



On Simplifying Features in OpenStreetMap database

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Currently the visualization of OpenStreetMap data is using a tile server which stores map tiles that have been rendered from vector data in advance. However, tiled map are short of functionalities such as data editing and customized styling. To enable these advanced functionality, Client-side processing and rendering of geospatial data is needed. Considering the voluminous size of the OpenStreetMap data, simply sending region queries results of OSM database to client is prohibitive. To make the OSM data retrieved from database adapted for client receiving and rendering, It must be filtered and simplified at server-side to limit its volume.

We propose a database extension for OSM database to make it possible to simplifying geospatial objects such as ways and relations during data queries. Several auxiliary tables and PL/pgSQL functions are presented to make the geospatial features can be simplified by omitting unimportant vertices. There are five components in the database extension: Vertices weight computation by polyline and polygon simplification algorithm, Vertices weight storage in auxiliary tables. filtering and selecting of vertices using specific threshold value during spatial queries, assembling of simplified geospatial objects using filtered vertices, vertices weight updating after geospatial objects editing.

The database extension is implemented on an OSM APIDB using PL/pgSQL. The database contains a subset of OSM database. The experimental database contains geographic data of United Kingdom which is about 100 million vertices and roughly occupy 100GB disk. JOSM are used to retrieve the data from the database using a revised data accessing API and render the geospatial objects in real-time. When serving simplified data to client, The database allows user to set the bound of the error of simplification or the bound of responding time in each data query. Experimental results show the effectiveness and efficiency of the proposed methods in building a versatile and promising Internet-oriented GIS.