

Watermarking of Ultrasound Medical Images in Teleradiology Using Compressed Watermark

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ABSTRACT

The open accessibility of Internet-based medical images in teleradiology face security threats due to the nonsecured communication media. This paper discusses the spatial domain watermarking of ultrasound medical images for content authentication, tamper detection, and lossless recovery. For this purpose, the image is divided into two main parts, the region of interest (ROI) and region of noninterest (RONI). The defined ROI and its hash value are combined as watermark, lossless compressed, and embedded into the RONI part of images at pixel's least significant bits (LSBs). The watermark lossless compression and embedding at pixel's LSBs preserve image diagnostic and perceptual qualities. Different lossless compression techniques including Lempel-Ziv-Welch (LZW) were tested for watermark compression. The performances of these techniques were compared based on more bit reduction and compression ratio. LZW was found better than others and used in tamper detection and recovery watermarking of medical images (TDARWMI) scheme development to be used for ROI authentication, tamper detection, localization, and lossless recovery. TDARWMI performance was compared and found to be better than other watermarking schemes.

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