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高分辨率星载SAR图像水上桥梁解译

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Auto-interpretation for Bridges over Water in High-resolution Space-borne SAR Imagery

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摘要 该文提出一种高分辨率星载SAR图像水上桥梁解译方法。首先计算图像分类特征的纹理描述量，包括Gabor滤波器响应、树形小波参数和灰度共生矩阵。然后利用支持向量机对图像进行分类，将SAR图像分为低反射率区域、城市建筑区和植被覆盖区。在低反射率区域中，利用目标的形状、拓扑关系和目标与背景的灰度分布完成桥梁兴趣区检测。最后利用雷达成像参数和多次回波模型计算桥梁的方向、长度、宽度、水面高度、桥体厚度和正射投影位置。利用TerraSAR-X图像进行的实验表明了该方法的有效性。

关键词： 合成孔径雷达 纹理分析 图像分类 桥梁检测 桥梁参数估计

Abstract： An automatic method for detecting and interpreting bridges over water in high-resolution space-borne synthetic aperture radar imagery is proposed. Firstly, the textual features for image classification are computed, including response for Gabor filter, tree-structure wavelet coefficient and statistics of gray level co-occurrence matrix. Then the SAR imagery is classified to low-reflection area, vegetation covered area and built-up area using support vector machine classifier. By analyzing targets' space distribution, shape and gray characteristic in low-reflection area, the Regions Of Interested (ROI) are detected. For each ROI, five key parameters of bridge are estimated based on imaging model of radar, including direction, length over water, width, elevation over water, thickness of body and the real position for orthographic projection. Experiment with TerraSAR-X image indicates that the method is effective.

Keywords： SAR Textural analysis Image classification Bridge detection Estimation of parameters for bridge

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