

## Adaptive color image watermarking based on a modified improved pixel-wise masking technique

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**Abstract:** In this paper, a family of modified wavelet-based watermarking techniques is proposed. This family of techniques is based on the improved pixel-wise (PW) watermarking scheme. The basic proposed algorithm considerably improves the PSNR of the watermarked image (in the range of 2.20-7.28 dB), and is based on selecting specific locations in the three detailed sub-bands of the first level of the DWT decomposition of the image. The selective nature of the modified PW method (denoted as selective PW: SPW) allows the scheme to be adaptive in terms of the imperceptibility and the watermark size. Also, the PW and SPW methods were extended to be implemented with color images: (1) grayscale-wise PW method (G-PW) that embeds the watermark in the Y component of the YCbCr model. (2) Multi spectral-PW method (MS-PW) that embeds the watermark in the R, G, and B layers independently. (3) Multi spectral-SPW method (MS-SPW) that gains high PSNR value compared with MS-PW, and (4) multi spectral-maximum PW method (MS-MPW) which is proposed to improve the PSNR value as well as the level of watermarking security, when compared with MS-PW method.