An Unsupervised Ship Classifier for High-Resolution SAR Images

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Abstract: This paper presents an unsupervised ship classifier for high-resolution synthetic aperture radar(SAR) images. Firstly, the algorithm to extract the geometric features of ship targets from high-resolution SAR images is described. Since usual edge detectors can hardly correctly get the ship profile affected by speckle noise and strong scatter point in SAR images, a new method combining the ratio-of-averages edge detector and image morphological processing is presented to extract ship profile. With the ship profile, some other geometric features are also extracted including a novel ship feature representation based on the space distribution of strong scatter points. Secondly, ship texture feature extraction and dimension reduction are discussed in terms of gray-level co-occurrence matrix(GLCM) and local binary pattern(LBP). Finally, the ship classification model is derived with the EM algorithm of unsupervised learning according to the ship features. Ship images from TerraSAR-X have been used as training and testing data, and experiment results are given, which proves the good performance of the classifier.

Keyword: High-Resolution Synthetic Aperture Radar,Ship Classification,Feature Extraction,Unsupervised Learning