

Chapter 2

Quality Evaluation of Volunteered Geographic Information: The Case of OpenStreetMap

Hongyu Zhang
Western University, Canada

Jacek Malczewski
Western University, Canada

ABSTRACT

A large amount of crowd-sourced geospatial data have been created in recent years due to the interactivity of Web 2.0 and the availability of Global Positioning System (GPS). This geo-information is typically referred to as volunteered geographic information (VGI). OpenStreetMap (OSM) is a popular VGI platform that allows users to create or edit maps using GPS-enabled devices or aerial imageries. The issue of quality of geo-information generated by OSM has become a trending research topic because of the large size of the dataset and the inapplicability of Linus' Law in a geospatial context. This chapter systematically reviews the quality evaluation process of OSM, and demonstrates a case study of London, Canada for the assessment of completeness, positional accuracy and attribute accuracy. The findings of the quality evaluation can potentially serve as a guide of cartographic product selection and provide a better understanding of the development of OSM quality over geographic space and time.

INTRODUCTION

Although a large amount of geospatial data and wide range of applications have made GIS very popular, the users are often unaware of the data quality. New elements were added to the discussion of geospatial data quality in the 21st century through the development of Web 2.0 and the availability of Global Positioning System (GPS). The interactivity of the new web technology helped create a large amount of user-generated content (UGC). UGC with location information is referred to as user-generated geospatial

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content (Coleman, Georgiadou, & Labonte, 2009), crowd-sourced geodata (Barron, Neis, & Zipf, 2014) or volunteered geographic information (VGI) (Goodchild, 2007). More specifically, using location-based services (LBS), GPS-enabled devices and/or satellite images, VGI users actively upload and share data following an opt-in provision, and VGI can be direct or indirect depending on whether users have local knowledge (Haklay, 2013). The activities of contributing VGI have been termed in different ways as well, including collaborative mapping (Jokar Arsanjani & Vaz, 2015), participatory GIS (Elwood, 2006) and public participation GIS (PPGIS) (Lin, 2013).

Researchers are interested in VGI because of its values. The conventional apprehension about commercial or governmental cartographical products is authoritative, comprehensive and accurate. However, Coleman (2013) and Dobson (2013) concluded that these databases are often out-of-date, incomplete, of inconsistent quality, and costly to maintain. Therefore, VGI is studied as a crowd-sourced alternative to “authoritative” datasets. OpenStreetMap (OSM) is one of the VGI applications that allow users to create and edit maps using satellite images. As of July 2016, the total number of registered users on OSM has passed 2.8 million, creating more than 3.4 billion nodes (data points) accumulatively (“OSMstats - Statistics of the free wiki world map,” 2016). This chapter systematically summarizes the quality evaluation process of OSM through literature review and a case study in London, Canada, with focuses on the comparisons of different assessment methods and findings.

BACKGROUND

The term volunteered geographic information (VGI) was suggested by Goodchild (2007) to represent geospatial data contributed by individuals voluntarily. Since VGI is often the most cost-effective solution, the crowd-sourced geodata have been applied in many fields such as participatory planning and spatial decision making. Moreover, VGI is the only source of geodata in some regions because of security or financial concerns. The area of humanitarian relief and crisis management is the most prominent application of VGI. Ushahidi and the Humanitarian OpenStreetMap Team (HOT) are two platforms that have had strong presence on disaster management since 2008 and 2009 respectively. Table 1 compares some VGI applications with OSM. Although OSM is not the project with the longest history, it is the

Table 1. Comparison of volunteered geographic information (VGI) applications

Attributes	OpenStreet Map	Wikimapia	Waze	Moovit	GasBuddy
Founding year	2004	2006	2008	2012	2000
Specialization	Mapping	Mapping	Navigation	Public transit	Fuel prices
Number of users or registered members (in million)	2.8 (in 2016)	1.9 (in 2013)	50 (in 2013)	20 (in 2014)	35 (n.d.)
Coverage in 2016	World	World	World	600+ cities	United States and Canada
License	ODbL	CC BY-SA	Proprietary	Proprietary	Proprietary
Data downloadable	Yes	Yes	No	No	No

Note. ODbL, Open Data Commons Open Database License; CC BY-SA, Creative Commons license Attribution-ShareAlike; data for OpenStreetMap from “OSMstats - Statistics of the free wiki world map” (2016), for Wikimapia from Neis & Zielstra (2014), for Waze from CBC News (2013), for Moovit from “Moovit Company Overview” (2014), and for GasBuddy from “Advertise with us - Gasbuddy Gas Prices” (n.d.).

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