Visual recognition algorithm: need RA to classify urban land use through machine learning

Marlon Seror (UQAM) is looking for a graduate student in **Computer Science** or **Geography** to work on an empirical project joint with Clement Imbert (Warwick), Xiaolun Yu (LSE), and Yanos Zylberberg (Bristol). The project studies migration and urban growth in China since the 1980s—the figures below show an example of urban sprawl and how it can be identified from satellite images.

The task: The job consists of developing a **supervised classification algorithm** to classify land use in Chinese cities from Landsat **satellite imagery**. One challenge is to construct a comparable classification over time (1985-2018), accounting for the evolution of image quality; this may involve the use of transfer learning or "time series classification".

Requirements: This job requires mastering Python and the standard machine learning applications to remote sensing (e.g., Convolutional Neural Network but also simpler algorithms, CART/Random Forest). Not required, but useful: being familiar with Google Earth Engine; being used to the classification of low-resolution images; having experience in transfer learning.

The RA will be able to work in French or English and is expected to work remotely. The salary will be competitive.

Proposed methodology: The research assistant will construct a yearly time-series of classified land use. This could involve the following tasks:

1. Select and clean a mosaic of cloud-free satellite images around each city;
2. Write a simple land classification algorithm (e.g., CART or Random Forest);
3. Write a deeper land classification algorithm (Convolutional Neural Network);
4. Organize a workflow in Google Earth Engine (e.g., to export images/tables);
5. (Optional) Use transfer learning to smooth classification differences over time;
6. (Optional) Use time-series classification to smooth classification differences over time;

Please contact Marlon Seror (seror.marlon@uqam.ca) to apply, or for further information.

Figure 1: an urban district of Qingdao in 2004

Figure 2: the same urban district in 2017