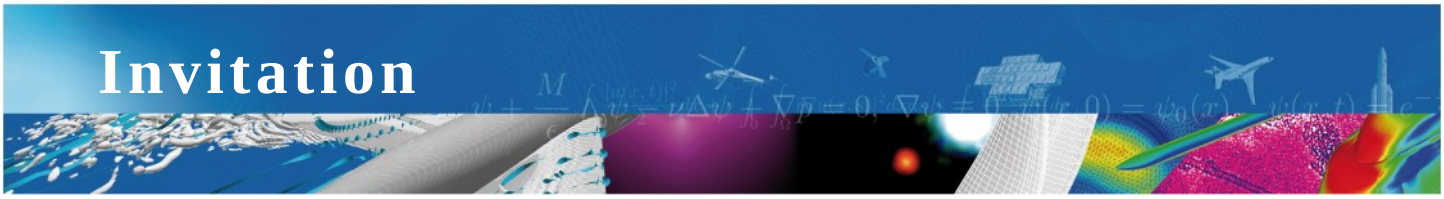

Semi-supervised learning for large scale Earth observation data understanding

Soutenance de thèse – Javiera Castillo Navarro

23 mars 2022 à 14h00

Conservatoire National des Arts et Métiers,
292 rue Saint Martin, 75003 Paris,
Amphithéâtre Jean Prouvé (accés 11, rez-de-chaussé)

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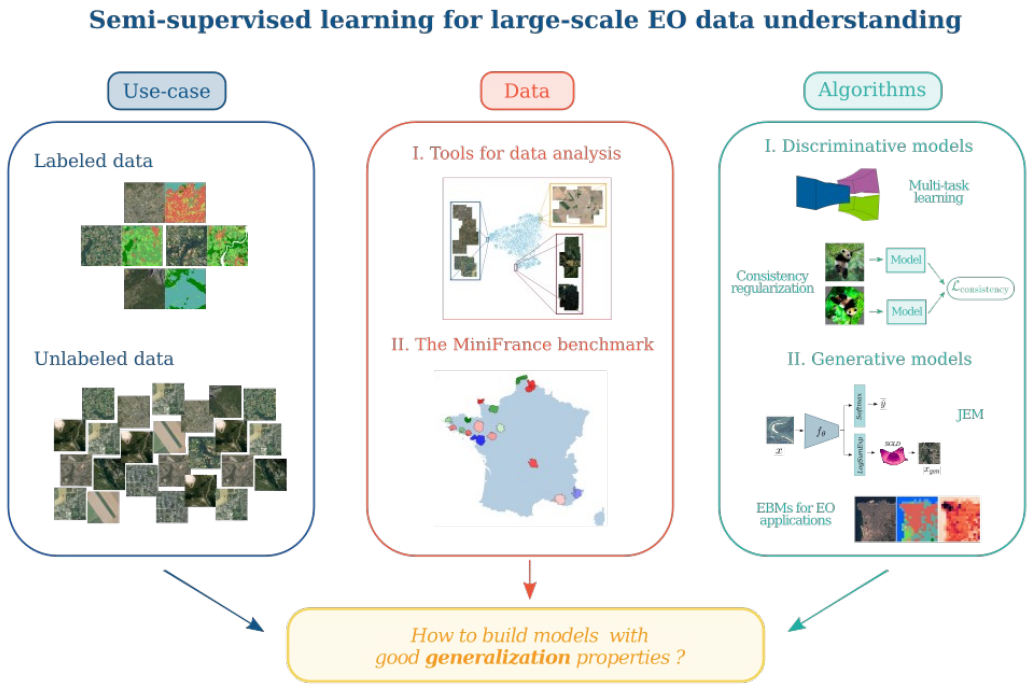

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Nicolas Thome	Conservatoire National des Arts et Métiers	Rapporteur
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Résumé

Earth observation (EO) plays a significant role in the way we understand our planet and its dynamics. While plenty of data are available, they cannot be processed by humans only, so artificial intelligence has emerged as a solution to achieve automatic analysis of EO imagery. Still, most data are not exploited because they are unlabeled. Hence, algorithms beyond supervised learning are needed to get complete insight.

This thesis investigates deep semi-supervised learning (SSL) for classification and segmentation in order to achieve EO data understanding at a large scale. First, we explore the potential of unlabeled data and propose tools for analyzing data representativeness for multi-location datasets. Then, we explore two ways of approaching the SSL problem. By discriminative modeling, first, we develop multi-task networks and auxiliary tasks to tackle semi-supervised semantic segmentation; second, we explore consistency regularization methods (e.g., FixMatch) to perform scene classification in EO data. Moving to generative modeling, we show the potential of joint energy-based models for semi-supervised classification and many other EO applications.
Through extensive experiments, we show that SSL allows us to train algorithms with better performances and generalization capacities for land use and land cover mapping.

Finally, our contributions also include the release of MiniFrance, the first dataset and open benchmark designed to assess and help design SSL in remote sensing, and part of the IEEE GRSS Data Fusion Contest 2022.

Mots clés

Deep learning; semi-supervised learning; Earth observation; semantic segmentation; land use/ land cover mapping.