Imperceptibility Improved ROI-Based Watermarking for Content Integrity Verification in Tele-Radiology

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In communicating tele-radiology images, existence of lots of delicate local information makes us to look for methods in order to control the content integrity of these types of images. This need becomes even more serious when confronting critical restrictions in bandwidth and saving capacity, which makes us to apply unavoidable lossy compression methods. Medical watermarking can be used to reach this goal. Osborne (2004) proposed a multiple, robust-to-compression watermarking method, which satisfies this goal. Although the method resists suitably against compression, it heavily destroys the background region in the transmitted tele-radiology image. In this paper, we propose a modification, which establishes a fine balance between the robustness of the watermarks against compression and their imperceptibility. The applied technique is based on Watson Perceptual Model and changes the embedding strength of each of the coefficients in an 8×8 DCT block according to the inverse of its counterpart DCT frequency sensitivity coefficient. Results show the efficiency of our proposed method with a much better image visual quality and also acceptable robustness of watermarks against JPEG compression.