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Transcoding-based self-supervised learning for semantic segmentation of PolSAR imagery

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The abundant availability of modern satellite imagery (including optical images and Synthetic Aperture Radar (SAR) data) allows a continuous monitoring of processes on the Earth's surface. However, training automatic systems to analyze such data requires large amounts of training samples. This is rarely the case for Earth Observation tasks. This talk discusses an example of self-supervised learning that allows to drastically reduce the amount of training data while increasing the achieved performance. The core idea is that learning the proxy task of transcoding SAR images into optical images forces an employed conditional generative adversarial network (GAN) to implicitly distinguish between different land surfaces. Such a network can then be used to build a classifier with significantly fewer free parameters that generalizes well even when trained on a very small amount of labeled data. We train such a GAN on aligned Sentinel-1 and Sentinel-2 image pairs and then show that a pre-trained classifier using these features learned from transcoding outperforms classifiers that are trained from scratch in particular when only a very limited amount of labeled pixels are available for training.