SAR PIXEL-WISE AND OBJECT-BASED TARGET DETECTION: PERFORMANCE REEVALUATION AND INFLUENCE OF MORPHOLOGICAL OPERATIONS ON CHANGE-DETECTION ALGORITHMS

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Abstract: Target detection in synthetic-aperture radar (SAR) images is a well-known application for change-detection algorithms (CDAs). These algorithms aim to highlight objects of interest (e.g., military vehicles), suppressing the clutter influence on a surveillance image through reference images from the same area. In order to evaluate their performance in relation to other approaches, metrics such as probability of detection and number of false alarms are assessed. However, these metrics are susceptible to morphological operations and, when analyzing the object-based detection (i.e., detection of connected pixels), can lead to misinterpretations of performance. Employing pixel- and object-based metrics, a comparison between two CDAs is presented: one based on a likelihood ratio test approach and other based on control charts applications. The performance of these CDAs are assessed both with and without morphological operations.