

values of different image fusion methods will give the better conclusion on the proposed FDCT based fusion method. In our algorithm, firstly, each of the registered images are decomposed using curvelet, then the coefficients are fused using the fusion rules. Fusion rule 1 is for curvelet coefficients at lower frequencies and fusion rule 2 is for the curvelet coefficients at higher frequencies. Fusion rule 1 substitute the coarser scale coefficients of LR multispectral bands into the coarser scale coefficients of HR Pan image. Fusion rule 2 is based on the high pass modulation using Local Magnitude Ratio (LMR) of the curvelet coefficients in each orientation and scale. Fused coefficients are reconstructed by performing the inverse curvelet transform. Indian Remote Sensing (IRS) Resourcesat-1 LISS IV satellite sensor image of spatial resolution of 5.8m is used as low resolution (LR) multispectral image and Cartosat-1 Panchromatic (Pan) of spatial resolution 2.5m is used as high resolution (HR) Pan image. This fusion rule generates HR multispectral image at 2.5m spatial resolution. The experimental results on given images showed that the proposed method has better performance than Wavelet, Principal component analysis (PCA), High pass filtering (HPF), Modified Intensity- Hue Saturation (M.IHS), and Grams-Schmidt fusion methods. Proposed method spatially outperforms the other methods and retains both spatial and rich multispectral details.

6. Future Scope

In the future enhancement work, we propose a method to interpret the features more efficiently, having high resolution by using Contourlet Transforms. NSCT is very efficient in representing the directional information and capturing intrinsic geometrical structures of the objects. It has characteristics of high resolution, shift-invariance, and high directionality. In the proposed methods, a given number of decomposition levels are used for multispectral (MS) images while a higher number of decomposition levels are used for Pan images relatively to the ratio of the Pan pixel size to the MS pixel size. This preserves both spectral and spatial qualities while decreasing computation time.

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