MSc Internship position

Change Detection in Multi-temporal Remote Sensing Imagery Using Statistical and Deep Learning Approaches

For more information or to apply, please contact:

Josiane ZERUBIA (Inria and Université Côte d'Azur)
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Application:

Please email a full application to both Zoltan Kato and Josiane Zerubia, indicating "MSc Internship" in the e-mail subject line. The application should contain:

- CV including publication list
- publications in pdf (if any)
- minimum 2 reference letters
- motivation letter demonstrating academic strengths and related experience to this position (in particular, mention your competences wrt stochastic modeling, deep learning, computer vision, remote sensing).

Abstract:

Change detection aims to identify semantic land cover variations between a pair of registered remote sensing images of the same geographical location obtained at two distinct time. It is the core problem of a wide range of applications, such as land use or land cover change, irrigated land change, urban growth, forest and vegetation dynamics, natural disaster monitoring, etc. Automatic change detection methods are either supervised or unsupervised. Supervised approaches (e.g. neural networks, support vector machine, post-classification comparison) need training data to learn knowledge about the territory under investigation while unsupervised methods work directly on the first image of the multi-temporal data set to acquire change data (e.g. image differencing, change vector analysis or principal component analysis).

Considering the lack of labeled training datasets for supervised change detection, alternative techniques, based on much larger remote sensing semantic segmentation data sets, such as transfer learning, or active learning became popular recently. To address the problems raised

by these difficulties, this Master internship intends to develop a novel, *minimally supervised* multi-temporal remote sensing change detection method using statistical models and deep neural networks to automatically learn features to achieve high quality change detection using a minimal set of annotations. Furthermore, making use of the available semantic segmentation datasets, we plan to focus not only on the change detection and on the analysis of quality of the detection, but also on separating and recognizing various types of changes.

The proposed approach will be tested and validated on various semantic classification and change detection data sets. The Master intern will look in particular at the data sets provided during the various IEEE GRSS data fusion challenges (see http://dase.grss-ieee.org/), as well as at the publicly available Inria data base (see https://project.inria.fr/aerialimagelabeling/) for semantic classification, and finally at both Onera change detection data set (see https://rcdaudt.github.io/oscd/) and SZTAKI AirChange Benchmark set (see http://web.eee.sztaki.hu/remotesensing/airchange_benchmark.html).

Candidate profile:

We encourage applications from outstanding candidates with strong academic backgrounds in Stochastic Modeling, Deep Learning, Computer Vision, and/or Remote Sensing.

At SZTE, Inria, and UCA, we seek to increase the number of women in areas where they are under-represented and therefore explicitly encourage women to apply. Furthermore, we are committed to increasing the number of individuals with disabilities in our workforce and therefore encourage applications from such qualified individuals.

Indemnity:

Master internship indemnity (this is not a salary, no taxes):

- 550 EUR per month if Master internship in France (located at Inria-SAM on the French Riviera) with one month stay in Hungary, or
- 100.000 HUF (around 300 EUR) per month if Master internship in Hungary (located at Szeged in the center of the Carpathian Basin) with one month stay in France.

FYI the trip and stay of one month in the partner country will be funded independently of the internship indemnity.

Duration:

5 or 6 months

Starting date:

March or April 2020