

Markov Random Field-Based Segmentation Algorithm for Detection of Land Cover Changes Using Uninhabited Aerial Vehicle Synthetic Aperture Radar Polarimetric Images

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Abstract : The information on land use/land cover changing plays an essential role for environmental assessment, planning and management in regional development. Remotely sensed imagery is widely used for providing information in many change detection applications. Polarimetric Synthetic aperture radar (PolSAR) image, with the discrimination capability between different scattering mechanisms, is a powerful tool for environmental monitoring applications. This paper proposes a new boundary-based segmentation algorithm as a fundamental step for land cover change detection. In this method, first, two PolSAR images are segmented using integration of marker-controlled watershed algorithm and coupled Markov random field (MRF). Then, object-based classification is performed to determine changed/no changed image objects. Compared with pixel-based support vector machine (SVM) classifier, this novel segmentation algorithm significantly reduces the speckle effect in PolSAR images and improves the accuracy of binary classification in object-based level. The experimental results on Uninhabited Aerial Vehicle Synthetic Aperture Radar (UAVSAR) polarimetric images show a 3% and 6% improvement in overall accuracy and kappa coefficient, respectively. Also, the proposed method can correctly distinguish homogeneous image parcels.

Keywords : coupled Markov random field (MRF), environment, object-based analysis, polarimetric SAR (PolSAR) images

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