From remote sensing to bioeconomy: how big data can improve automatic map generation

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Recent years are experiencing an exponential increase of remote sensing datasets coming from different sources (satellites, airplanes, UAVs) at different resolutions (up to few cm) based on different sensors (single bands sensors, hyperspectral cameras, LIDAR, ...). At the same time, IT developments are allowing for the storage of very large datasets (up to Petabytes) and their efficient processing (through HPC, distributed computing, use of GPUs). This allowed for the development and diffusion of many libraries and packages implementing machine learning algorithm in a very efficient way. It has become therefor possible to use machine learning (including deep learning methods such as convolutional neural networks) to spatial datasets with the aim of increase the level of automaticity of the creation of new maps or the update of existing maps.

Within this context, the Norwegian Institute of Bioeconomy Research (NIBIO), has started a project to test and apply big data methods and tools to support research activity transversally across its divisions. NIBIO is a research-based knowledge institution that utilizes its expertise and professional breadth for the development of the bioeconomy in Norway. Its social mission entails a national responsibility in the bioeconomy sector, focusing on several societal challenges including: i) Climate (emission reductions, carbon uptake and climate adaptation); ii) Sustainability (environment, resource management and production within nature and society's tolerance limits); iii) Transformation (circular economy, resource efficient production systems, innovation and technology development); iv) food; and v) economy.

The presentation will show obtained results focus on land cover mapping using different methods and different dataset, include satellite images and airborne hyperspectral images. Further, the presentation will focus related on the criticalities related to automatic mapping from remote sensing dataset and importance of the availability of large training datasets.