, but also their spatio-temporal characteristics and their dynamic behaviour.

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