Large Polari metric SAR Data Semi-Supervised Classification with Spatial-Anchor Graph.

Recently, graph-based semi-supervised classification (SSC) has attracted considerable attentions as it could enhance classification accuracy by utilizing only a few labeled samples and large numbers of unlabeled samples via graphs. However, the construction of graphs is time consuming especially for large-scale polarimetric synthetic aperture radar (PolSAR) data. Moreover, speckle noise in images remarkably degrades the accuracy of the constructed graph. To address these two issues, this paper proposes a novel spatial-anchor graph for large-scale PolSAR terrain classification. First, the PolSAR image is segmented to obtain homogeneous regions. The features of each pixel are weighted by that of the surrounding pixels from the homogeneous regions to reduce the influence of the speckle noise. Second, Wishart distance-based clustering is performed on the weighted features, and the cluster centers are computed and serve as initial anchors. Then, the label of each pixel is predicted by the label of its nearest anchors on the spatial-anchor graph which is constructed through solving an optimization problem. Experimental results on synthesized PolSAR data and real ones from different approaches show that the proposed method reduces the computational complexity to a linear time, and the graph combined with the spatial information suppresses the speckle noise and enhances the classification accuracy in comparison with state-of-the-art graph-based SSCs when only a small number of labeled samples are available.