Indoor Spaces in OpenStreetMap

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ABSTRACT

The OpenStreetMap (OSM) project was created to map streets. But as many other successful innovations, it created new possibilities. Beyond streets, the community started to capture other information, to create more than just street maps. For example, initiatives like wheelmap.org enhance the OSM with tools and specific data for wheelchair drivers. The OSM proved that Volunteered Geographic Information (VGI) can be used in large scale projects. OSM became a school for neogeographers, where they learn how to produce high value user-generated geographic content. Many techniques and technologies were developed specifically to improve the quality of OSM, and to support the OSM mappers. In this paper we present a proposal to map indoor spaces in OSM. The goal is to map public indoor spaces, like universities, malls and airports. A central public hospital, for example, can have many more people moving around than a small city. This is not the first or the only proposal around. Many people already suggested and developed some support to indoor spaces in OSM. This proposal tries to get the best of former initiatives to establish a common path to move forward. We start by reviewing some important concepts, obviously starting by defining the meaning and the scope of indoor space and its representation. There are representations based on floor footprints and representations more based on the building model. Either can be more syntactical or semantic oriented. The distinction between indoor spaces and 3D models is necessarily discussed, since the distinction between them is somewhat blurred. Indoor routing and navigation are also reviewed, to highlight the differences and the relations between them. Any kind of routing can always be reduced to a graph representation, but current available algorithms rely on the distance to populate the graph. For indoor spaces, the same x and y location can be used for an elevator that travels through several floors, for example. The graph resulting from the indoor space must be aware of the distance between nodes on different floors, but on almost the same x and y location. We will demonstrate our proposal, covering the entire workflow from mapping to visualization and exploration of indoor information. We also show a multi-modal routing solution, taking advantage of indoor information. The routing solution was developed on top of Open Trip Planner (OTP). The contributed code is available as open source on a public repository.

Key words: OpenStreetMap, Indoor routing, VGI, Open Trip Planner