

Chapter 11

Improving Accessibility Through VGI and Crowdsourcing

Igor Gomes Cruz

Federal University of Campina Grande, Brazil

Claudio Campelo

Federal University of Campina Grande, Brazil

ABSTRACT

Accessibility is an important element in the life of those who have certain limitations, such as the physically disabled and visually impaired people. However, one of the greatest challenges for this group is to find paths and areas adapted to their limitations while performing their daily activities, since not all environments they explore have these characteristics. Volunteered Geographic Information (VGI) and the crowdsourcing technique appear to be quite useful to develop solutions to overcome these challenges, since these techniques are naturally cheap as they rely on human sensors as the main agent of information delivery. In this chapter, we discuss how these techniques can help mitigate accessibility problems and present some existing research and applications in the field.

INTRODUCTION

According to the World Health Organization, “more than a billion people in the world today experience disability. These people generally have poorer health, lower education achievements, fewer economic opportunities and higher rates of poverty. This is largely due to the barriers they face in their everyday lives, rather than their disability. Disability is not only a public health issue, but also a human rights and development issue.”

Urban mobility can be defined as the people’s capacity to move around the city, to live and to interact with the space. This ability can be strongly affected by architectonic obstacles which represent a physical impediment to the exercise of citizenship by people with special needs, such as disabled elderly people. (Mirri, Prandi & Salomoni, 2016)

The term accessibility has various definitions and it can be understood as a medium to obtain barrier-free environments which affect the usability or the utilization of services associated to these areas, depending

DOI: 10.4018/978-1-5225-2446-5.ch011

on the context in which it is employed. Inside this group, we can highlight the environmental accessibility which refers to how accessible a place is to a group of people. This kind of accessibility describes the relation person-environment, in which the abilities of a person are opposed to the environmental properties for a given place. The environmental accessibility extends to a large group of users, which includes children, elders, people walking with baby carriages or with heavy luggage, among others. It basically has the goal of equality. (Laakso, 2014)

It is clear that human navigation is a quite complex activity, essential to people in environments which require movement. It is a process which involves the association of many locomotion components, discovery of paths/routes, vision (responsible for the capture of static and dynamic information of the environment) and the locomotion medium (on foot, cars, motorcycles, wheelchairs, among others). Thus, for someone with visual impairment or movement disability, the navigation in unknown environments becomes a hard task. This happens due to the specific necessities of each individual. Consequently, many disabled people deprive themselves from exploring unknown environments because of these problems and of the risk they can offer to their security and health. (Vanclooster, Weghe & Maeyer, 2016; Brock, Truillet, Oriola, Picard & Jouffrais, 2012; Coughlan & Shen, 2013; Schmitz, Becker, Blessing & Großmann, 2011; Santos, Forest, Dutra & Almeida, 2012; Neis, 2014)

Thus, environmental accessibility has a fundamental role for those who have some kind of special need, as these individuals have many difficulties when trying to move around public environments, since such places sometimes are not adequately adapted to users with some disability, whether it is physical or visual. People with disabilities should be in constant interaction with their sociocultural medium. Although the construction of accessible places is a goal in current society, urban areas, specifically the ones for pedestrians, are often inadequate for locomotion of the elderly and disabled, since these users have greater and more remarkable needs when it comes to accessibility. Therefore, these environments still represent one of the most real examples of the difficulty of locomotion felt by people with disabilities. Thus, geospatial data play an important role in offering help in choosing the best routes according to the population needs.

However, another barrier which hinders people's independent locomotion is the lack of information about the urban environment and its accessibility. The maintenance of up-to-date databases is considerably costly, thus the availability of information about urban accessibility has been traditionally limited for many urban centers. Consequently, traditional approaches based on databases (e.g., maintained by government authorities) have appeared to be not sufficiently effective in the field, thus lowering the chances of becoming a social inclusion medium (Mirri, Prandi & Salomoni, 2016).

In order to assist the users with special needs, a geospatial database must contain the maximum amount of information on the characteristics which affect the accessibility, since the pedestrians locomotion mediums are extremely large and suffer constant changes in their structure. Thus, crowdsourcing, social media and Volunteered Geographical Information (VGI) offer a great potential to the collection of data at pedestrian level. The OpenStreetMap – OSM (www.openstreetmap.org) is one of the most representative examples of dynamic maps. It is a voluntary project offering the users an online map, which grows with the help of non-official sensors, i.e., amateurs which contribute daily with information updates. (Qin, Aburizaiza, R. Rice, Paez & M. Rice, 2015; Laakso, 2014; Antoniou & Skopeliti, 2015; Basiouka, Potsiou & Bakogiannis, 2015)

The mapping of dynamic geographical phenomena is a hard task, due to the frequency of changes they are subject to. In urban areas, for instance, pedestrian walkways and the transportation infrastructure

17 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/improving-accessibility-through-vgi-crowdsourcing/178806

Related Content

Free and Open Source Tools for Volunteer Geographic Information and Geo-Crowdsourcing

Maria Antonia Brovelli, Blagoj Delipetrevand Giorgio Zamboni (2019). *Geospatial Intelligence: Concepts, Methodologies, Tools, and Applications* (pp. 837-862).

www.irma-international.org/chapter/free-and-open-source-tools-for-volunteer-geographic-information-and-geo-crowdsourcing/222928

Research Commentary: Increasing the Flexibility of Legacy Systems

William L. Garrison, Barry Wellar, Ross MacKinnon, William R. Blackand Arthur Getis (2011). *International Journal of Applied Geospatial Research* (pp. 39-55).

www.irma-international.org/article/research-commentary-increasing-flexibility-legacy/53194

Sensitivity of Modeled Channel Hydraulic Variables to Invasive and Native Riparian Vegetation

Adriana E. Martinez (2017). *International Journal of Applied Geospatial Research* (pp. 47-61).

www.irma-international.org/article/sensitivity-of-modeled-channel-hydraulic-variables-to-invasive-and-native-riparian-vegetation/186782

Mapping Accessibility to General Practitioners

Lars Brabynand Paul Gower (2003). *Geographic Information Systems and Health Applications* (pp. 290-308).

www.irma-international.org/chapter/mapping-accessibility-general-practitioners/18848

A Brief Cartography of Smart Cameras: Proactive Surveillance and Control

Fernanda Bruno (2013). *Geographic Information Systems: Concepts, Methodologies, Tools, and Applications* (pp. 66-80).

www.irma-international.org/chapter/brief-cartography-smart-cameras/70435