

Semi-automatic Ship Detection using Pi-SAR-L2 Data

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Abstract

Synthetic Aperture Radar (SAR) systems are active sensors offering unique high spatial resolution regardless of weather or other conditions, can operate both day and night with wide area coverage, so they can be used in sea surface ship monitoring. This paper shows a study on an alternative method for ship detection of SAR data using Pi-SAR-L2 (L-band, JAXA-Airborne SAR) data. Our ship detection method is consisted of eight main stages. After the Pi-SAR data is registered and speckle-filtered, the land is masked using SRTM-DEM (Shuttle Radar Topography Mission-Digital Elevation Model) data, since most ship detectors produce false detections when applied to land areas. A ship sample image is then selected (cropped). The next step is to detect some unique keypoints of ship sample image using Speeded Up Robust Features (SURF) detector and maximum distance of keypoints is then calculated ('MaxDist'). The same detector is then applied to whole Pi-SAR imagery to detect all possible keypoints. Then, for each detected keypoint, we calculate distance to other keypoint ('Dist'). If 'Dist' is smaller than 'MaxDist', then we mark these two (or more) keypoints as neighboring keypoints. If the number of neighbouring keypoints is greater than or equal two, finally we mark these keypoints as 'Detected Ship' (draw rectangle and show its geographic position). Result obtained shows that our method can detect successfully 32 'possible ships' from Pi-SAR-L2 data acquired on the area of North Sulawesi, Indonesia (August 8, 2012).

Keywords : Ship detection, Synthetic Aperture Radar, Pi-SAR-L2, keypoint, Speeded Up Robust Features (SURF) detector.