Humanitarian Mapping within a Student Association: PoliMappers

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Abstract

The lack of availability and accessibility of open geospatial data, especially in developing countries is addressed by various volunteer mapping associations. PoliMappers, a chapter of the YouthMappers network and a student association of Politecnico di Milano, was established with this purpose in December 2016. PoliMappers aims to contribute data to the OpenStreetMap (OSM) database by promoting the use of Free and Open Source Software (FOSS). Hence, it focuses on creating awareness on the lack of open geospatial data and on how individuals can have an impact on contributing to open geospatial databases using FOSS. The activities of PoliMappers focus on teaching and promoting the use of such geospatial technologies to run OSM-based mapathons and mapping parties.

1. Introduction

Over the last decades, the availability and accessibility of geospatial data have increased as they represent an essential asset for people, companies and governments to accomplish a number of tasks ranging across land planning and management, environmental studies, logistics and emergency response. Nevertheless, availability and accessibility of geospatial data still represent an issue for many countries and regions of the world where authoritative mapping agencies are missing or their work is prevented by adverse social, political and economic situations (Minghini et al., in press). On the other hand, even where geospatial data exist and are efficiently managed by authoritative agencies, there is often the need to rely on alternative open geospatial data sources, e.g. those resulting from crowdsourcing (Howe, 2006) or Volunteered Geographic Information (VGI) initiatives (Goodchild, 2007). In addition to comparison and integration with authoritative datasets, these geospatial data sources grant users the freedom to reuse, share and distribute them for any purpose.

Several crowdsourcing and VGI projects have been initiated over the past 15 years (See et al., 2016). Among them, the most successful and popular one is OpenStreetMap (OSM, http://www.openstreetmap.org). OSM is a community-based project enabling anyone to contribute to a free and open database of the world (https://wiki.openstreetmap.org/wiki). An impressive amount of software tools, applications and services (mainly open source) were created to handle OSM data (Mooney and Minghini, in press) and nowadays OSM's popularity

among academics has made it a new research topic (Jokar Arsanjani et al., 2015). OSM needs control and coordination among volunteer mappers to ensure its quality and adequate updates to the database. For this reason, the creation of associations or networks of OSM contributors represents a valuable strategy, as these associations ensure coordination and training of contributors and provide continuity to the project.

PoliMappers (https://polimappers.github.io), a student association of Politecnico di Milano (http://www.polimi.it/en) and a chapter of the YouthMappers network (http://www.youthmappers.org), was established in December 2016 with the purpose of bringing contribution to the OSM project through the use and promotion of Free and Open Source Software (FOSS) in the geospatial domain within the university. This involves raising awareness on the lack of availability and accessibility of open geospatial data, teaching the use of the software tools required to contribute OSM map data, and coordinating students in the use and development of these tools.

The remainder of the paper is structured as follows. Section 2 presents in more detail the motivations and objectives of PoliMappers, while Section 3 presents the main activities carried out so far. Finally, Section 4 summarizes the lessons learned after the first half year of the association and draws some conclusions on the next steps to follow.

2. Motivations and Objectives

The primary objective of PoliMappers is to promote OSM mapping at Politecnico di Milano by forming a stable and competent community of volunteer mappers. Being a chapter of the YouthMappers international network (currently the only one in Europe), PoliMappers aims to cultivate a new generation of young leaders to create resilient communities and to define their world by mapping it (Rautenbach et al., 2017).

PoliMappers' contributions to OSM primarily happen through armchair mapping, i.e. by digitizing map features (roads, buildings, land use areas, etc.) on top of satellite imagery. Most of the contributions address the high-priority tasks proposed by the Humanitarian OpenStreetMap Team (HOT, http://hotosm.org), the worldwide nonprofit organization coordinating volunteers' mapping efforts after major disasters strike anywhere in the world. Mapping tasks proposed by the Missing Maps project (http://www.missingmaps.org) are addressed as well. Missing Maps is a consortium of organizations (including HOT) committed to mapping for improving the resilience of vulnerable communities threatened by epidemics, natural disasters and/or political crises and living in areas where maps do not currently exist.

In addition to armchair group mapping sessions, also termed mapathons (literally "map marathons"), PoliMappers organizes and runs so-called mapping parties, i.e. on-the-field mapping activities where geospatial data are collected using GPS receivers and other tools such as Field Papers (http://fieldpapers.org) and then uploaded to the OSM database. Volunteered contributions in the form of georeferenced photos are also uploaded by the members of PoliMappers to Mapillary (https://www.mapillary.com), a crowdsourcing project aimed to create an open archive of street-level photos which is used as a powerful source of information for OSM.

