

Watermark Compression in Medical Image Watermarking Using Lempel-Ziv-Welch (LZW) Lossless Compression Technique

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ABSTRACT

In teleradiology, image contents may be altered due to noisy communication channels and hacker manipulation. Medical image data is very sensitive and can not tolerate any illegal change. Illegally changed image-based analysis could result in wrong medical decision. Digital watermarking technique can be used to authenticate images and detect as well as recover illegal changes made to teleradiology images. Watermarking of medical images with heavy payload watermarks causes image perceptual degradation. The image perceptual degradation directly affects medical diagnosis. To maintain the image perceptual and diagnostic qualities standard during watermarking, the watermark should be lossless compressed. This paper focuses on watermarking of ultrasound medical images with Lempel-Ziv-Welch (LZW) lossless-compressed watermarks. The watermark lossless compression reduces watermark payload without data loss. In this research work, watermark is the combination of defined region of interest (ROI) and image watermarking secret key. The performance of the LZW compression technique was compared with other conventional compression methods based on compression ratio. LZW was found better and used for watermark lossless compression in ultrasound medical images watermarking. Tabulated results show the watermark bits reduction, image watermarking with effective tamper detection and lossless recovery.

KEYWORDS: Teleradiology; Ultrasound medical image; Compression; Digital watermark; LZW lossless compression; Secret key

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