Earth Observation Tools for Risk Exposure monitoring: welcoming Sentinel-2 data in Risk Assessment applications

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Vulnerability Seismic Risk Change detection

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Introduction

In the framework of different FP7 projects (SENSUM [1], RASOR [2] and MARSITE [3]), a set of open-source tools [4] [5] has been developed with the aim to monitor exposure in risk assessment. Proxy extraction algorithms were designed to process medium resolution Landsat imagery, looking for the extension and the expansion in time of urban areas [6] [7], while very high-resolution optical imagery was used to zoom into detected urban areas and extend the analysis to single-building level. The code is currently distributed open source on GitHub [8] and as official QGIS plugins [9].

plugins.qgis.org/sensum_eo_tools

ldt.unipv.it/sensum-docs/

github.com/SENSUM-project/ sensum_rs_qgis

Medium Resolution - Earth Observation Tools

Medium Resolution satellites (LANDSAT) → Stack Satellite algorithm → Unsupervised change detection algorithm

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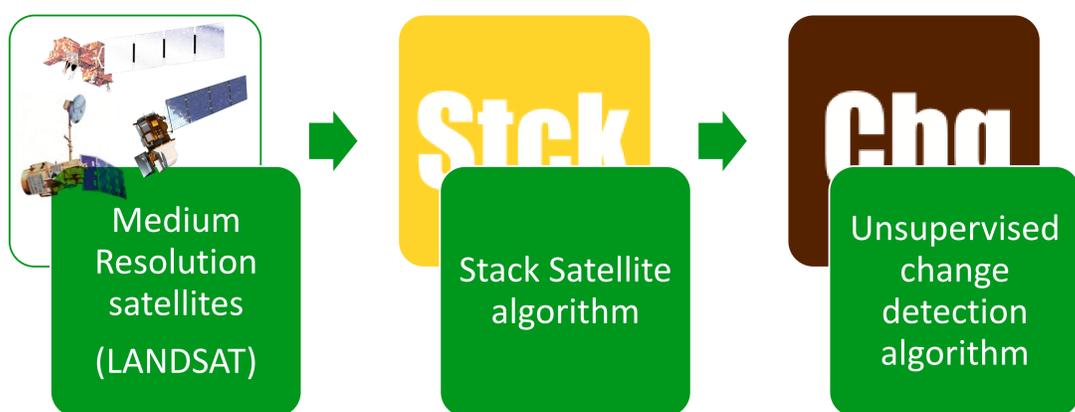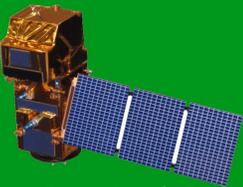
Sentinel-2

The similarity of both spectral and geometric resolutions between Landsat and Sentinel-2 satellites gave the chance to adapt the original methods with minor modifications.

Built-Up area extraction from Landsat imagery

Istanbul 2011

Built-Up area extraction from Sentinel-2

Istanbul 2016

The algorithm automatically recognizes and adapts to the different input types: Landsat 5/7, Landsat 8 or Sentinel-2.
A complementary source of information is the SRTM DEM used by the algorithm to mask out the steeper areas and reduce the errors in the extraction.
The outcome of the hybrid procedures (Dissimilarity- and PCA-based) can be processed by the Unsupervised Change Detection algorithm, being unaware of the image source.

The Stack Satellite algorithm is also available as ESA G-POD service, taking advantage of the grid processing architecture and direct connection with Sentinel-2 and Landsat repositories.

Combination of the built-up extraction from different years

Istanbul 1984-2011

g-pod
grid processing on demand

References

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[8] SENSUM GitHub repository, available online at: https://github.com/SENSUM-project/sensum_rs_qgis
[9] SENSUM QGIS plugin, available online at: https://plugins.qgis.org/plugins/sensum_eo_tools/

http://www.sensum-project.eu/   MARsite http://marsite.eu/   RASOR http://www.rasor-project.eu/   GPLv3 Free Software — Free as in Freedom