

Automatic Detection for Ship Targets in RADARSAT SAR Images from Coastal Regions

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Abstract

An automatic detection model for ship target in RADARSAT SAR images is described and assessed. The major tasks to be performed by this model are firstly to mask out land regions in a coastal image and secondly to detect ship targets in sea region. This paper presents current progress made on the detection model. Some detection examples of RADARSAT SAR images are also shown.

Keywords: SAR image, Cleaning operation, Land and sea detection, Ship target detection

1 Introduction

Ship detection is the detection of point targets in a radar clutter background. In general, ships are identified in the SAR imagery as very bright features because of the corner reflection. The detection of a ship depends on the physical properties of the ship itself such as size, shape, and structure, on the orientation relative to the radar look-direction, and also on the general sea state. There have already been considerable works done on the detection of ships and ship wakes in SAR images. For Seasat and ERS imagery, most of the research work is concentrated on the detection of ship wakes, e.g., [3, 6, 7, 8, 9], since they believe that it is advantageous to detect the wake instead of the ship since wake is larger and more distinct than the ship. RADARSAT has the capability to detect both stationary and moving ships on the ocean. These ships appear as bright targets, usually against the dark background of the ocean. However, The imaging geometry and polarization of RADARSAT makes wake detection more difficult than for the Seasat and ERS series of satellites.

Automatic detection algorithms for ships in RADARSAT SAR images have been developed by us-

ing statistical analysis and image processing techniques (see [1, 4, 5, 11]). This work is a further development of our research work in [1]. Our strategy is to detect all possible ship targets in RADARSAT SAR images (with 16 bits) from coastal regions (see Figure 1). The first problem in this automatic ship detection model is to distinguish sea from land in an image. One potential technique is presented in Section 3. The CFAR algorithms based on statistical models (K-distribution and Gamma distribution) are used to improve the ship detection performance. A ship detection algorithm is described in Section 4. Some experimental results based on our model are shown in Section 5.



Figure 1: A RADARSAT SAR image with land, sea and ship targets