Education and teaching stay as well at the core of PoliMappers' activities. The association is committed to introduce its members (including students without any GIS or programming background) to the main OSM-related open source tools. These include the OSM editors iD (http://wiki.openstreetmap.org/wiki/ID) and JOSM (https://josm.openstreetmap.de) to contribute data to OSM, and the desktop GIS software QGIS (http://qgis.org) to download OSM data and use them to produce maps. PoliMappers' interaction with Politecnico di Milano and other local organizations active in the domain of open source, open data and open knowledge provides its members with lots of additional opportunities to attend domain-oriented workshops, lectures, seminars and webinars.

Finally, following the successful experience of the world-record humanitarian mapathon that PoliMappers leaders organized with primary school children in 2016 (Ebrahim et al., 2016), the association is committed to establish a long-term collaboration with a number of local primary and secondary schools with the purpose of introducing OSM armchair mapping activities in the childrens' Geography course. Besides adding data to OSM, the primary objective of such mapathons is to enhance children's awareness on the existing issues derived from the lack of geospatial data in developing countries, and in turn stimulate their personal and social skills in creating maps to help affected communities.

3. Activities and Outcomes

With the motivations and objectives presented in Section 2, during the first six months since its foundation PoliMappers organized a variety of activities. The most significant ones are described in the following.

Humanitarian Mapping

Among the many humanitarian tasks joined, PoliMappers participated in three mapping campaigns for malaria eradication in Africa, organized by HOT and Missing Maps and promoted as a challenge among all YouthMappers chapters. PoliMappers was among the winners of the second campaign thanks to the amount of mapping performed by its members (http://tinyurl.com/kuqj9sr). Figure 1a shows PoliMappers involved in humanitarian mapping. Other mapping tasks promoted by HOT and joined by PoliMappers focused on Tanzania to help prevent female genital mutilation, early marriage and gender-based violence, and Malawi to introduce clinic staff and community members to Information and Communication Technologies for Development (ICT4D), while supporting their local health systems.

Field mapping at Politecnico di Milano – Leonardo Campus

On January 16, 2017 PoliMappers mapped the Leonardo Campus of Politecnico di Milano with the aim of updating and enhancing its OSM map. Field mapping was performed using Field Papers (see Figure 1b) and focused on point features such as coffee and vending machines, bathrooms, water dispensers, trash cans and fire extinguishers.

Cultural Heritage Mapping

On March 30, 2017 PoliMappers was invited at an event in the series of Maptime Milan (http://maptime.io/milan), a monthly learning environment and meeting for map nerds, geo-geeks, and spatially-oriented people in Milan (see

Figure 1c). The goal was to contribute OSM data for the cultural heritage project OD4CH - Open Data for Cultural Heritage (https://od4ch.org), developed at Politecnico di Milano, using disparate data sources such as Mapillary street-level photos and local high-resolution orthophotos. PoliMappers had also the chance of meeting other local organizations involved in the domains of open source, open data and open knowledge: GIStonic-Milano (http://www.gistonic.it) and Wikimedia Italia (http://www.wikimedia.it), the latter being the official OSM Italian chapter. More detailed information on the Maptime event is available at http://www.youthmappers.org/single-post/2017/04/12/PoliMappers-at-Maptime-Milan.

