

## 16 Volunteered Geographic Information

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### 16.1 Introduction

In its early days the World Wide Web contained static read-only information. It soon evolved into an interactive platform, known as Web.2.0, where content is added and updated all the time. Blogging, wikis, video sharing and social media are examples of Web.2.0. This type of content is referred to as user-generated content.

Volunteered geographic information (VGI) is a special kind of user-generated content. It refers to geographic information collected and shared voluntarily by the general public. Web.2.0 and associated advances in web mapping technologies have greatly enhanced the abilities to collect, share and interact with geographic information online, leading to VGI.

Crowdsourcing is the method of accomplishing a task, such as problem solving or the collection of information, by an open call for contributions. Instead of appointing a person or company to collect information, contributions from individuals are integrated in order to accomplish the task. Contributions are typically made online through an interactive website.

In the subsequent sub-sections, examples of crowdsourcing and volunteered geographic information are described, namely OpenStreetMap, Tracks4Africa, the Southern African Bird Atlas Project.<sup>2</sup> and Wikimapia. In the additional sub-sections a step-by-step guide to contributing to OpenStreetMap is provided.

### 16.2 OpenStreetMap

OpenStreetMap ([www.openstreetmap.org](http://www.openstreetmap.org)) is a collaborative project to create a free editable map of the world. Two major driving forces behind the

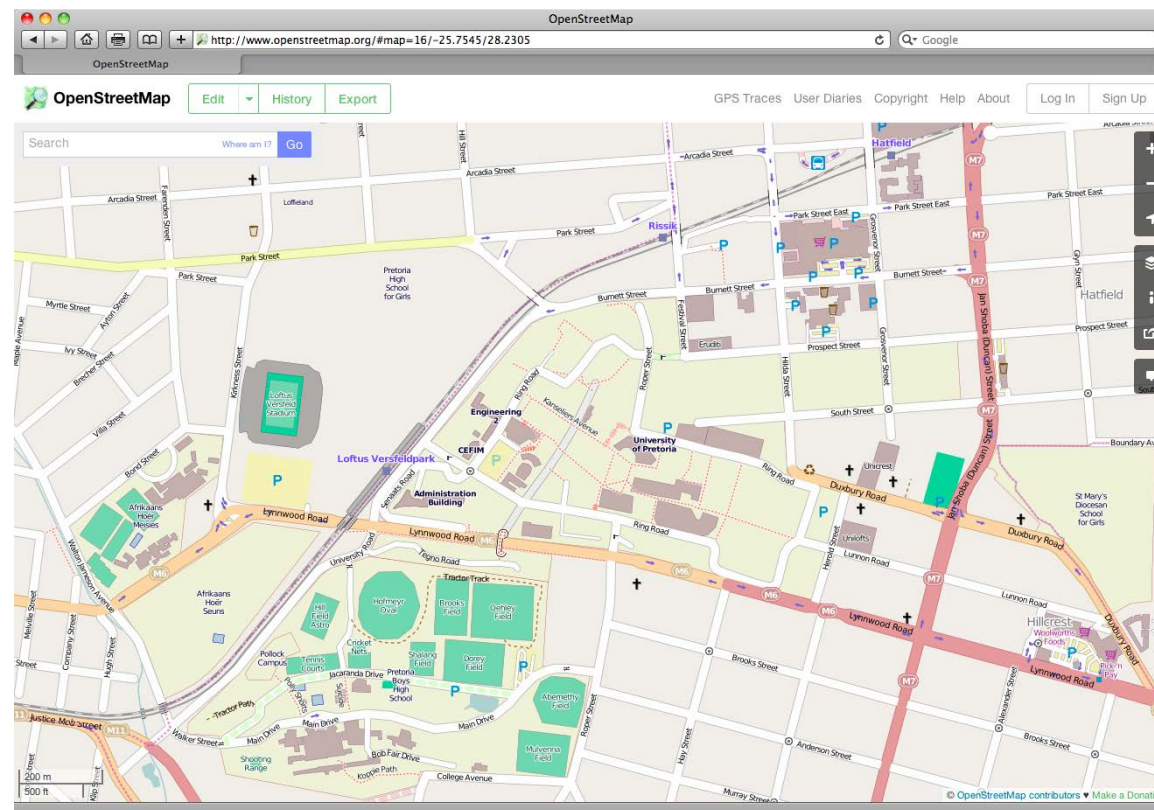


Figure 16.1 The OpenStreetMap map page.

establishment and growth of OpenStreetMap have been restrictions on the use or availability of geospatial information across much of the world and the advent of inexpensive portable satellite navigation devices.

Created by Steve Coast in the UK in 2004, it was inspired by the success of Wikipedia and preponderance of proprietary map data in the UK and elsewhere. Since then, OpenStreetMap has grown to over one million registered users who can contribute data using GPS

devices, aerial photography, and other free sources. This crowdsourced data is then made available under the Open Database License. The site is supported by the OpenStreetMap Foundation, a non-profit organization registered in England.

Rather than the map itself, the data generated by the OpenStreetMap project is considered its primary output. This data is available for use in both traditional applications, such as Craigslist, Geocaching, MapQuest

Open, JMP statistical software, and Foursquare to replace Google Maps, and more unusual roles such as replacing default data included with GPS receivers. The OpenStreetMap data has been favourably compared with proprietary data sources, though data quality varies worldwide [Source: Wikipedia].

### 16.3 Tracks4Africa

Tracks4Africa ([www.tracks4africa.org](http://www.tracks4africa.org)) started out as a hobby where like-minded people shared their GPS tracks and waypoints with each other in 2000. In the absence of any useful maps for GPS navigation in Africa, this hobby grew into a community of people sharing their travel

experiences with one another. Tracks4Africa, the company, was established in 2003 to act as the custodian of this vault of community data. Tracks4Africa also started to build a very unique map of Africa using community contributed GPS data exclusively. This map forms the basis of T4A GPS Maps and all their other products. In the year 2005 Tracks4Africa started to sell T4A GPS Maps to people outside the Tracks4Africa community of travellers who contribute to the data. The company aims to strike a balance between crowdsourced data, community driven development of their products and a sustainable commercial model [Source: Tracks4Africa website].

