OpenStreetMap.org - Community game or real geo-data? And the role of data donations

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1 ABSTRACT

Openstreetmap is an 5 year old Web 2.0 community project collecting geographical data. It also consists of several software projects, which enables data manipulation and usage. In Austria a big data donation accelerates the process to reach a nearly full coverage. Since there are many data quality checks, openstreetmap now reaches a state, where data really can be used for some projects addressing real worlds problems.

2 OPENSTREETMAP.ORG

2.1 The short history

Founded as a community project in August 2004, openstreetmap.org was the answer of a secondary market failure (I consider the first failure in the late 80ies by states and communities not having a business model to sell data to private companies needing data and the second by the two major street data companies raising business models, that didn't fit the needs of private users and SMEs.). In 2006 first editors were released and the first products have been published. In 2007 Tiger data for the USA and AND data for the Netherlands were imported. This was also the year, where Yahoo agreed into using their aerial imagery being used by the openstreetmap community to map additional information. In the meantime the 100.000 user milestone was reached.

2.2 The foundation

Like many other open source projects, in the first days the project is owned by nobody. Data is owned by the contributors. But in the meantime a foundation was founded in Great Britain, which at least is mandatory for the hardware infrastructure and responsible for legal issues.

2.3 How data is collected, how it is attributed

Since openstreetmap derives from user contributed data, this is collected in several ways:

- in the beginning the main way of collecting data was tracking GPS signals with various devices and uploading them to the site; in the meantime published editors could load that data in the background to draw real mapping data

- based on the Yahoo data mentioned earlier especially maps of and around the big cities have been mapped, often without tagging attributes, which had to be added in a second phase. Such effects also took place in 'Oberpfalz' in Germany, where an aerial imagery donation from the government recently occurred.

- some major imports of data collected from other sources helped the project growing. Especially the Tiger import in the USA and the AND import for the Netherlands should be mentioned here.

Similar to Wikis, attribute data is not organized in fields, but in tags. There is no restriction to special keys, so anyone can create new 'fields'. Beside that freedom the community tries to self organize many keys and their specific values.

Since the community isn't only interested in collecting street data, also POI data and data of e.g. hiking routes, biking etc. is collected. So in that point no commercial data package is competitively.

2.4 Data structure and programming overview

Since the founders (and first programmers) of openstreetmap didn't have any GIS background, data structures within the main database seems a little bit strange to GIS experts. The main servers database is built up on a mySQL (myISAM) database with a quite simple structure. On the one hand every point is represented in the database without respect to its function whether it is a node or a vertex. On the other hand polylines and polygons are represented as a relational table of their points.

The main API is programmed in Ruby and returns XML-Files upon data HTTP requests. In the meantime there are several editors and interfaces to that API, especially being mentioned here:

- Editors
  - o Potlatch is a flash based simple editor used to bring in the wiki principe into the platform. Every registered user may change data within without knowing too much about the data in short time without installing any program.
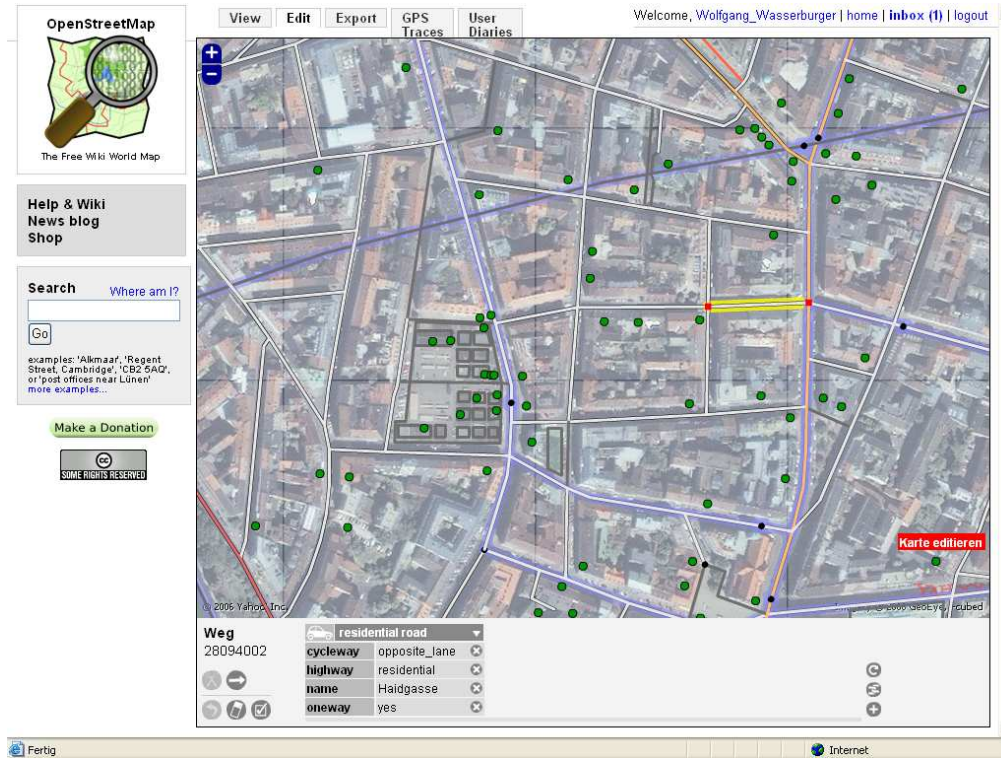

