

# Deep learning for multi-modal satellite remote sensing

Open position - 9 month contract

March 8, 2022

## About CESBIO

Research at CESBIO aims to develop knowledge on continental biosphere dynamics and functioning at various temporal and spatial scales and as such participates in the specification of space missions and the processing of remotely sensed data. CESBIO is or has been PI for 2 ESA satellite missions (SMOS, the Soil Moisture and Ocean Salinity satellite, and BIOMASS, a P-band SAR system to be launched in 2022) and for the French-Israeli Venus satellite (2-day revisit, 10 m resolution, optical sensor for vegetation monitoring, launched in 2017). CESBIO has developed the [iota2](#) processing chain for the operational production of land-cover maps at the national French scale. It has therefore a strong experience in upscaling learning and classification processes. CESBIO has been committed over the last 4 years in collecting feedback, tailoring [iota2](#) outputs for various end-users, and disseminating it for several research institutes in France.

## Context

The [MAESTRIA](#) project (Multi-modal Earth obServation Image Analysis) aims to solve the methodological challenges related to the fully automatic analysis of the massive amount of images acquired by Earth Observation platforms. MAESTRIA targets to generate land-cover and land-use descriptions at country scale at many spatial resolutions and sets of classes. The ultimate goal is to provide a continuum of spatially and semantically consistent products, that are relevant for many end-users and applications. Both public policies at local or national levels and scientific models will benefit from such kinds of products for climate modelling, urban planning, crop monitoring or impact assessment of surface changes.

The output of the MAESTRIA project will be two-fold: (i) methods that leverage current challenges in Earth Observation image analysis; (ii) a large range of precise and up-to-date land-cover maps available over very large scales from 2m to 100m. Both will be made freely available so as to stimulate research and commercial services built upon such maps.

The current position integrates in and is funded by the MAESTRIA project.

## Assignment

The work is dedicated to the fusion of heterogeneous information coming from different satellite sensors in order to improve the accuracy and semantic richness of the produced land cover maps.

In MAESTRIA, a new *pivotal* representation of the multi-modal data is being developed in order to minimize the loss of information with respect to the original data: **a set of common variables to all modalities sampled at 10m resolution and daily revisit**. Two main approaches will be developed in parallel: one based on (1) **physical approaches** (models of the landscapes and the measuring mechanisms) and the other one based on purely (2) **statistical approaches**. We pay special attention to the possibility of cross-pollination of the two approaches.

The specific tasks of the job cover the implementation and the evaluation of representation learning algorithms (deep learning networks). The work will be done under the supervision of the MAESTRIA researchers.

## Skills

- Master's or PhD in Applied Mathematics, Computer Science or Machine Learning
- Good programming skills in Python, knowledge of Pytorch will be highly appreciated

## Application procedure

Candidates should send an e-mail to [jordi.inglada@cesbio.eu](mailto:jordi.inglada@cesbio.eu) containing:

1. Full CV
2. Letter of interest
3. Contact information for 2 references

## Remuneration and duration

The gross monthly salary will be between 1800 € and 2200 € depending on the experience. The contract may be reconducted up to 24 months in the frame of another project.