

Intitulé du cours / Course Title

Big data for development: Image analysis

Langue d'enseignement / Language

English

Enseignant(s) / Professor(s)

Clément Gorin, Lisa Chauvet

Page Web (ou/et EPI) du cours / Webpage

02-M2-big-data-for-development-image-analysis

Diplôme et année / Program and year

M2R Development Economics - M2I Economie du Développement Durable

Volume horaire et nombre de séances / Teaching hours and number of sessions

6 sessions of 3 hours = 18 hours

Modalités d'examen / Exam

Term poster

Prérequis / Prerequisites

Econometrics

- Linear regressions
- Panel estimations

Description (150 mots) / Description (150 words)

Many important questions in development economics remain unanswered, partly because the data required to address them is encoded in high-dimensional data structures such as images. This course begins with an overview of novel data sources for development economists and then offers a comprehensive introduction to image processing techniques and specialised neural network models for analysing image data. While grounded in theory and mathematical formalisation, the course emphasises intuitive understanding and practical implementation using Python. By the end of the course, students will be able to leverage a variety of data sources for empirical work, including satellite and street-view images, historical maps, and documents, for tasks such as regression, classification, localisation and segmentation.

Plan du cours / Course outline

1. Image data for development economics (Lisa Chauvet)
2. Predictive modelling (Clément Gorin)
3. Image processing and GIS fundamentals (Clément Gorin)
4. Neural networks (Clément Gorin)
5. Convolutional networks (Clément Gorin)
6. Image modelling applications (Clément Gorin)

Références / References

**Textbooks**

- Hastie, Trevor, Robert Tibshirani, and Jerome Friedman (2009). *The elements of statistical learning*. Springer.
- Goodfellow, Ian, Yoshua Bengio, and Aaron Courville (2016). *Deep Learning*. MIT Press.

**Papers**

- Breiman, Leo (2001). *Statistical modeling: The two cultures*. *Statistical Science* 16.3, pp. 199-231.
- Mullainathan, Sendhil and Jann Spiess (2017). *Machine learning: An applied econometric approach*. *Journal of Economic Perspectives* 31.2, pp. 87-106.
- LeCun, Yann, Yoshua Bengio, and Geoffrey Hinton (2015). *Deep learning*. *Nature* 521, pp. 436-444.

Specific references will be provided in class.