Abstract

Digital medical images has two important things that needs to be taken care of, that things are the authority of ownership and the authenticity of the image. The ownership of the image must be stated correctly and modifications to the image must be detectable. The solutions to both this problems is using multiple watermarking. There are two types of watermarks that are used, one is called signature watermark and the other called reference watermark. Signature watermark is used to claim ownership of the image, while reference watermark is used to detect the authenticity of the image.

Both of the watermark are embedded with same method base, which is using wavelet transformation then continued with difference expansion method to embed the data for reference watermark, and with additive method to embed the data for signature watermark. These watermarks are embedded in different areas. Signature watermark embedded at the RONI side of the image, while reference watermark embedded at the ROI side of the image. Performance parameters used are Peak Signal to Noise Ratio (PSNR), Bit Error Rate (BER), Character Error Rate (CER). PSNR, BER and CER used as an objective assessment parameters. Testing done by analizing the quality of watermarked image and the extracted reference watermark and also signature watermark condition after the watermarked image given an attack. The attacks that is tested are sharpening, blur, Gaussian noise and JPEG compression.

The test results shows that Reed Solomon Code is able to improve the robustness of signature watermark to attacks such as mentioned above but within some special condition. While reference watermark is able to detect attacks that occurs to the image despite using minor attacks.

Keywords: *multiple watermarking, wavelet, difference expansion.*