Free and Open Source Software for Geospatial (FOSS4G) Conference Proceedings

2015

House Number Interpolation For Route Planning Applications

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Recommended Citation

PO-12

House Number Interpolation For Route Planning Applications

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Abstract

Nowadays users expect door-to-door routing from a navigation system; for a given address including street name and house number this requires at least an approximate location on the routable part of the OSM data.

Of course, eventually the goal is to have every single building mapped and tagged in OSM with its housenumber. For most regions this is still a pipe dream, though. Often, only a small subset of the buildings have been mapped, and even if mapped, quite frequently their housenumber is missing. In particular buildings mapped automatically from aerial imagery typically lack more detailed tags. And even though there are explicit interpolation tags recommended to be used, they are not frequently used, hence many addresses with house numbers cannot be located even approximately.

In this paper we show how to automatically infer house numbers based on the data already present in OpenStreetMap. The result of our algorithm is a street graph where every road segment (part of a way between two consecutive nodes) is associated with a range/subset of house numbers. On one hand, this yields an interpolation of house numbers that are not explicitly present in the OSM data. On the other hand this allows route planning applications to perform door-to-door routing up to OSM road segment level (which seems sufficient given that a typical OSM road segment between consecutive nodes is rather short) without the need to look up house numbers in respective building data etc. This is an important advantage in particular in offline scenarios where the route planning data is stored locally e.g. on a mobile device.

For example, in a small (but rather well mapped) excerpt of the OpenStreetMap data of Germany, we have counted about 494k buildings, but only around 241k with a housenumber provided (either at the building outline/way or at an entrance node). For most of these buildings our methods allow for the association of the correct range of house numbers including these missing house numbers (and potentially housenumbers of still unmapped buildings). The addr:interpolation tag has only been used 81 times in this excerpt.

Our implementation is efficient enough such that a country-sized excerpt can be processed within few minutes (e.g. in preparation for offline storage on a mobile route planning device).

Academic Discipline and Sub-Disciplines : Open Source; geoinformatics; route planning; map

Keywords : Open Source; route planning; housenumbers; interpolation; data quality