Outdoor Mapping in the mountains

On May 27, 2017 PoliMappers organized an outdoor hiking day in the mountains surrounding Lake Como (see Figure 1d). Field mapping was performed using GPS receivers and mobile OSM editors including OSMTracker for Android (http://wiki.openstreetmap.org/wiki/OSMTracker_(Android)) and MAPS.ME (http://maps.me). The walking path was also fully photographed for inclusion in Mapillary. This activity did not just create a stronger bond between the members of the association, but also enhanced the OSM map and the open georeferenced data available for the surveyed areas.
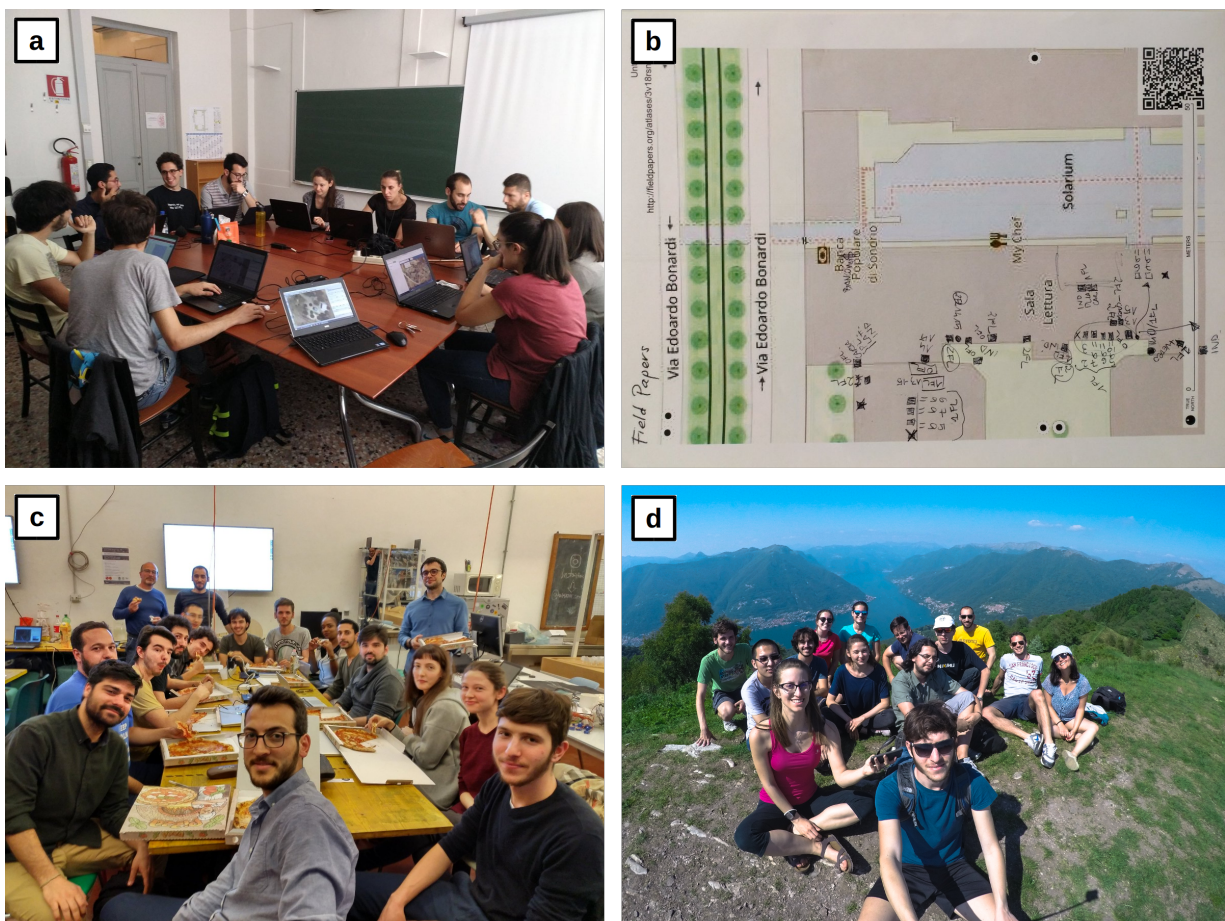

Figure 1: PoliMappers activities: (a) students committed in humanitarian armchair mapping; (b) a Field Paper used to map the Leonardo Campus of Politecnico di Milano; (c) cultural heritage mapping at Maptime Milan; and (d) outdoor mapping in the mountains over Lake Como.

Aggregated data on PoliMappers activities are presented in Figure 2 and Figure 3. The former shows the distribution of OSM changesets made by PoliMappers members over the world countries. Clearly, most of the edits happened in Italy as a result of field mapping and in African countries (especially in Zimbabwe, Zambia, Tanzania and Malawi) as a result of humanitarian armchair mapping. For each mapping activity, one or more hashtags were included by PoliMappers members in the comments to their OSM changesets to be able to quantify the overall mapping. Figure 3 shows the most occurring hashtags in the comments of PoliMappers changesets. The most used tag is #polimappers, which is the general hashtag identifying any OSM edit made by the association's members.
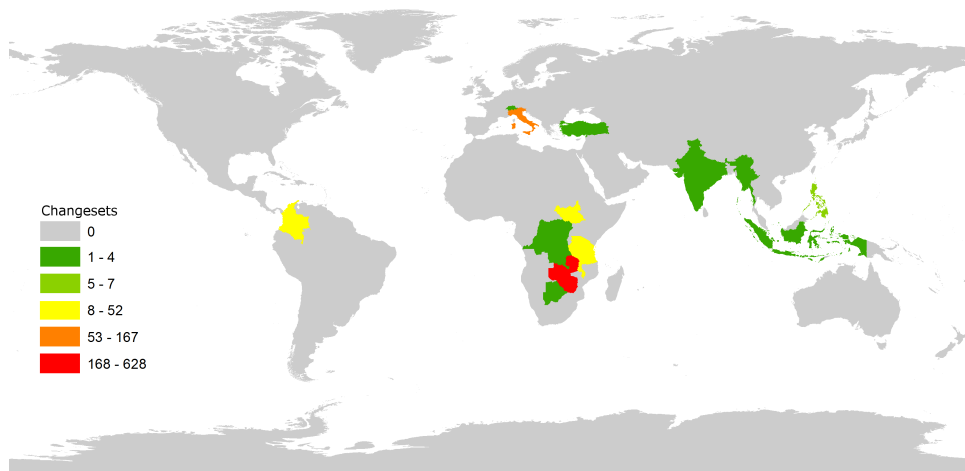