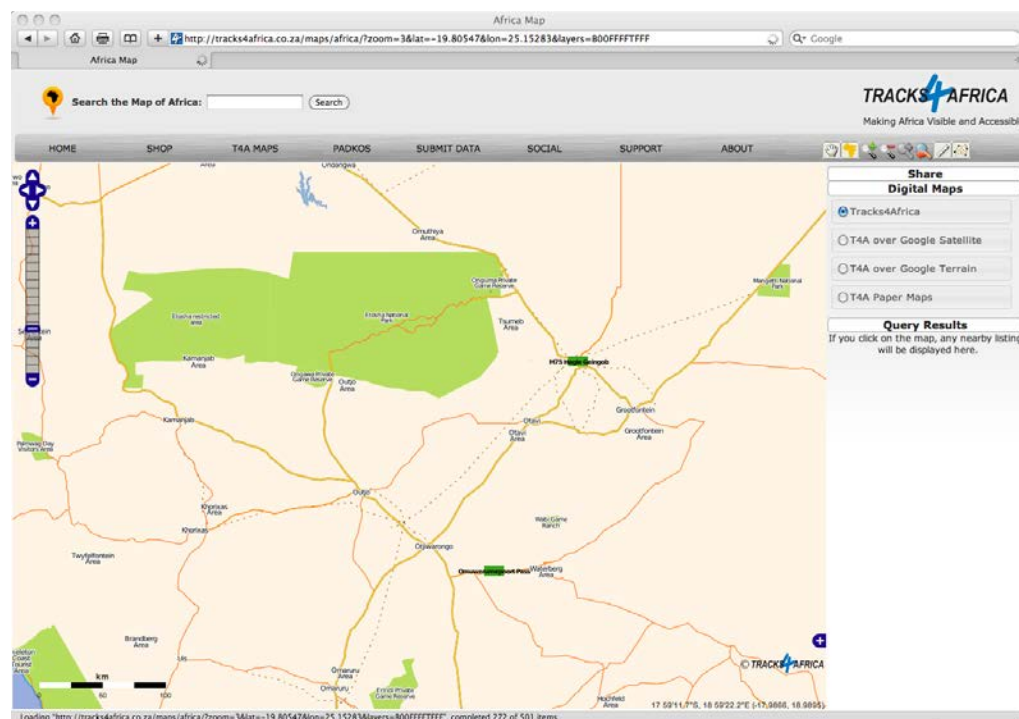


Figure 16.2 The Tracks4Africa map page.

### 16.4 The Southern African Bird Atlas Project 2

The Southern African Bird Atlas Project 2 (SABAP2) ([sabap2.adu.org.za](http://sabap2.adu.org.za)) is the follow-up on the first Southern African Bird Atlas Project (SABAP). The first atlas project took place from 1987–1991. The current project is a joint venture between the Animal Demography Unit at the University of Cape Town in South Africa, Bird Life South Africa and the South African National Biodiversity Institute (SANBI). The project aims to map the distribution and relative abundance of birds in southern Africa. The second atlas project started on 1 July, 2007 and plans to run indefinitely.

The fieldwork for this project is done by more than a thousand volunteers, known as citizen scientists—they collect the data from the field at their own cost and in their own time and as such they make a huge contribution to the conservation of birds and their habitat. The unit of data collection is the pentad, five minutes of latitude by five minutes of longitude, squares with sides of roughly 9 km. There are 17,000 pentads in the original atlas area of South Africa, Lesotho and Swaziland, and a further 10,000 in Namibia [Source: Wikipedia].

### 16.5 Wikimapia

Wikimapia ([www.wikimapia.org](http://www.wikimapia.org)) is an open-content collaborative mapping project that aims to mark and describe all geographical objects in the world. It combines an interactive web map with a geographically referenced wiki system. As of early 2013, the project's website claimed that registered users and guests have already marked over 20,000,000 objects.

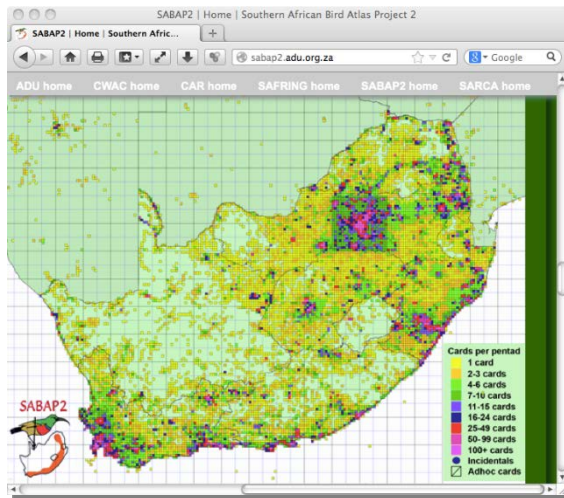


Figure 16.3 Progress map of the Southern African Bird Atlas Project.

The Wikimapia website provides a Google Maps, API-based, interactive web map that consists of a user-generated information layer on top of Google Maps satellite imagery and other resources.

The Wikimapia layer is a collection of 'objects' with polygonal features (such as outlines of buildings, lakes, etc.) and 'linear features' (such as streets, railroads, rivers, etc.). Both kinds of items may have textual descriptions and photos attached to them. Viewers can click on any marked object or street segment to see its description. Facilities are provided to highlight objects by category and to measure distances between objects.

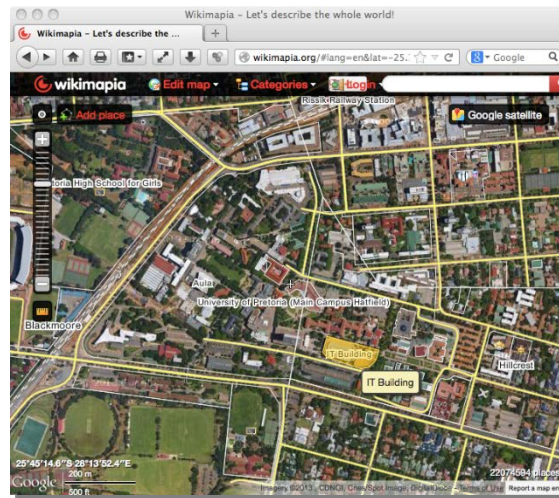


Figure 16.4 The Wikimapia map page.

Anyone can add a new item to the Wikimapia layer. Objects and linear features are supposed to be drawn onto the main window so as to match the satellite photo underneath, using a simple graphical editing tool. When an object is created the user is invited to specify its categories, add a textual description, and upload relevant photos. Only registered users can edit existing items. Editors can set up a 'watchlist' to monitor all changes that are made in one or more rectangular areas on the map.