Fig. 1: Potlatch, the 'Wiki'-Editor

  - o JOSM and Mercaator are Java respectively C++ based Editors programmed in Java and C. They have more complex features and make it possible to do complex changes.
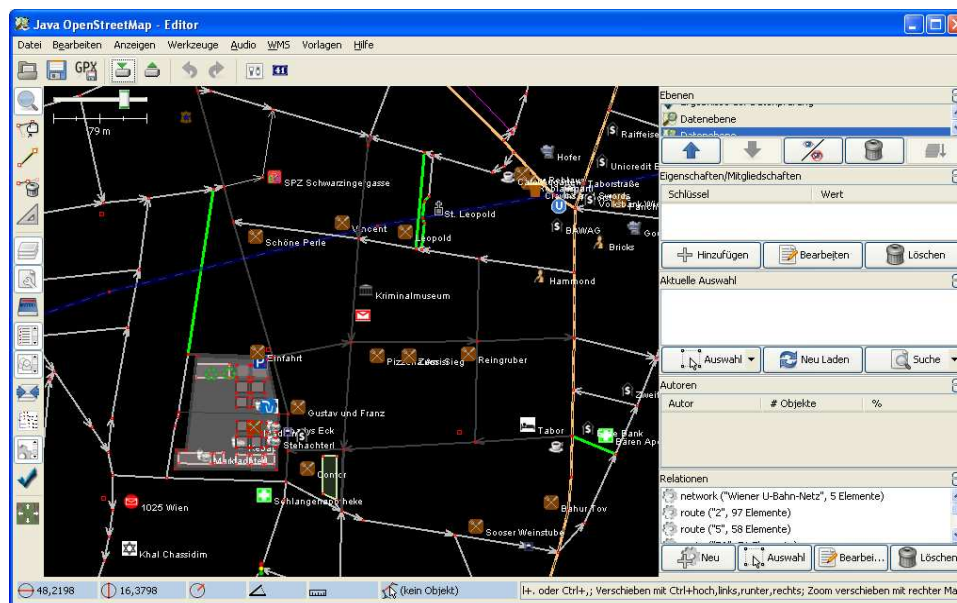

Fig. 2: JOSM, a GIS-like Java implemented Editor

  - o Osm2go is an offline editor for mobile devices
- Prepared data

o Planet.osm: free for download from the server (and several mirrors) every week the server exports all data into a ziped XML-File. In the moment the ziped File is about 4 GB.

o Diffs: whereas the planet.osm is a big challenge to process and download, there are also daily, hourly and even minutely differential files, where someone can find all modifications, and also new created and deleted objects. So it is quite easy to maintain mirror servers or other application servers nearly real time.
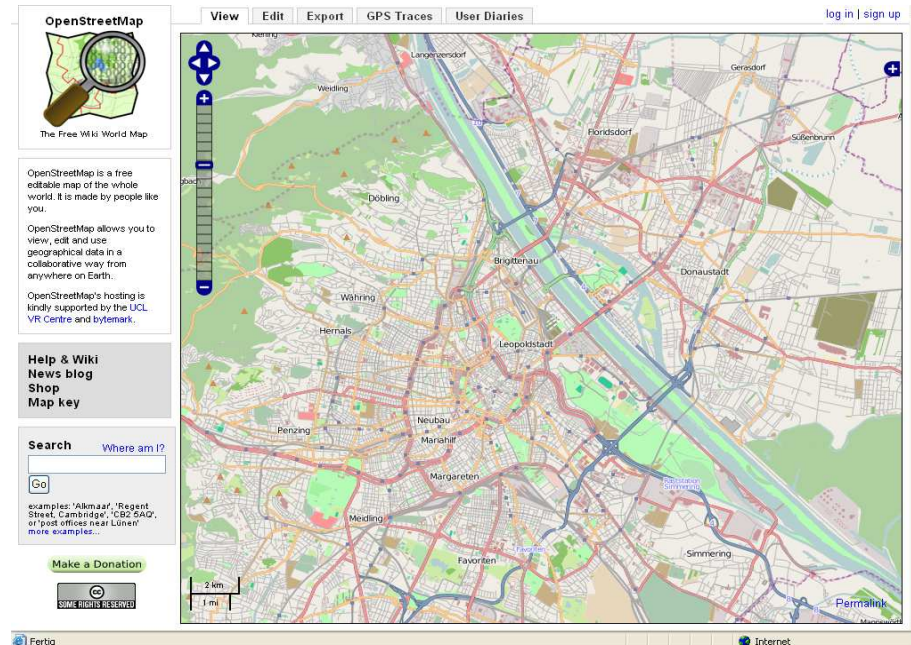

