



Knowledge-Based Scale Transfer Approach for Image Fusion

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The purpose of image fusion is to integrate images with different resolutions or images from different sensors so that identifiability and reliability of remotely sensed data can be improved. In order to improve image identifiability, scale transfer and knowledge-based concepts were involved for the proposed knowledge-based scale transfer (KBST) fusion technique.

Firstly, SPOT multispectral (XS) images were used for three major categories (water, vegetation, and bare soil/built-up) landcover classification of the study area. Regression relationships between digital numbers of panchromatic (PAN) and XS images were then established and used for subsequent scale transfer. The class-specific regression models help preserve spectral information during scale transfer. Finally, a scale transfer algorithm using class-specific regression models was adopted for fusion of SPOT XS and PAN images, yielding a multispectral, high-resolution image which offers more details of the study area than other spatial domain fusion techniques.

Experimental results show the proposed KBST fusion outperforms other commonly used spatial-domain fusion techniques. The resultant images fused by the proposed KBST method show higher spatial resolution and recognition rate than those fused by other spatial domain fusion methods.