The editor community is largely self-organized, with users communicating through an internal e-mail-like system and through a public forum. The system automatically assigns 'experience points' to editors for various editing actions, and ranks them in levels according to points earned. Higher levels have increased access to editing tools and fewer restrictions on editing activity.

Editors at the top levels may be invited to become "moderators" or "power users." As such, they receive additional editing rights, access to more map-monitoring facilities, and authority to ban users. Those power users do most of the work of managing other editors, including establishing rules and fighting vandalism [Source: Wikipedia].

## 16.6 Familiarizing yourself with OpenStreetMap

The tasks described in this section will assist you in familiarizing yourself in OpenStreetMap (i.e., how to search for places, how to move around on the map window and how to share maps from OpenStreetMap with friends).



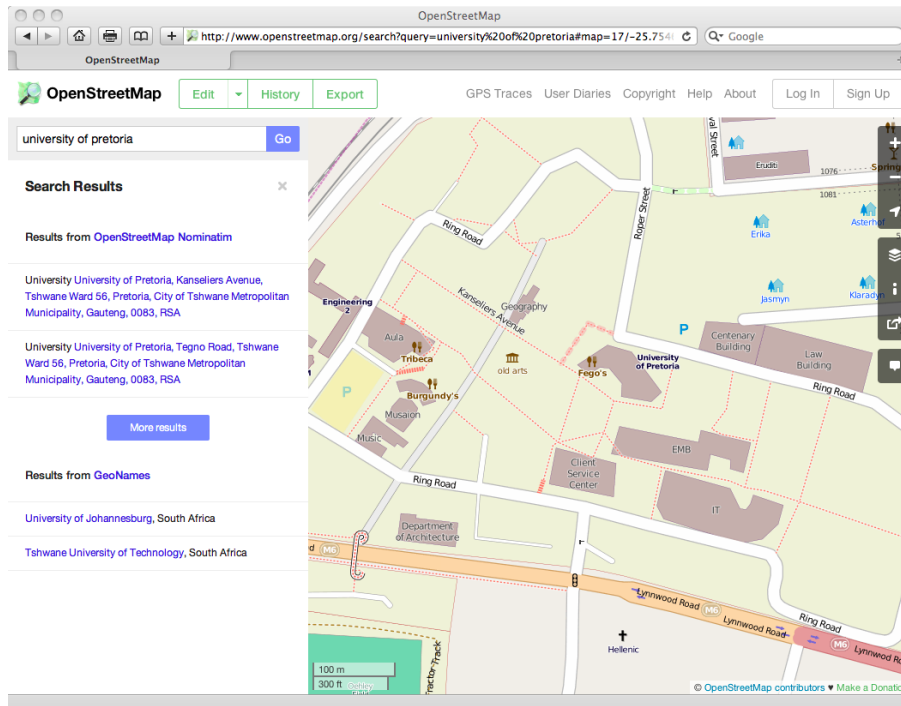


Figure 16.5. Searching for the University of Pretoria (Task 1).

**Task 1:** Go to the OpenStreetMap page at [www.openstreetmap.org](http://www.openstreetmap.org) and search for the 'University of Pretoria.' Click on the relevant item in Search Results sidebar to position the map around the university. Close the 'Search Results' sidebar when you are done.

The map is navigable with a mouse like any other online map. One can pan or drag the map to a desired location, zoom in and out as required, etc.

**Task 2:** Close the Search Results window by pressing the X in the top right corner. Zoom the map (use the + and - on the right menu) until the scale bar (in the left bottom corner) displays 50m.

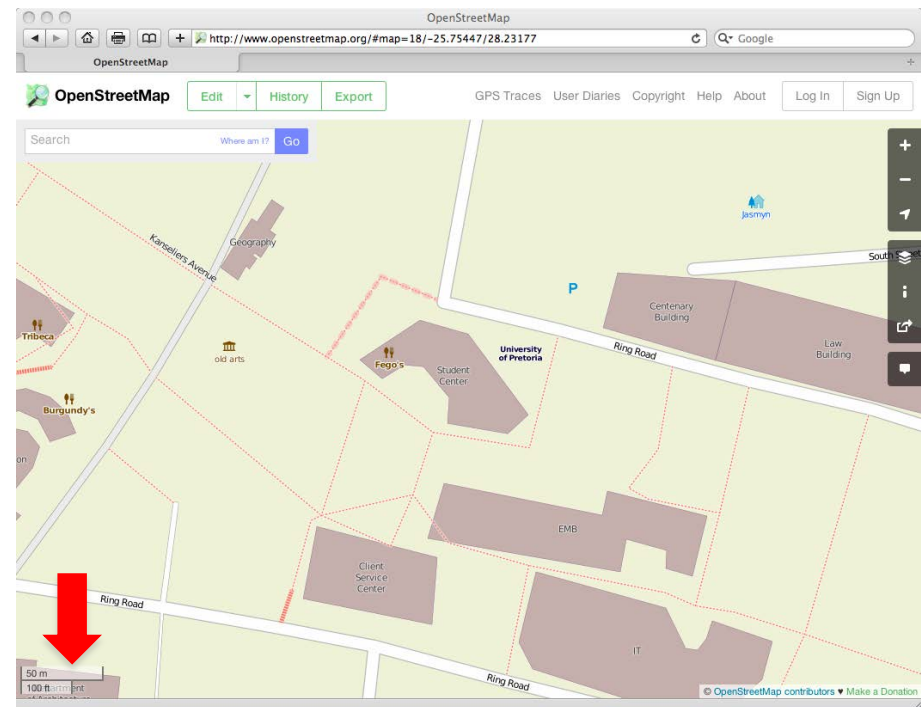


Figure 16.6. Zooming until the scale bar is 50m (Task 2).

**Task 3:** Pan the map to the West (click and hold down the mouse, dragging it right) until the Loftus Versfeld Stadium appears on the left-hand side of the map.

