

应用

基于DS理论的高分辨率SAR图像复杂背景直线边缘提取方法

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摘要:

针对高分辨率SAR图像复杂背景下的线状目标边缘, 提出了一种基于DS证据理论的融合提取方法。首先, 分析并建立了线状目标的边缘模型; 其次, 改进了现有的ROEWA算法, 在计算边缘强度的同时, 利用方向模板和二次曲线进行方向估计, 得到了边缘方向; 然后, 基于边缘模型设计了DS证据理论识别框架, 利用道路边缘点方向, 设计了一种一一映射的Hough变换方法, 基于线状目标直线边缘的高边缘强度值、直线边缘共线性、直线边缘侧面均匀区域统计特性(灰度均值和方差), 构建了三组相互独立的基本概率分配函数(BPAF), 并采用DS证据理论的Dempster方法, 实现了复杂背景下线状目标边缘提取的融合判决。最后, 利用机载SAR图像进行城区道路目标的边缘提取试验, 验证了本文方法的性能。

关键词: SAR图像; 边缘提取; 边缘模型; 方向ROEWA算子; DS证据理论; 证据融合

The Linear Edge Extraction with complicated background in High Resolution SAR Images Based on the DS Evidence Theory

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Abstract:

An approach of linear object edges extraction in high resolution SAR images with complicated background is presented based on the DS Evidence Theory. The edge model of linear object is built firstly. Then a modified ROEWA edge detector is proposed to get the edge intensity and edge direction with the eight directional templates and the conic function. Under the edge direction, a one to one mapping based on Hough transformation is designed to improve the computational efficiency. Most importantly, the extraction frame based on the edge model is presented with the DS Evidence Theory, and three groups of basic probability assignment function (BPAF) of DS Evidence Theory are constructed with the characteristics of the linear object, such as the sharp edge variation in the edge point neighbor, the collinear characteristic among the edge points, the statistical characteristics in the inner or side region of the linear object present as low and smooth intensity. The Dempster rule is adopt to realize the evidence fusion. Finally experiments of the urban roads extraction are carried out with aerial SAR images, and results are analyzed to validate the performance of the approach proposed in the thesis.

Keywords: SAR image edge detection edge model directional ROEWA detector DS Evidence Theory; Evidence Fusion

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