Abstract

Many literatures report about watermarking schemes based on frequency transforms like discrete wavelet transform (DWT), redundant discrete wavelet transform (RDWT) and Curvelet for gray scale images. For extraction, many of the researchers use their own extraction algorithm, which is the inverse of embedding algorithm, mainly based on embedding locations. Hence, this paper proposes robust color image watermarking techniques based on DWT, RDWT and Curvelet transform in RGB color space for copyright protection and data authentication. The proposed embedding technique is based on computation of noise visibility function (NVF), where the strength of watermarking is controlled. These results in watermarks embed at texture & edge areas are stronger than flat areas. For extraction, an intelligent detection technique, namely, fast independent component analysis (FastICA) is used. The features of FastICA are quick convergence, easy to implement and does not need original image for extracting watermark. Performances of the proposed schemes are evaluated in terms of metrics like peak signal to noise ratio (PSNR) and normalized correlation (NC) values. Robustness of the proposed scheme is validated against various image processing attacks like Gaussian noise, Salt & Pepper noise, blurring, sharpening, rotation, cropping and JPEG.
compression etc. The comparison analysis reveals that watermarking scheme using curvelet transform in blue plane performs superior than other transforms.

References

- Hien T. D., Hanane Hark, Yen Wei Chan and Yasunori Nagata. Curvelet domain image watermarking based on edge embedding. -------

**Index Terms**

Computer Science  
Image Processing

**Keywords**

Color Image Watermarking  
Wavelet Transform  
Curvelet Transform  
Noise Visibility  
Function And Independent Component Analysis