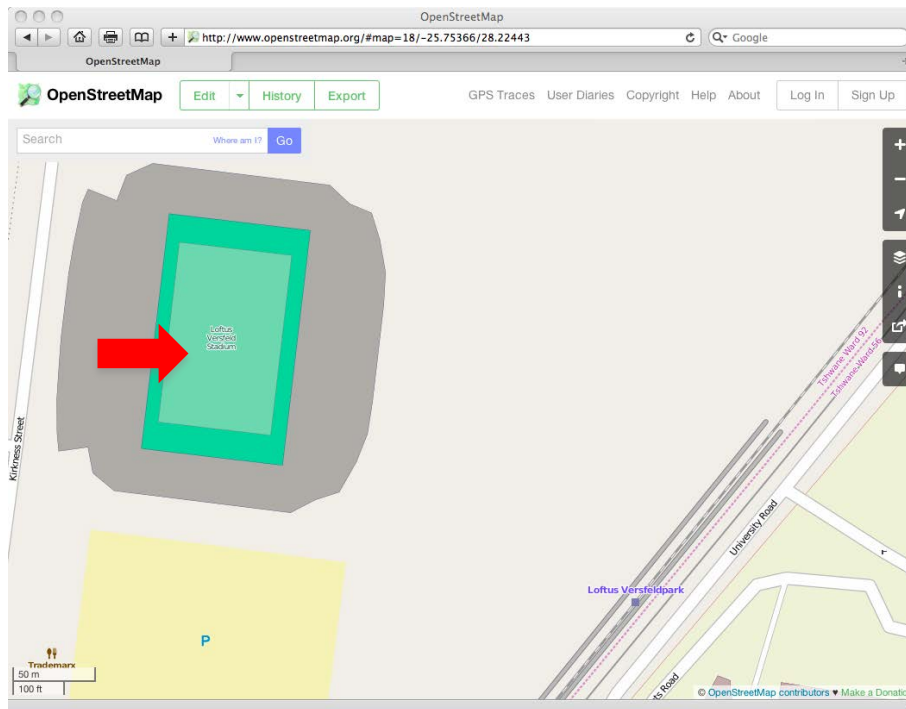


Figure 16.7. Panning to the Loftus Versfeld Stadium (Task 3).

**Task 4:** Click on the Layers icon (☰) to open the Map Layers sidebar and use the radio buttons to view the different map styles.

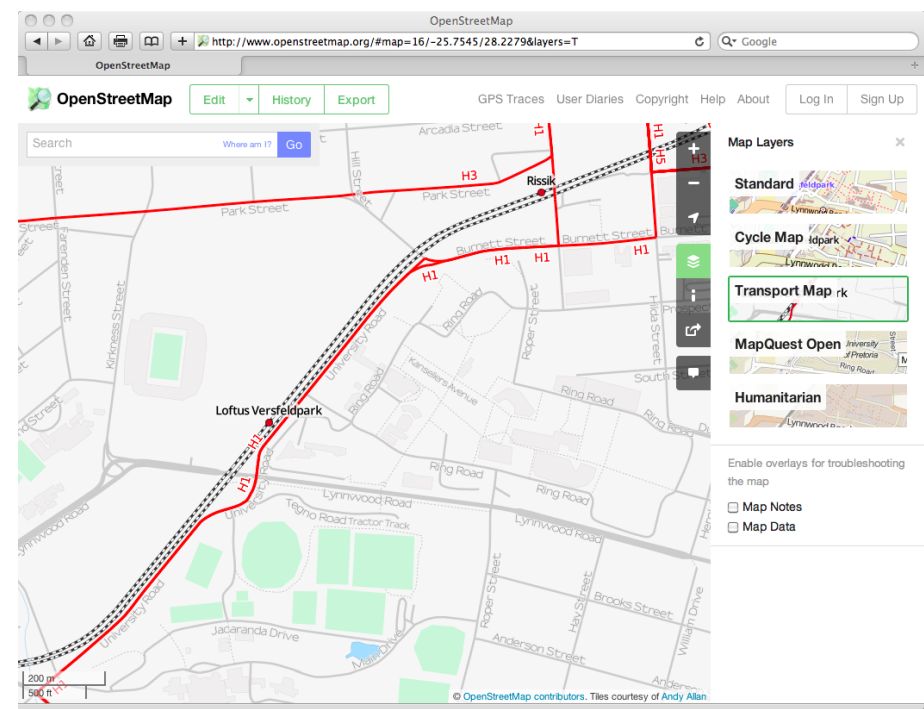



Figure 16.8. Viewing the OpenStreetMap data as a transport map (Task 4).


There are different ways to view the OpenStreetMap data on the main map page, depending on one's personal preference or purpose (e.g., hiking, cycling, or tourism). The OpenStreetMap page offers a few alternatives, including a cycling and transport map. Other websites display the OpenStreetMap data for their own specific purpose. Examples include the OpenPisteMap ([www.openpistemap.org](http://www.openpistemap.org)) showing ski pistes and lifts and a Geocaching Map ([www.geocaching.com](http://www.geocaching.com)) showing locations of geocaches.

Maps can be shared with friends and colleagues, for example, to communicate the location of a business meeting or birthday party.

**Task 5:** Click on the Share icon () to open the Share sidebar. Copy the hyperlink in the textbox below 'Link | Short Link | HTML', create a new tab in your browser, paste the text and press Enter. This displays exactly the same map as you had on the first tab. If you check 'Include marker,' a red marker is displayed on the map.

You will notice that the URL is quite long. Click on 'Short Link' to get a shorter URL that redirects to the same longer URL. You can share this map with friends or clients by sending them either the full or the shortened hyperlink in an e-mail.

Maps can also be embedded into the HTML pages of a website, for example, to show the location of a school or the venue for a sports event (See also Figure 16.11.).

**Task 6:** Click on the Share icon () to open the Share sidebar and then click on 'HTML'. Copy the HTML snippet in the textbox to the clipboard (e.g., with Ctrl-C). Use any text editor to create an HTML file and paste the text from the clipboard into the HTML file (e.g., with Ctrl-V). Enclose the text with `<html>` and `<body>` tags. See Figure 16.10. Open the HTML file in a browser (e.g., by using File > Open). Alternatively, you can double-click on the HTML file to display it in a browser. See Figure 16.11.

