A Novel Image Watermarking Scheme using Hybrid DWT-DCT-ELM Technique

Abstract

We propose a novel gray scale image watermarking scheme using hybrid DCT-DWT transform. The low frequency band coefficients are selected and the dataset of size 256*7 prepared using these coefficients is supplied to a newly developed simple layer feed forward network popularly known as Extreme Learning Machine (ELM). The ELM produces a normalized column vector of size 256*1 which is used as watermark sequence to be embedded in the low frequency coefficients. The DWT-DCT hybrid transform is supposed to produce better results for imperceptibility criteria. Five different image processing attacks are carried out over signed images. Watermarks are extracted successfully from signed and attacked images. Time complexity calculation indicates that the watermarking scheme is completely executed within seconds which makes it suitable for real time watermarking applications.

References

A Novel Image Watermarking Scheme using Hybrid DWT-DCT-ELM Technique

- G-B Huang (2004), The Matlab code for ELM is available on: http://www.ntu.edu.sg/home/egbhuang

Index Terms

- Computer Science
- Image Processing

Keywords

- Discrete wavelet transforms (DWT)
- Extreme Learning Machine (ELM)
- Similarity
- Correlation
- Normalized Correlation
- Peak Signal Noise Ratio (PSNR)
SSIM