Figure 2: World countries distribution of the number of OSM changesets made by PoliMappers members. Data © OpenStreetMap contributors.
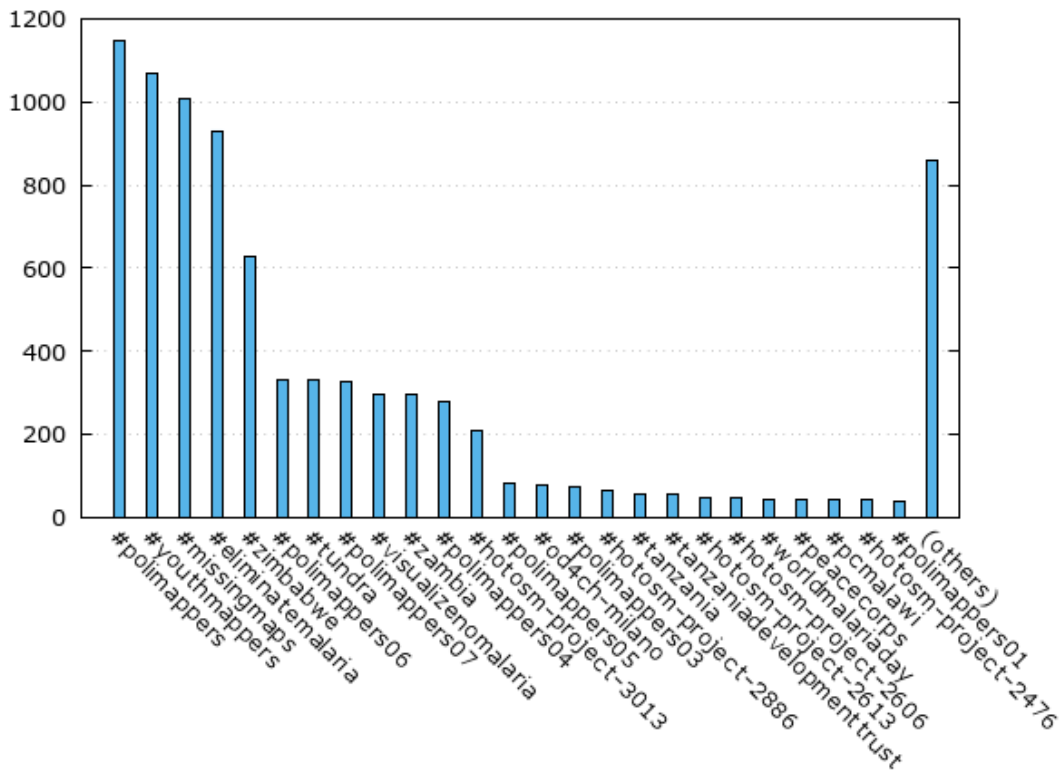

Figure 3: Occurrence of changesets included in the OSM comments by PoliMappers members.

Lessons learned and conclusions

The increasing importance of accurate and up-to-date geospatial information for a variety of societal needs requires young generations to acquire the skills needed to optimally produce, use and manage it. Based on the principles of open data, open source and more in general open knowledge, PoliMappers has acquired an increasing interest and participation from students having different background, knowledge and experience. The desire to learn new things and to experience new approaches, the focus on teamwork, the disparate activities that have been performed and the collaboration with other organizations have been all crucial factors for the success and growth of PoliMappers. Thanks to the guidance from the senior members and the faculty advisors as well as the group activities performed in a friendly, collaborative and open environment, many students without previous experience in OSM have become active OSM contributors and, most importantly, had the opportunity to discover the different aspects and benefits of contributing to community projects.

Future activities are aimed to increase the number of students involved in the association and expand the collaborations with other organizations. Thanks to the contacts with other chapters of YouthMappers, especially in Uganda, Ghana and US, there are currently plans to organize shared events like webinars and mapathons. On-the-field mapping parties will also be repeated in order to keep the OSM map of Politecnico di Milano as up-to-date as possible and to engage PoliMappers members in outdoor activities. In this regard, some contacts were established with administrations and other associations that need geospatial data in order to start new collaborations.

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