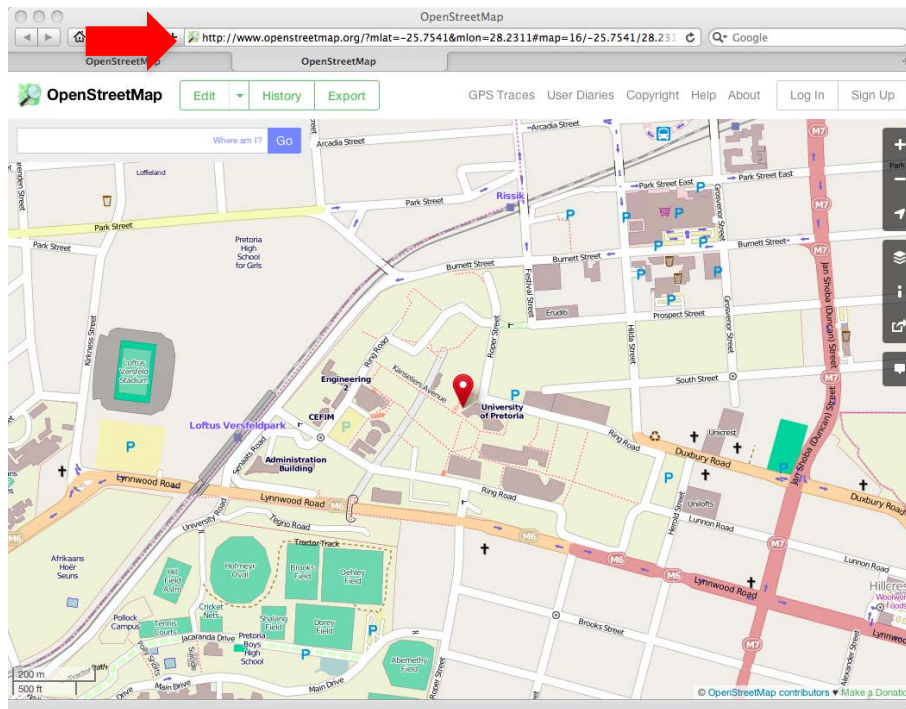


Figure 16.9. The URL for this page was copied and pasted from the Share sidebar. Note the red marker (Task 5).

```
<html><body>
This page includes the HTML snippet.<br/>
You can zoom and pan the map on this
page.<br/>
Click on 'Viewing Larger Map' to go to
the main OpenStreetMap page.
<br/>
<iframe width="425" height="350"
frameborder="0" scrolling="no"
marginheight="0" marginwidth="0"
src="http://www.openstreetmap.org/export/
embed.html?bbox=28.222439289093018%2C-
25.760590307319447%2C28.239691257476807%2
C-25.747583759633553&
layer=mapnik&marker=-
25.7540872115283%2C28.231065273284912"
style="border: 1px solid black">
</iframe>
<br/>
<small><a href="
http://www.openstreetmap.org/?mlat=-
25.7541&mlon=28.2311#map=16/-
25.7541/28.2311">View Larger Map</a>
</small>
</body></html>
```

Figure 16.10. A basic HTML page with an embedded map from OpenStreetMap (Task 6).

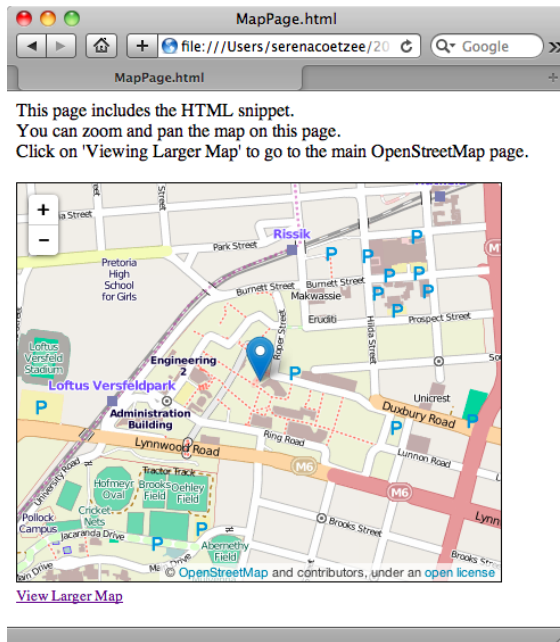


Figure 16.11. Displaying the HTML in Figure 16.6 in a browser (Task 6).

Finally, one can also download the current map image, for example, as PNG or PDF file.

**Task 7:** Click on the Share icon (🔗) to open the Share sidebar. Choose a format in the drop-down list (the default is PNG). Click on the Download button. See Figure 16.12.

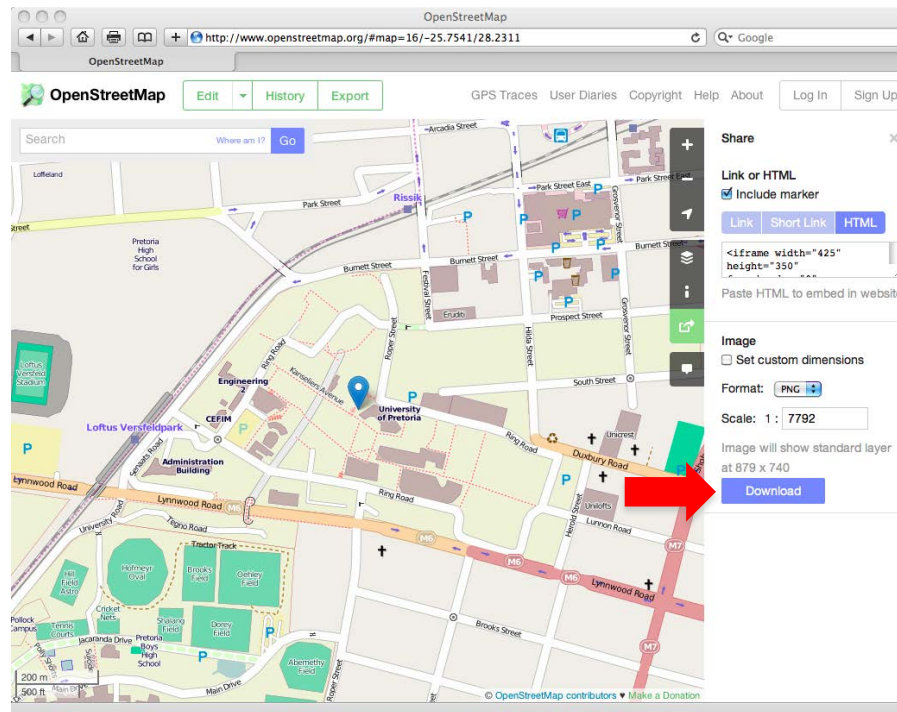


Figure 16.12. Downloading a map image (Task 7).

## 16.7 Contributing to OpenStreetMap

The OpenStreetMap data is an example of crowdsourcing: the data is being collected by more than a million contributors from all over the world. Any registered user can contribute to the OpenStreetMap data by adding individual features, as we will do in the subsequent tasks, or by offering entire datasets for importing ([wiki.openstreetmap.org/wiki/Import](http://wiki.openstreetmap.org/wiki/Import)). Some users take GPS devices on walks, drives or cycling trips to record tracks that can then be imported to OpenStreetMap. Others help out by tracing roads and features they find in satellite imagery into the map. Tutorials are available in many different languages. All

one needs is a computer connected to the Internet and time to gather the information and enter it. A GPS device and connecting cable are purely optional.

