MODULE 3 : INTELLIGENCE ARTIFICIELLE POUR L'IMAGERIE BIOLOGIQUE

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Introduction

Artificial intelligence, and in particular deep learning, is becoming an important part of our analysis methods. Its applications cover the tasks of image restoration, segmentation and analysis of extracted data. During this module we will try to have an overview of the developments in this direction, the efforts of the community to make these methods more accessible, but also the current limitations and points of attention. We will also compare these methods with analytical methods, for a reasoned and controlled use of artificial intelligence in our community. Numerous workshops will also be proposed during an associated thematic course

Samedi 6 novembre 8h30

Microscopy Image Analysis: The Shift to Deep Learning?

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The quantification of microscopy images requires automatic tools to extract relevant information from complex data. To tackle this task, numerous image analysis algorithms have been designed, commonly based on prior knowledge and on physical modeling. However, the recent success of the deep learning (DL) in computer science have drastically changed the bioimage analysis workflows to a data-centric paradigm. While this DL technology remains relatively inaccessible to end-users, recent efforts has been proposed to facilitate the deployment of DL for some bioimage applications through new open-source software packages.

Here, we present a set of user-friendly tools that allows to test DL models and to gain proficiency in DL technology: the centralized repository of bioimage model (Bioimage Model Zoo), the ready-to-use notebooks for the training, and the plugin deepImageJ that can run a DL model in ImageJ.

We provide also good practice tips to avoid the risk of misuses. We address some practical issues such as the availability of massive amount of images, the understanding of generalizability concept, or the selection of the pre-trained models. The shift to deep learning also questions the community about the trust, the reliability and the validity of such trained deep learning models.

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Multiscale and multimodal registration: an overview of methods.

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