

Multi-Band CARSS Airborne PolSAR Image Fusion Classification

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As a kind of active microwave remote sensing, SAR (Synthetic Aperture Radar) is very suitable for the resolution of different features with its all-weather and all-day characteristics. In order to improve the resolution of different features and make in-depth analysis and research on different feature types, it is necessary to use the multi-band and multi-polarization information of SAR. The transmission characteristics and the backscattering characteristics of target echoes are different for SAR of different bands, and the fusion of SAR images of different bands can better integrate the information of SAR images of different bands.

In this paper, the experimental data were selected from the airborne data acquired by two Xinzhou 60 remote sensing aircraft modified by the Air and Space Academy of Chinese Academy of Sciences under the support of the Chinese Aeronautic Remote Sensing System (CARSS) construction project. Fully PolSAR data including C and S bands contains five types such as paddy fields, forested lands, dry lands, artificial buildings and water. And it is classified using scattering features such as $H/A/\alpha$ and Freeman decomposition components. In order to make full use of the advantages of multi-band, a multi-band fully PolSAR image fusion method based on wavelet transform is also proposed in the paper, which takes advantage of the wavelet transform for multi-resolution fusion and combines the variation of scattering features of different feature types by different bands, and is applied to airborne C-band and S-band SAR images to realize the classification of different types of features in the same area, which can effectively improve the classification effect and increase the classification accuracy.

多波段全极化 CARSS 机载 SAR 图像融合分类

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合成孔径雷达 (Synthetic Aperture Radar, SAR) 作为一种主动式的微波遥感, 其全天候全天候的特性十分适合不同地物的分辨工作。为了提高对不同地物的分辨能力, 对不同地物类型作深入的分析与研究, 需要利用 SAR 的多波段、多极化信息。而不同波段的 SAR, 其传输特性、目标回波的后向散射特性都是不同的, 将不同波段的 SAR 图像进行融合, 能更好的综合不同波段 SAR 图像的信息。

本文实验数据选用了在中国航空遥感系统 (Chinese Aeronautic Remote Sensing System, CARSS) 建设项目支持下, 中科院空天院改装的两架新舟 60 遥感飞机所获取的机载数据, 它包含 C 和 S 两个波段的全极化 SAR 数据, 包含水田、林地、旱地、人工建筑、水域等 5 种地物类型, 利用 $H/A/\alpha$ 和 Freeman 分解分量等散射特征进行分类。为了充分利用多波段的优势, 文中还提出一种基于小波变换的多波段全极化 SAR 图像融合方法, 利用小波变换对于多分辨率融合的优势, 结合不同波段对不同地物类型散射特征的变化, 应用于机载 C 波段和 S 波段的 SAR 图像, 实现了同一地区不同类型的地物分类, 可以有效地改善分类效果, 提高分类精度。