In the subsequent tasks you will add point, line and area features to OpenStreetMap.

**Task 8:** Follow the instructions in the OpenStreetMap Beginner's Guide at ([wiki.openstreetmap.org/wiki/Beginners\\_Guide\\_1.0](http://wiki.openstreetmap.org/wiki/Beginners_Guide_1.0)) to create a free OpenStreetMap user account. Zoom to an area of interest and click on the 'Edit' button to log in to the editing tool. Read through the introductory material.

You can at any time switch to the map view (by clicking on the OpenStreetMap logo) to locate a different area of



interest on the map. Once you click on the 'Edit' button, the editing map is updated to the current map view.

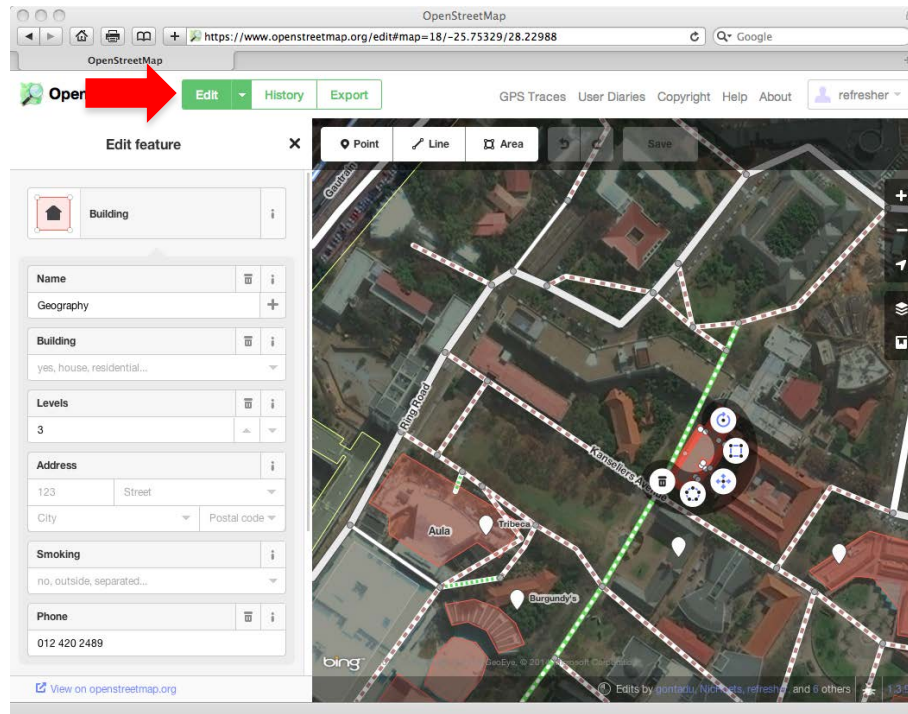




Figure 16.13. The default OpenStreetMap editing tool (Task 8).

You will now start adding data. First a point of interest, then the outline of a building and finally a footpath.

**Task 9:** Locate an area you are familiar with and where a point of interest can be added. Click on the 'Edit' button and click on 'Point' (  ) in the top menu. Click on the map where the point of interest should be added. Select the feature type (see Figure 16.14) and subsequently add the attribute information for the point of interest (see Figure 16.15). Clicking on the 'i' (  ) next to the attribute name provides a description of the attribute, if available. Additional attributes are available when clicking on the row of icons at the bottom.

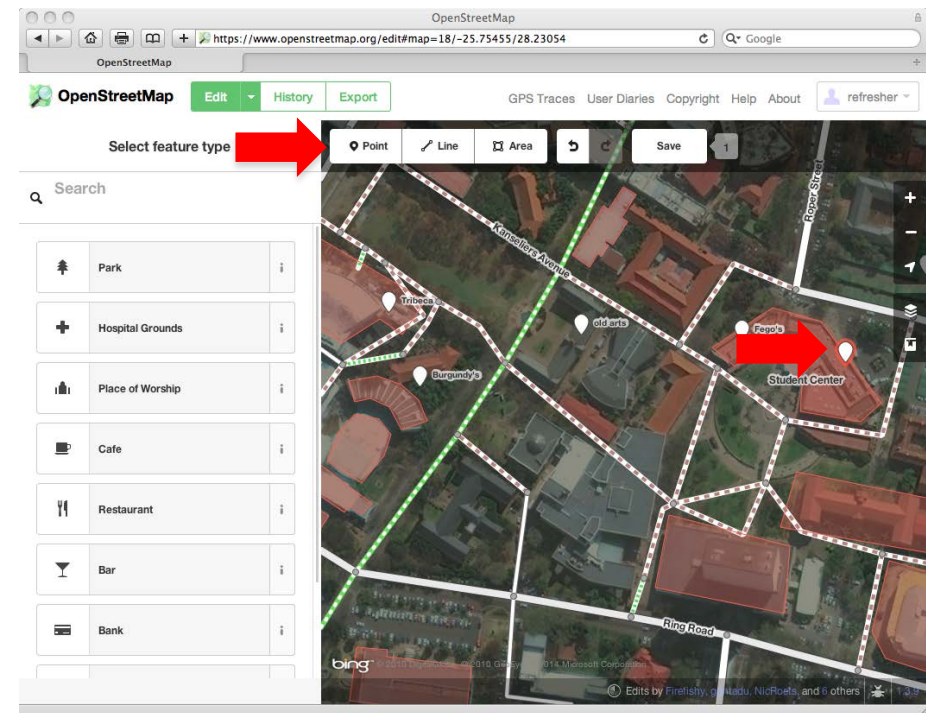


Figure 16.14. Indicating the location and selecting the feature type for a point of interest (Task 9).



Tags are used to describe a point of interest (or other feature). You can add or remove tags to describe the point of interest you are adding. For example, tags for a restaurant could be amenity, name and cuisine. By default, the values of these tags are set to the values of the attributes.

