Using the OpenStreetMap database to improve an object-based classification process. Application to a landcover product on small islands in the Indian Ocean

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To cite this version:

Christophe Révillion, Vincent Herbreteau. Using the OpenStreetMap database to improve an object-based classification process. Application to a landcover product on small islands in the Indian Ocean. GEOBIA 2018 - From pixels to ecosystems and global sustainability, Jun 2018, Montpellier, France.
hal-01957270

HAL Id: hal-01957270
https://hal.univ-reunion.fr/hal-01957270
Submitted on 2 Apr 2019
The southwest of the Indian Ocean comprises numerous islands of less than 3000 sq. km, including the Comoros Archipelago, the Seychelles Archipelago, the Mascarene Archipelago (La Réunion, Mauritius and Rodrigues). These small island territories have very fragmented and diversified environments. Land cover and land-use mapping of such environments requires satellite images with high spatial resolution. Unfortunately, the land use products available so far were often at low resolutions (usually from 4 kilometers to 250 meters). That’s why we realized a homogeneous high-resolution land cover mapping of these small islands by analysing SPOT 5 satellite images.

To improve the results of this classification, we used some data from the free and participative OpenStreetMap (OSM) database as training data. Created in 2004 and often described as the “Wikipedia of Cartography”, OSM is a collective project whose multiple collaborative environments aim to feed a shared, freely editable and reusable global cartographic database. The OSM community now consists of more than 4.5 million registered members united around a single focus of interest: “freely mapping the world”.

Data mapping in OSM can be done in various ways, including: 1) photo-interpretation of satellite images made available on the OSM website (https://www.openstreetmap.org), 2) massive integration of free vector data (this is the case of cadastral data in some countries), 3) data recording directly on site using smartphones or tablets. In all cases, this requires the creation of an identifier for tracking editions.

OSM data can be easily queried using their keys and values (for example, downloading primary roads on the extent of an island). This tool can be directly accessed in the QGIS software using the QuickOSM plugin, which greatly facilitates its use (Herbreteau et al., 2018).

Our objective was to provide an easily accessible land use / land cover product with a common typology to allow comparative studies on several islands. Using OSM data, this study also aims to propose a methodology that can be reused in other territories.

We classified the land cover / land use of these tropical islands into 12 major classes. Helped by a good knowledge of the field and the use of OSM data, the classification reached a good general accuracy with a kappa of 0.85.

This high resolution land cover is available on a web portal (http://homisland.seas-oi.org) to ensure a wide distribution to researchers and thematists using land cover information.

The integration of participatory approach data into satellite image classification processes is an opportunity to improve the quality of remote sensing products that often lack in situ data. It also raises many methodological questions and involves taking a critical look at this data to make the best use of it. In our study, these reflexes are at a preliminary stage.

For the use of OSM data some elements have to be taken into account:
- It is necessary to check the completeness of the data used, which sometimes involves spending time editing on the online database
- Make sure that the satellite background used for OSM editing is a data close to the date of the image you want to classify
- By using OSM data for this work, we helped to assess the quality of this data and improve its accuracy and completeness. This mapping work (preliminary to the classification) will therefore be free and available to any other user via the OSM database.

More globally in a period where new field of study for automated remote sensing image classification opens with mathematical approaches such as deep learning or data harvesting, the OSM participatory database can have a great contribution to these fields of study.

Acknowledgements

The authors would like to thank:
- The SEAS-OI platform for the distribution of SPOT5 images
- The 3Li (3Li.com) company for its remarkable free and opensource webmapping tool, iLmap for QGIS and the very useful plugin in QGIS, QuickOSM
- OSM contributors and especially those at La Réunion who contributed to this mapping

Funding
- LeptOI project (FEDER POCT 31569)
- ISIE-Mayotte (French Ministry of Outremer, MOM 2012)
- TROI project (FEDER InterReg V)

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