

Digital watermarking based on discrete wavelet transform for medical image

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In some hospitals, doctor transfers medical image to the patient with CD. Medical images are usually compressed by the manner of JPEG. It is convenient that digital watermark maintains the patient and examination information. We developed digital watermarking based on discrete wavelet transform (DWT) for medical image. It is robust to JPEG and JPEG2000 compression. But peculiar artifact appears in DWT watermarked image. In this paper we mainly concerned about the artifact of DWT watermarked image. And discussed about the relationship between image quality and difficulty of making diagnosis. The image quality was measured by PSNR. We used a chest X-ray image and a CT image of abdomen. The images of size 512x512 pixels and 256 gray scale are used. In discrete wavelet transform, biorthogonal (9,7) filter was used and the watermark was embedded by operating coefficients of LL3 subband. Pixel value changed, too, when the coefficients operated. And the operated amount grew, PSNR became small and robustness to compression was increased. The artifact looks like patchy infiltration of lung in the chest X-ray images, or focal fatty liver in abdominal CT. DWT watermarking interferes to make a diagnosis in less than 45dB in PSNR. Attention is necessary for the image quality deterioration caused by the watermarking. assume peculiar artifact watermark that used DWT.