

Spectral Characteristics and Classification of Urban Land-Cover Based on Airborne Hyperspectral Data

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Abstract: Urban environment is generally complicated, mixture of both natural land-cover (e.g. water, vegetation) and man-made or impervious land-cover (e.g. roads, buildings). The distribution of land-cover classes is important for environmental management, disaster management and urban planning. There have been many researches focusing on the classification of vegetation in urban areas. However, the researches on the classification of man-made land-surfaces are still limited. Due to the fine spectral resolution, hyperspectral remote sensing data have potential to classify artificial land-cover with different materials. In this study, a fundamental study to classify urban land-cover and land-use was carried out using a dataset from the 2013 IEEE's data fusion contest. Firstly, the artificial structures were classified according to their heights and sizes. A LiDAR data with 2.5 m spatial resolution was introduced to obtain necessary physical dimensions. Then, the spectral characteristics for both natural components and various artificial structures were investigated using the airborne hyperspectral data covering a part of Houston, Texas, USA. The hyperspectral data were captured by the Compact Airborne Spectral Imager (CASI) on June 23, 2012, with 144 bands of wavelengths from 380 nm to 1050 nm (visible to near-infrared spectrum). Band selection based on the principal component analysis (PCA) and unsupervised and supervised land-cover classifications were carried out. In addition, land-cover classification was also conducted for 8-band WorldView-2 (WV-2) images taken on October 16, 2010 and the results were compared with those from the hyperspectral data. Finally, object-based classification was applied to both the hyperspectral data and WV-2 images. All these classification results were compared with those from manual interpretation and field survey.

Keyword: Hyperspectral data, LiDAR data, WorldView-2, land-cover, classification, manmade structure