

Terrain Classification using Single-Pol Synthetic Aperture Radar¹

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Abstract

Except in the most extreme conditions, Synthetic aperture radar (SAR) is a remote sensing technology that can operate day or night. A SAR can provide surveillance over a long time period by making multiple passes over a wide area. For object-based intelligence it is convenient to segment and classify the SAR images into objects that identify various terrains and man-made structures that we call “static features.” In this paper we introduce a novel SAR image product that captures how different regions decorrelate at different rates. Using superpixels and the first two moments of the pixels underneath the superpixel we develop a series of one-class classification algorithms using a goodness-of-fit metric. P-value fusion is used to combine the results from different features. We also show how to combine multiple one-class classifiers to get a confidence about a classification. To enforce spatial consistency we represent the confidence labeling of the superpixels as a conditional random field and infer the most likely labeling by maximize the posterior probability of the random field.

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