Fig. 3: Map Sample from Vienna, Feb. 2009 (Mapnik)

o SHP: for users not willing to operate the native XML format, the german company Geofabrik also provides Shapefiles for Europe and the European countries, which are generated weekly

- XAPI: via an extended API it is possible to do even some attribute orientated queries

- For large updates and several data manipulation purposes some developers created also many perl scripts.

2.5 Renderers and Route services

Directly via openstreetmap.org everyone can explore the maps. The rendering of these is done by two different engines, both of them were invented just for that purpose. In some points they have a really cartographic feeling, whereas in some others they look like reinventions of the mapserver from the University of Minnesota.

Mapnik, the standard map, is a tile server, which renders new every week by a dedicated server.

Osmarender uses another strategy: it renders new on demand and the tiles are not rendered from a central host, but worked out by distributed cpu time donated by many users (tiles@home).

Besides there are some routing services from which the www.openrouteservice.org, developed at the university in Bonn, Germany, is the most advanced.

2.6 The donation in Austria

In Novembre 2008 the business data publisher Compass-Verlag decided to donate its map data until that only used for the site www.plan.at and its own site maps for 160.000+ companies. At this time openstreetmap.org reached about 70.000 km of streets in Austria, whereas the plan.at data was more than 157.000 km. After some legal discussion and a meeting of the CEO of Compass, Mag. Nikolaus Futter and Mikel Maron, member of the board of the openstreetmap foundation, work could start in mid December 2008 and was finished 6 weeks later. After that technical import the data, which in most cases is imported in a hidden form

using special name spaces, has to be combined by local mappers, which was ongoing while this paper was written. After that period it is planned to delete all objects, which could not be used.
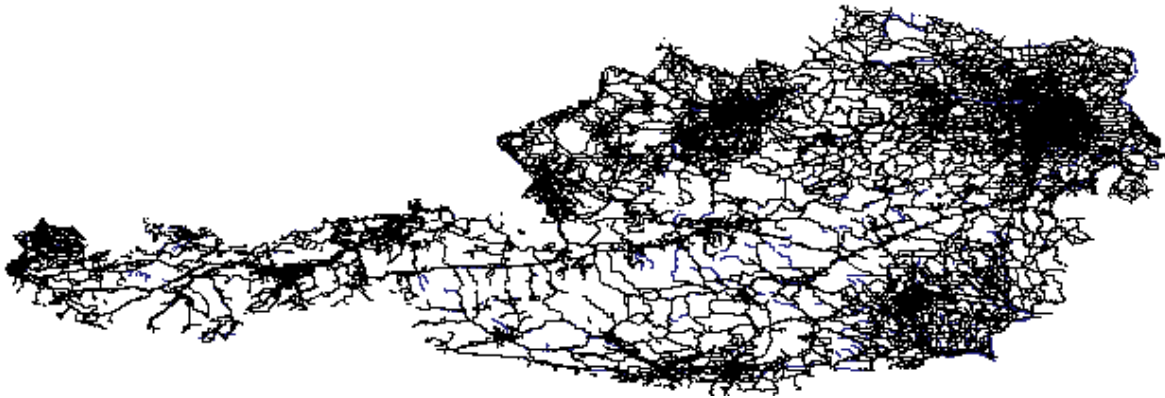

