基于改进水平集方法的高分辨率遥感图像道路提取

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摘　要：

提出了一种基于改进水平集方法的遥感图像道路提取实用方法。针对水平集分割方法速度较慢以及对区域划分仅仅考虑灰度特征等不足，提出一种改进算法，通过引入罚函数项，并整合RGB空间和HSI空间的各通道信息，构造了一类基于多空间信息且无需重新初始化的水平集演化方程。同时针对遥感图像幅值大的特点，建立整图划分若干子图的划分方法，使提取的目标道路集中在少量子图中，减少了无目标背景干扰。利用QuickBird 0.61m分辨率遥感图像进行道路信息提取试验，并建立评价指标对算法结果进行量化评价和分析。结果表明，研究的方法可较好地抑制区域背景噪声的干扰，快速准确地提出完整的道路区域，在道路交通规划辅助决策等领域具有重要的应用前景。

关键词：水平集方法；曲线演化；图像分割；道路提取

Road Extraction from High-resolution Remote Sensing Images Based on an Improved Level Set Method

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Abstract:

In this paper a novel scheme that makes use of improved level set to extract roads in high-resolution remote sensing images (RS) is proposed. The traditional level set methods for image segmentation are computational expensive due to the re-initiation and always only use the gray value as input information. To solve these problems, the proposed approach introduces a distance regularizing term into the CV model, and utilizes both gray features and each channel of HSI model to construct a new level set evolution function without re-initialization. Furthermore, a framework of dividing large images into sub-images is designed according to the size of the RS images. It makes the roads' objects lie in fewer images, and reduces the noises from the background. The proposed approach was tested by the QuickBird RS images at 0.61m resolution and two numeral indexes were defined to evaluate the results. Results show that the presented approach reduces the influence of area noises and is able to extracts the roads precisely. These make it be a valuable and promising method for decision-making in transportation.

Keywords: level set; curve evolution; image segmentation; road extraction

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