Topographic Correction of Hyperspectral Images Using LiDAR Data

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Abstract: Compared to multispectral images, hyperspectral images offer more sophisticated spectrum reflectance information of ground object, and have been widely used in various applications. In most of the applications, the spectral radiance stored in the hyperspectral image has to be calibrated into the spectral reflectance previously through the atmospheric and topographic correction. However, most of the atmospheric correction programs such as the ATREM, ACORN and FLAASH assume that the surface is horizontal and has a Lambertain reflectance. The reason may be that the real hyperspectral data typical do not have the enough surface information for topographic correction. Nowadays the LiDAR instrument which has the ability to acquire the three-dimensional information about the earth surface precisely can be integrated with hyperspectral sensor for land investigation and thematic mapping. This provides an opportunity to perform the topographic correction for hyperspectral images with high spatial resolution. In this study, the influence of the topography effect on hyperspectral images is analyzed using simulating and real data sets.Among the researches about interaction between topography and reflectance spectrum, the bidirection reflectance distribution function (BRDF) is the most general mathematic model. BRDF model relate to many factors, expect of solar angle, view angle of sensor and the topography, the characteristic of ground objects is also important. According to this, the propose of this research aim at single kind of ground object, discuss how the different angle and different topography affect spectrum reflectance curve, and go further to simulate the spectrum reflectance curve for the reference to correct the topography effect of the real high resolution hyperspectral images.

Keyword : BRDF, hypersepctral image, LiDAR, simulate