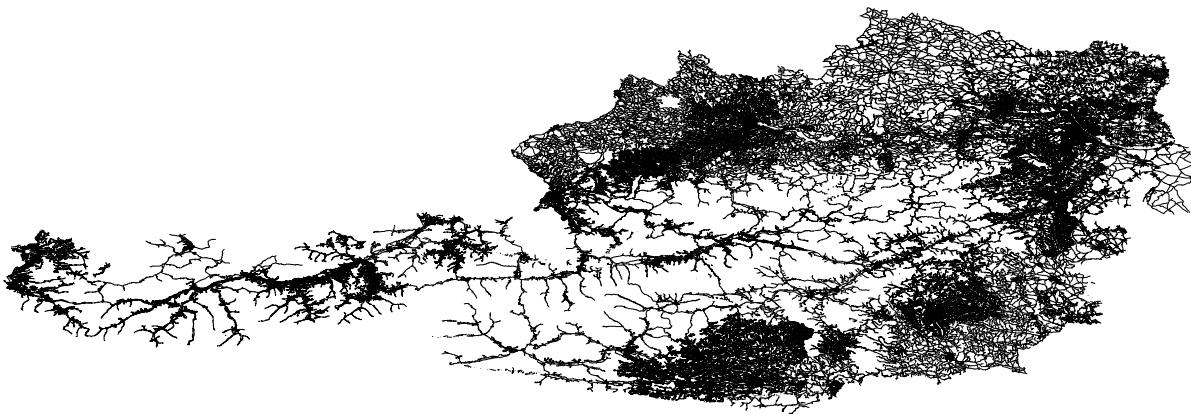Fig. 4: existing openstreetmap data in Oct. 2008

Fig. 5: existing plan.at data in Oct. 2008

In the meantime the plan.at site will also be redeveloped using openstreetmap data. In opposite to the original openstreetmap tile servers, this should be accomplished using the Minnesota mapserver combined with the openLayers library and a redesigned version of the existing name search.

2.7 Data quality

One should think, that data quality is a big challenge in community projects, but there are several mechanisms to assure a good quality. While the positioning quality always will suffer from the sources (GPS and – sometimes badly georeferenced – aerial pictures), especially the topological quality of the street network is proved by many different tools. Additionally shifts in GPS positions corrects itself when reused in GPS context.

Manually quality checks for Austria showed a very high standard. Especially the roadnet was checked for routing possibilities

Besides the mapping community in most places is permanently checking their environment. Even applications like www.openstreetbug.org help passive users to transmit errors to mappers, which are able to fix them. Therefore changes in the real world are mirrored very quick to openstreetmap. So applications which need just in time data can easily update its data as often as needed.
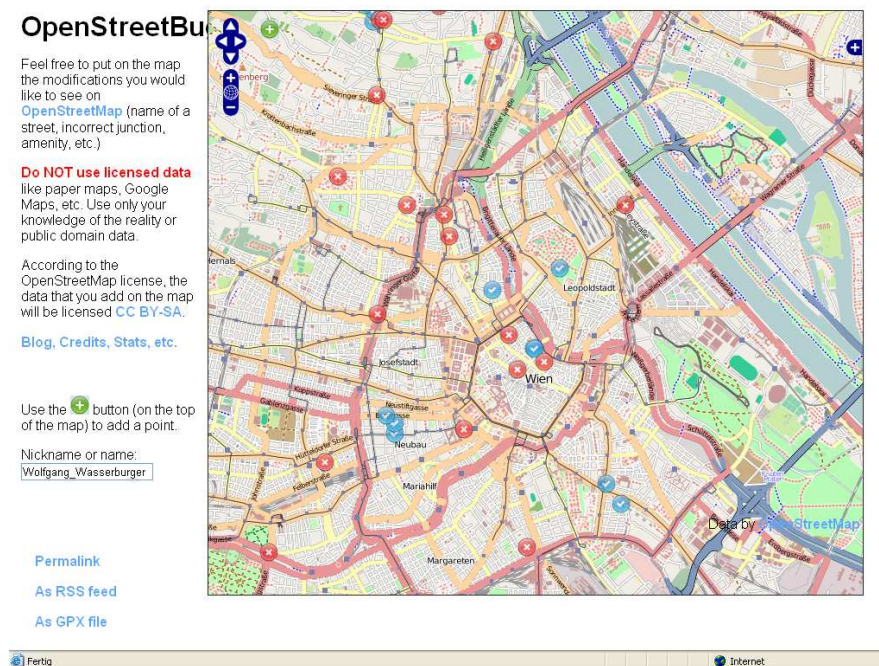
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Strategies, concepts and technologies for planning the urban future

Fig. 6: Error transmitting tool 'openstreetbugs'

3 COMMUNITY GAME OR REAL DATA? – NOT A FINAL CONCLUSIO

Like many other Web 2.0 applications, openstreetmap.org started like a community game. In the meantime the project grew and the amount of data with it aswell. Soon after the first data was entered, some projects were defined to work on concrete cities and regions. Additional to that several applications were developed, which today reach a quite professional stage. Since data quality management took place and more and more regions got nearly fully surveyed, the aera of real data began. Although it is not established in all regions, the project is on a good way to get an adult. So there is no final conclusio yet, but it seems – at least for some regions, that openstreetmap got real data already.

4 REFERENCES

http://www.openstreetmap.org
http://wiki.openstreetmap.org
http://www.openrouteservice.de
http://www.plan.at
http://www.compass.at