

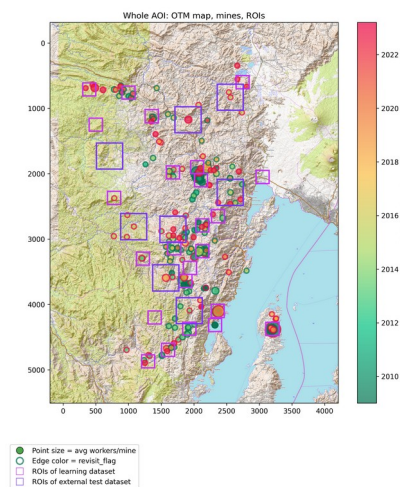
Change classification from SAR imagery and Machine Learning techniques

Description

Change detection and classification techniques based on imagery analysis have applications in many different areas including in the socio-ecological domain of detection and monitoring of human activities as deforestation and buildings constructions or the study of soil quality for agricultural purposes. The increasing number of Synthetic Aperture Radar (SAR) satellites observing the earth on a regular basis provides image time series that can be used to detect and classify changes. The manual analysis of SAR images for this purpose is a tedious task. However, the progress in Artificial Intelligence (AI) and in particular, in Machine Learning (ML), offers fast ways to perform change detection and classification.

The “Signal Processing” lab of the Centre Spatial de Liège (CSL) has a long expertise in SAR imagery and has studied for a few years the exploitation of SAR imagery by ML techniques for diverse applications as detection of land changes. Currently, this lab is contributing to a research project targeted a specific application with an ongoing initiative aimed at detecting spatio-temporal environmental changes induced by mining activities in the Democratic Republic of Congo (DRC). For this work, with the help of two master students, a dataset made of SAR images times series selected from a spatio-temporal Area Of Interest (AOI) covering numerous mining sites in the Kivu Lake region of DRC has been created and a self-supervised ML methodology of change detection from SAR imagery has been developed. These developments allowed to produce an inventory of changes in the selected AOI. In addition, a labeling work will soon be done to provide for the same AOI labeled SAR data with labels indicating different types of changes among which the ones to be identified, that is the ones induced by mining activities.

In this context, this lab is looking for a motivated master student to develop an supervised ML methodology in order to classify the changes of the created inventory with the use of the labeled SAR data. The student will be responsible for making a literature survey to propose a theoretical approach of classification of changes (with special attention to Deep Learning classifiers based on a CNN architecture, in particular the popular ML object detection algorithms as YOLO and Mask-RCNN) and developing it. The outcomes of the internship / master thesis are expected to contribute to the field of automatized detection and classification of changes from SAR imagery.



Supervision

The internship / master thesis will be carried out under the supervision of Murielle Kirkove from the “Signal Processing” lab). Regular meetings (every week or every two weeks) will be organized during the year.

Recommended skills/courses

- Remote sensing
- Machine learning (Deep Learning)
- Programming (principles, algorithmic, Python language)

Contact person

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