

Development of a generic model for the detection of roof materials based on an object-based approach using WorldView-2 satellite imagery

Abstract

The detection of impervious surface (IS) in heterogeneous urban areas is one of the most challenging tasks in urban remote sensing. One of the limitations in IS detection at the parcel level is the lack of sufficient training data. In this study, a generic model of spatial distribution of roof materials is considered to overcome this limitation. A generic model that is based on spectral, spatial and textural information which is extracted from available training data is proposed. An object-based approach is used to extract the information inherent in the image. Furthermore, linear discriminant analysis is used for dimensionality reduction and to discriminate between different spatial, spectral and textural attributes. The generic model is composed of a discriminant function based on linear combinations of the predictor variables that provide the best discrimination among the groups. The discriminant analysis result shows that of the 54 attributes extracted from the WorldView-2 image, only 13 attributes related to spatial, spectral and textural information are useful for discriminating different roof materials. Finally, this model is applied to different WorldView-2 images from different areas and proves that this model has good potential to predict roof materials from the WorldView-2 images without using training data.

Keyword: Urban; Object-based; Discriminant analysis; Roof materials; Very high resolution imagery; WorldView-2