6-month research engineer position
IGN - Laboratoire MATIS

Land cover classification in Urban Areas using multi- and hyperspectral imagery

Context

The MATIS lab of the French National Institute of Geographic and Forestry Information (IGN) has been carried out for many years research in land-cover classification and change detection from various sources of remote sensing data (airborne and satellite optical images, 3D lidar point clouds...), both in urban and natural environments.

Urban environments are characterized by a strong heterogeneity in shape, size, materials and uses as well as a high biodiversity… Very high spatial resolution remote sensing data becomes a useful tool to monitor them. Indeed, it is essential for its fast and accurate understanding and its ability to cope with the large size and highly variable temporal evolution of urban areas. Among the existing techniques, hyperspectral imagery, which acquires information in more than 100 spectral bands with a high spectral resolution (typically 10 nm) is a promising data source for land-cover characterization and evolution analysis.

The **HYEP project** (funded by the French National Research Agency - ANR) aims at developing on-purpose methods for processing multi- and hyperspectral images at various spatial resolutions for urban area monitoring (both land-cover semantization and change detection). Four application cases are targeted, namely impervious surface estimation, urban vegetation mapping, building roof characterization, and urban wetlands.

Subject

In relation with the other project partners, the most relevant land-cover classification techniques will be selected and adapted to the HYEP context, i.e., driven by the application cases and the spatial resolution of the input images (1 → 15 m). It is intended to study how the underlying classification processes can benefit from the joint use of low or medium spatial resolution hyperspectral images and (very) high spatial resolution multi-spectral images. Indeed, spectral information brought by usual very high spatial resolution multispectral sensors is generally not sufficient to be able to correctly deal with a fine characterization of urban environment. On the opposite, hyperspectral sensors bring very rich spectral information while they have a lower spatial resolution.

A first fusion scheme has already been proposed. It has now to be tested on much data. Work has also to be done to evaluate and improve its robustness when data are inconsistent (e.g. diachronic images).

For that purpose, airborne data acquired by IGN and ONERA from 2012 to 2015 over the city of

Toulouse (France) will be used, as well as images simulated by ONERA from this data and corresponding to existing and forthcoming spaceborne sensors.

Skills

The candidate should have strong knowledge in remote sensing, image processing or computer vision.

- Good spoken and written English. Knowledge of French would be useful.
- Good knowledge of programming language (C++/Python) is mandatory.

Organization

- **Deadline for applications : 1 February 2016.**
- **Duration:** 6 months starting Feb/March 2016.
- **Location and salary** : MATIS lab. of IGN in Saint-Mandé (94), Paris, France. The wages are 31-33,000€/year for a junior engineer (before taxes).
- Applications must include:
  - a detailed CV with a description of realized projects + publications ;
  - a motivation letter ;
  - and must be sent to the contacts in a **single PDF-format**.

Contact

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