Tomographic SAR (TomoSAR) is a powerful technique that allows the 3D reconstruction of objects lying on the surface of the Earth. It relies on a system called Synthetic Aperture Radar that sends electromagnetic waves and produces 2D images of the planet. By combining several images from different points of view, it is possible to achieve a 3D reconstruction of urban objects such as buildings, but also forest. Because at certain frequencies the wave penetrates the vegetation, the topographic structure of the ground beneath the canopy can be recovered, which would be impossible with an optical sensor.

Because SAR tomography allows a full 3D imaging, object detection and classification from such data is appealing. It is potentially useful for many applications such as forest biomass measurement, urban and environmental monitoring, cartography, etc. Moreover, knowing the category of object at each pixel also helps improving the quality of the 3D reconstruction itself, because it allows to add geometric or physical constraints to the reconstruction algorithms. For example, if a building is detected, planar constraints can be added.

In this work we propose the candidate to explore the possibilities of applying machine learning (ML) classification techniques to such data. Since tomography is a quite recent discipline, combining ML and TomoSAR is a cutting edge topic. First, a bibliographic work on classification on multi-dimensional SAR data will be performed. The candidate will select suitable methods for such a task and implement them. Then, the methods will be evaluated on real data where reference maps are available. Eventually, the problem of designing domain specific features will be addressed.

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