

Representation Learning For SAR Observations: A Generative Model Approach

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How can we learn the latent space that governs the backscatter in SAR-imagery? To answer this question we explored the dimensionality reduction properties of variational auto-encoders (VAE). By feeding dual polarization SAR data to a convolutional auto-encoder, which is trained to minimize a variational objective function, we learn the ELBO-optimal filters. Using these filters, we construct first and second order statistics from the convolved images, which we then concatenate to a single feature descriptor. These features are then used in tandem with a conventional classifier such as k-NN or SVM. Experiments on 7 GRDH Sentinel-1 scenes showcased the capability of this method to extract relevant information from the images, achieving up to 0.96 precision and recall and outperforming the Gabor Filter Bank features on the dataset.

The method is easily extendable to TerraSAR-X imagery and experiments using this data will be conducted in the future.