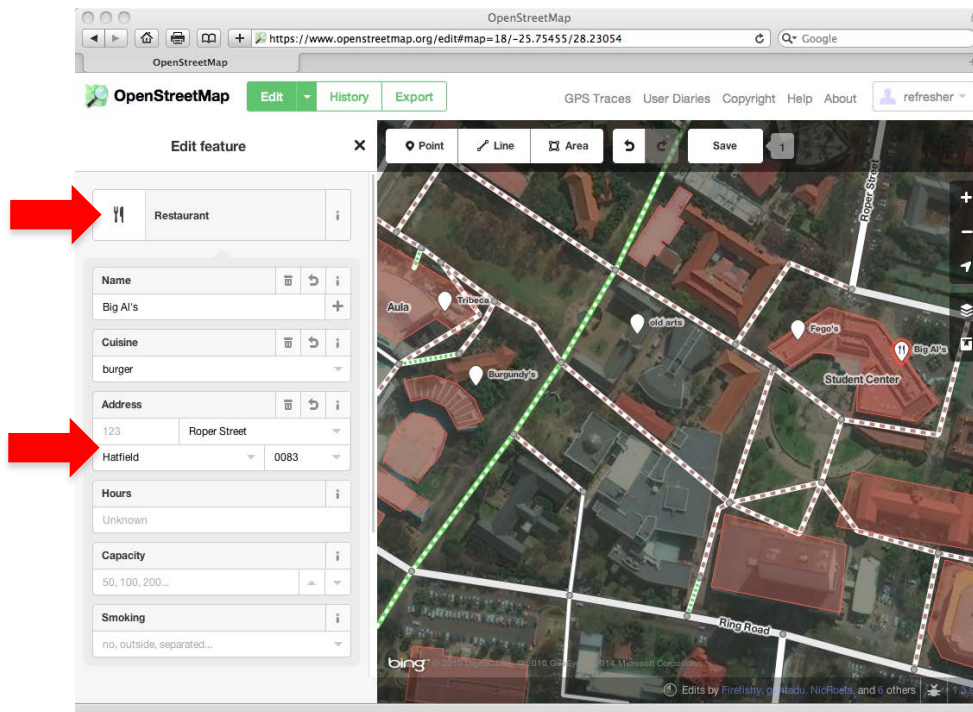


Figure 16.15. Filling in the attributes for a point of interest (Task 9).

Click 'Save' in the top menu to save the point of interest to OpenStreetMap. You have the opportunity to add a comment before confirming the point of interest by clicking the second 'Save' button. If you now switch to the map view, the point of interest is displayed in OpenStreetMap (see Figure 16.16). You may have to wait a few seconds for the updates to become visible (keep on refreshing the browser window until they are visible).

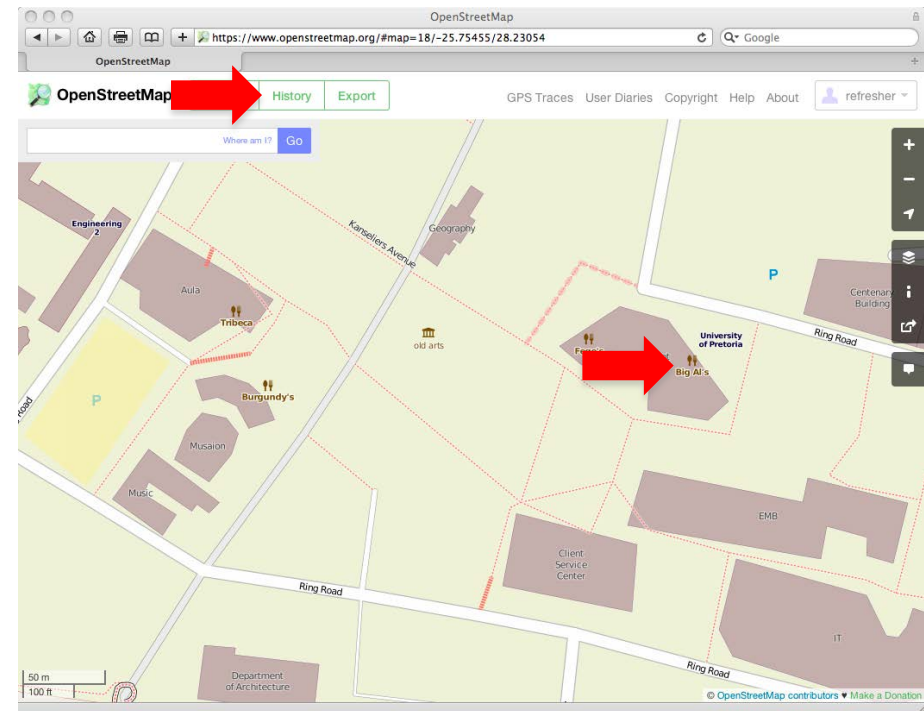


Figure 16.16. The new point of interest on OpenStreetMap (Task 9).

Click on the History button. A list of changesets is displayed. Click on the first item in the list. This displays the details of the change to OpenStreetMap (see Figure 16.17).

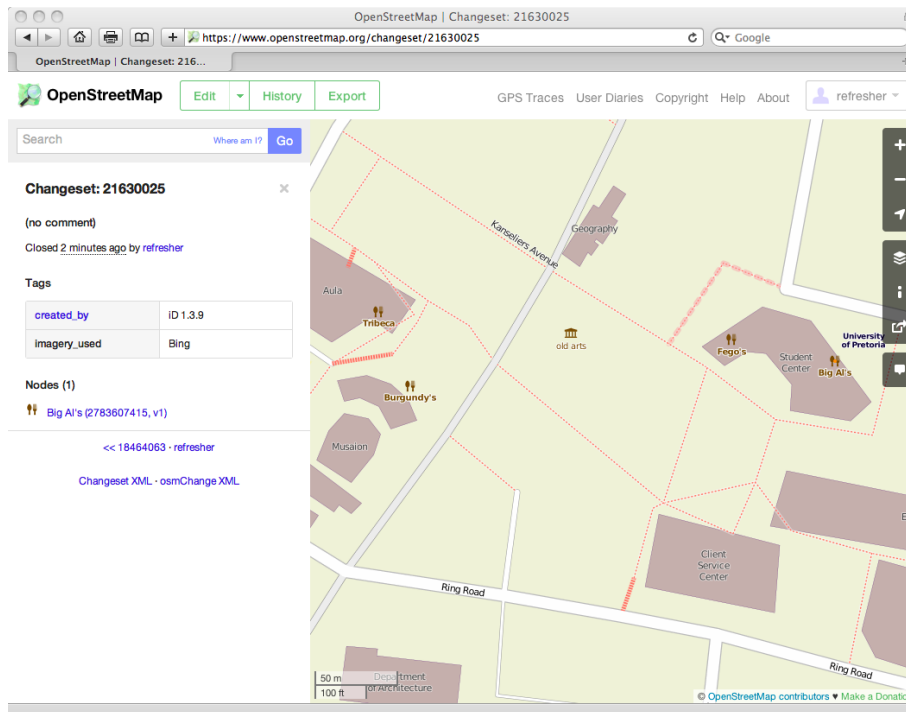


Figure 16.17. The changeset details on the History tab for the new point of interest (Task 9).

