Image Compression Techniques for High Resolution Satellite Imageries using Classical Lifting Scheme

Abstract

The properties of Wavelet Transform can be successfully applied for analysis and processing of non stationary signals e.g., speech and image processing, data compression and communications. Due to the growing number of applications in various areas, it is necessary to explore the hardware implementation options of the Discrete Wavelet Transform (DWT). The
Wavelet Series is just a sampled version of Continuous Wavelet Transform (CWT) and its computation may consume significant amount of time and resources, depending on the required resolution. The Discrete Wavelet Transform (DWT), based on sub-band coding, is a fast computation technique of Wavelet Transform, easy to implement and reduces the computational time and resources. Wavelet Transform uses multi-resolution technique by which different frequencies are analyzed with different resolutions. The study of 2-D DWT architectures reveals that there are two schemes for implementing DWT, one is based on convolution and other is based on lifting scheme. In this paper detailed study of Lifting Scheme has been carried out. Different architectures have been studied and performance parameters such as PSNR and Compression Ratio are determined. After obtaining double precision value of the image of size 256*256 imagery in BMP format, discrete wavelet transforms techniques are applied to obtain the wavelet coefficients for calculating PSNR and Compression ratio. Inverse Discrete wavelet transform are applied to get back the reconstructed image. It is found that for both satellite Rural and Urban imageries, the lifting scheme is very useful for obtaining higher quality of reconstructed images while achieving better PSNR~29 and Compression Ratios ~8.

Reference


**Index Terms**

Computer Science                     Signal Processing

**Key words**

Image Compression                       Satellite Imageries                        Lifting

Scheme

Continuous Wavelet Transform