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Semi-fragile watermarking for grayscale image authentication and tamper detection based on an adjusted expanded-bit multiscale quantization-based technique

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Abstract: In this work, a semi-fragile watermarking scheme, for grayscale image authentication and tamper detection, is proposed. The proposed watermarking scheme is based on implementing a modified DWT quantization - based algorithm by embedding a random watermark bit sequence into the DWT domain using an expanded -bit multiscale quantization-based technique with adjusted watermarked location. Here, the watermark bit is expanded into three similar bits and embedded in a multiscale fashion into the DWT low -frequency subbands of the 2nd DWT levels (LL2, LLHL1 and LLLH1). An adjustment of the quantized coefficients is provided based on modifying their values to fall in more secure locations within the quantization interval. Several designed criteria were used to judge the received image by classifying it into: authenticated, incidentally or maliciously attacked with high accuracy in detecting and classifying attacks. Experimental results have shown the suitability of the proposed approach for tamper detection and accurate authentication.