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## Image watermarking based on inter-tree coefficients differencing in paired wavelet-packets tree constructions

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**Abstract:** Recently, image watermarking has been used as a tremendous mean for copyright protection of images and multimedia as well. This work presents an image watermarking technique for copyright protection of grayscale images, and is based on the exploitation of the properties of the wavelet packet decomposition (WPD). Here, the input image is applied to WPD, then, modified trees are constructed in such a manner to gather WPD coefficients sharing the same spatial locations at different frequency subbands. The obtained new trees are reorganized in pairs and a differencing step, between the inter-tree coefficients, is performed. The result is compared to a bi-level threshold. At the embedding stage, few locations are modified while most of the locations are left unchanged. To improve the technique security, a content-dependent watermark is implemented and the threshold is made adaptive to the host under consideration. Simulation results have shown superior output watermarking quality with a PSNR > 48 dB as well as high robustness against a wide variety of attacks including moderate-to-severe image compression, filtering, noise addition and enhancement manipulations. Moreover, the technique has demonstrated a low computational cost due to the used approach in selecting the reorganized WPD coefficients.