**Task 10:** Familiarize yourself with the OpenStreetMap editing tool by adding additional points of interest, by moving existing points of interest around and by modifying the attributes of an existing point of interest.

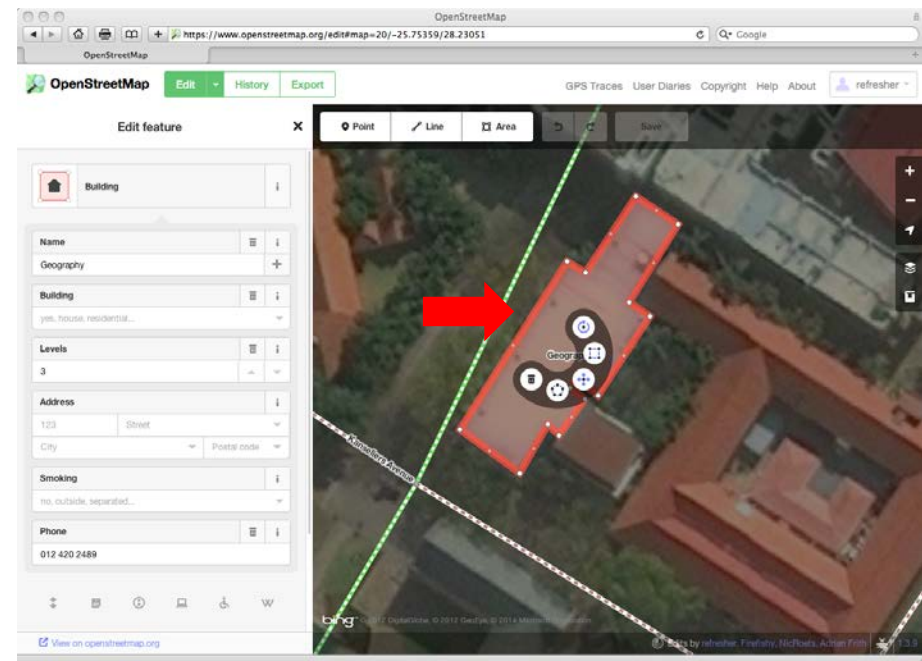


Figure 16.18. Adding an area feature (Task 11).

**Task 11:** On the map view, locate an area you are familiar with. Click on the 'Edit' button and click on 'Area' in the top menu. Indicate the boundary of the area you want to add on the map and press Escape when you are done. Follow the same procedure as Task 8 to specify the feature type and to fill in the attributes.

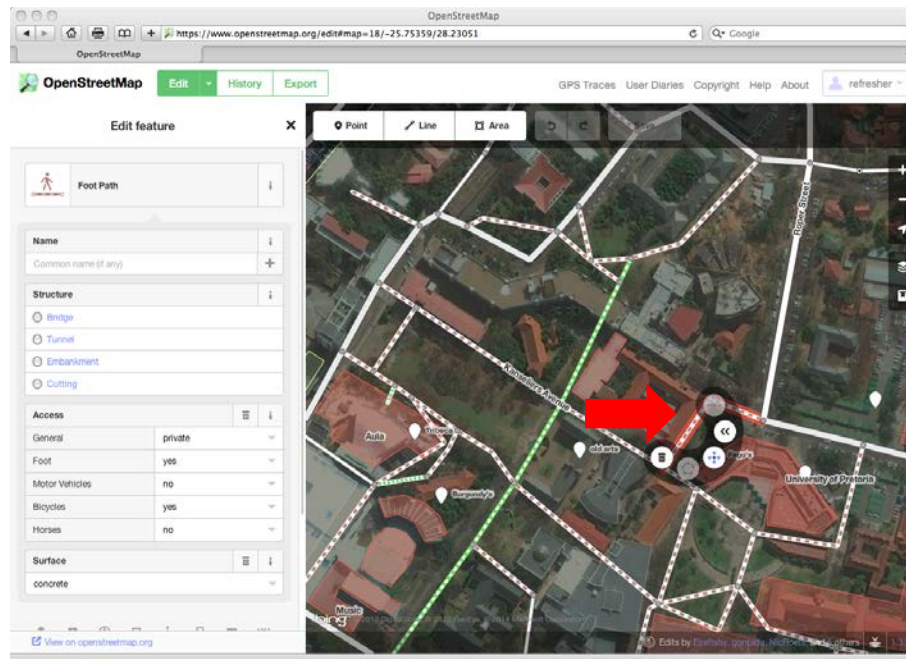


Figure 16.19. Adding a line feature (Task 12).

**Task 12:** On the map view, locate an area you are familiar with and where a line feature (e.g., a street or footpath) can be added. Click on the 'Edit' button and click on 'Line' in the top menu. Indicate the line feature on the map and press Escape when you are done. Follow the same procedure as Task 8 to specify the feature type and to fill in the attributes.

## 16.8 Conclusion

VGI and crowdsourcing are becoming an important source of geographic information, particularly for information that is difficult to collect from other sources. However, one should keep in mind that VGI contributions are not necessarily verified and quality checked in the same way as traditional mapping sources.

I would like to encourage you to contribute to OpenStreetMap in the areas where you live!

## References

Longley, P.A., M.F. Goodchild, D.J. Maguire, and D.W. Rhind, *Geographic Information Systems and Science*, Wiley: 2011.

OpenStreetMap, Beginner's Guide to OpenStreetMap, [http://wiki.openstreetmap.org/wiki/Beginners\\_guide](http://wiki.openstreetmap.org/wiki/Beginners_guide).

OpenStreetMap, [www.openstreetmap.org](http://www.openstreetmap.org).

Southern African Bird Atlas Project 2, [sabap2.adu.org.za](http://sabap2.adu.org.za).

Tracks4Africa, [www.tracks4africa.org](http://www.tracks4africa.org).

Wikimapia, [www.wikimapia.org](http://www.wikimapia.org).

Wikipedia, [www.wikipedia.org](http://www.wikipedia.org).