

Chapter 5

Quality Assessment of Volunteered Geographic Information for Educational Planning

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ABSTRACT

Volunteered Geographic Information is the term used to describe the process of collecting spatial data using a network of volunteers. The approach collects spatial data to build maps which are often freely accessible. The maps and the underlying data can be used by the public, companies and government agencies for a variety of tasks such as route finding. Given that untrained volunteers may collect the spatial data, questions regarding the quality of VGI have been raised. Several studies have emerged to assess the quality (positional, semantic and thematic accuracy) of VGI by comparing the data to ground truth. This approach fails to capture the quality of VGI for domain specific tasks. In this chapter we examine the quality of VGI for an educational planning task in Islamabad, Pakistan, and show that while the data may be suitable for route finding tasks, they are insufficient for educational planning alone.

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INTRODUCTION

Crowdsourcing of data involves volunteers collecting, processing and sharing data through specialized digital platforms or via ad-hoc methods. There are many examples of crowdsourcing projects. Wikipedia (encyclopedia), OpenSignal (cell tower information), Open Food Facts (food information) and RootMetrics (cell carrier quality metrics) are examples of crowdsourced repositories covering multiple domains. Goodchild (2007) introduced the term Volunteered Geographic Information (VGI) to describe the crowdsourcing of map and spatial data. OpenStreetMap (OSM) is perhaps the best known and most successful VGI project. The aim of the ongoing project is to map the world and to provide free access to the editable map and underlying data. The project builds on the local knowledge of volunteers to create detailed maps.

As crowdsourced data are often contributed by non-expert volunteers, questions regarding its quality have been raised. In the spatial domain many studies assess the quality of OSM data (Ciepluch et al., 2011; Haklay 2010; Girres & Touya 2010; Ludwig et al., 2011; Ballatore & Zipf, 2015; See et al., 2016). The studies assess OSM data for geometric accuracy, overlap, attribute accuracy and completeness. The quality assessment generally involves comparing the volunteered spatial data to official data sources such as data collected by national mapping agencies or mapping companies. Such studies assume that the professionals who have trained in map generation and cartography have produced an accurate ground truth. Although, the studies indicate that the quality of OSM is acceptable with accurate positional precision for road networks, the results also indicate that there are spatial and regional differences in relation to the quality of OSM data.

With the exception of route planning, studies assessing the correctness of volunteered spatial data are typically domain independent and focus on assessing the overall quality of OSM without drawing on specific spatial analysis tasks. This can hide the true value of VGI data for certain domains. For example, questions about the usefulness and quality of VGI for urban planning, infrastructure planning and service delivery have not been widely assessed. While such analysis is a subset of the overall quality assessment measurements, there may be subsets of the data where quality is better or worse than that seen in the overall OSM dataset.

In this chapter we investigate this by specifically examining the quality of OSM data for tasks related to educational planning. We use the city of Islamabad in Pakistan as a case study. We take the classic approach of comparing the spatial, semantic and thematic data of educational facilities in Pakistan to data collected by the National mapping agency in Pakistan (Survey of Pakistan (SoP)). We augment this with other ground truth data which we collected as part of the study. We assess the volunteered geographic data for completeness, attribute accuracy and positional accuracy and report the results as they apply for educational planning in Pakistan.

BACKGROUND

This section considers existing research in the field of educational planning and the comparison of authoritative datasets with that of VGI. We establish the relationship between educational planning, GIS and the potential of VGI.

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