Hochschule Karlsruhe
Technik und Wirtschaft
UNIVERSITY OF APPLIED SCIENCES

Master's thesis

The use of OpenStreetMap in commercial software application

PTV GROUP

Candidate: Mahdi Ghofrani

Referee: Prof. Dr. Peter Freckmann

Introduction

OpenStreetMap, as a collaborative project which in recent years has gone from a small to being a global resource with thousands of users contributing data and making use of it in different ways has gotten the attention of numerous organizations and companies involved in geospatial services. The customers of geodata production see the project as a potential alternative or complement to expensive digital maps built by commercial vendors like HERE and TomTom, which license data for all or parts of their online maps.

A key motivation for OSM project is to enable free access to current geographical information where acquiring accurate digital geographical information is considered to be expensive and out of the reach of individuals, small businesses, and community organizations. Commercial geographical information products from providers such as Here are also expensive and aren't available for individual users in an accessible format.

Rendering, routing and geocoding are three prominent mapping services which OSM provides.

The most prominent application is the rendering of the geographic data and features into raster images (for example, for the OSM map on the website).

Another most important feature in many applications, especially in geographic information systems (GIS), is the capability to locate addresses, i.e. to geocode the address. Geocoding became more popular and online mapping tools have popularized the concept of using an address as an initial map navigation tool. Recently there has been also a significant progress to geocode addresses by commercial Internet mapping APIs and Internet services. OSM also provides an application programming interface (API) for fetching raw data from and saving to the OSM database .

Objectives

This thesis is an approach to adaptation of OSM data to PTV AGF data model. AGF (Advanced Geographic Format) is PTV own internal and external exchange format for spatial data. It is a relational data model comprising of the tables for:

- Routing
- Geocoding
- Rendering

Methods & Approaches

- A converter is developed which converts the OSM data to the AGF. This converter is developed Based on the .Net DLL libraries of VISUM (PTV traffic software) which converts vector data to AGF format for rendering and routing purposes.

Visum libraries create the object of each OSM entity with relevant methods and constructors.

AGF converter accesses the objects of each entity then modifies and writes them one by one in the corresponding file. (Figure 1)

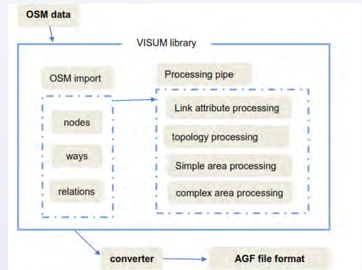

Figure1 :Overall design of the OSM to AGF converter with converter build on Visum libraries

- For geocoding purpose , required data are collected through Nominatim service. Nominatim is the most standard geocoding service for openstreetmap data. Written in C, it needs specific Ubuntu packages to be installed. It comes with a php component, which provide some tooling and the web part. Data are processed inside PostgreSQL database and finally imported to AGF format Tables.
- Using Osmosis which is a command line Java application, Large OSM dataset are fragmented into chunks of small size dataset. It also provides a bunch of useful functionalities which enable us to add ferry routes to each individual dataset . These routes are considered as an essential part of especially cross-country transportation in AGF data model.

Results

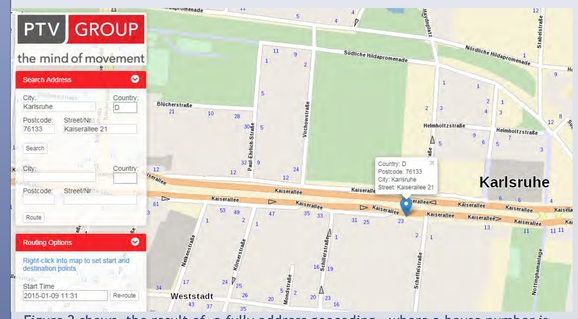

Figure 2 shows the result of a fully address geocoding , where a house number is searched and marked on the map.

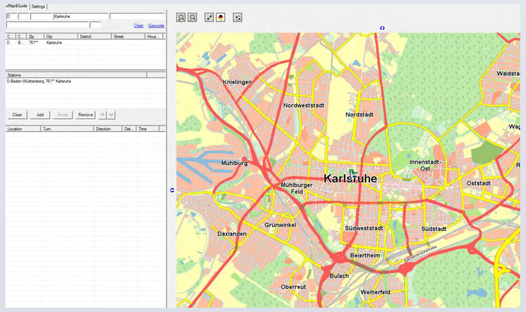

Figure 3: Geocode a city name.

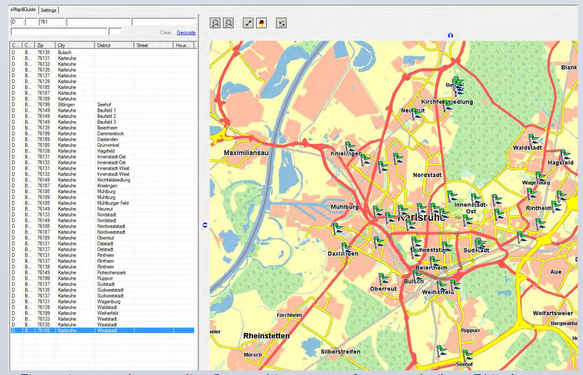

Figure 4: postcode geocoding.By searching a part of a postcode (here 761) the center of all postal areas which start with this number are displayed on the map

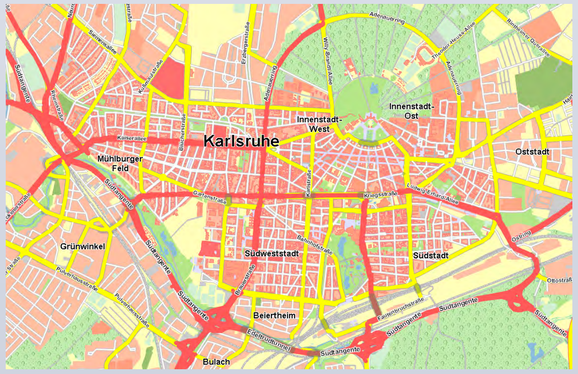

Figure 5: OSM data rendered by PTV Map server. Background areas, background lines, networks and the name of places are renderd

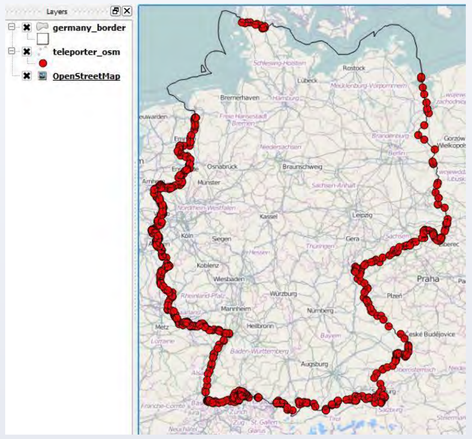

Figure 6 :
By splitting one large OpenStreetMap file into country-sized dataset and by cropping ways exactly at the boundaries, new artificial nodes are added to the dataset. These nodes offers a network system so-called "Teleporter" which connect two adjacent dataset via a routable connection .

Conclusion

In terms of display(rendering), OpenStreetMap data can be compared quite well with other web mapping services.

From a geocoding point-of-view, however, there is still more work to be done. The inherent inconsistencies present in the OpenStreetMap data however requires concessions in terms of referential integrity.

The positional accuracy to be expected strongly depends on the availability of house number data.

However ,considering the rapid development, strength and potential of OpenStreetMap project , geocoding with OSM data is very promising.