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**A Novel Data Hiding Algorithm for High Dynamic Range Images**

**Abstract**

In this paper, we propose a novel data hiding algorithm for high dynamic range (HDR) images encoded by the OpenEXR file format. The proposed algorithm exploits each of three 10-bit mantissa fields as an embedding unit in order to conceal k bits of a secret message using an optimal base which produces the least pixel variation. An aggressive bit encoding and decomposition scheme is recommended, which offers a high probability to convey (k + 1) bits without increasing the pixel variation caused by message concealment. In addition, we present a bit inversion embedding strategy to further increase the capacities when the probability of appearance of secret bit “1” is greater than 0.5. Furthermore, we introduce an adaptive data hiding approach for concealing more secret messages in pixels with low luminance, exploiting the features of the human visual system to achieve luminance-aware adaptive data hiding. The stego HDR images produced by our algorithm coincide with the HDR image file format, causing no suspicion from malicious eavesdroppers. The generated stego HDR images and their tone-mapped low dynamic range (LDR) images reveal no perceptual differences when subjected to quantitative testing by visual difference predictor. Our algorithm can resist steganalytic attacks from the HDR and LDR RS and SPAM steganalyzers. We present the first data hiding algorithm for OpenEXR HDR images offering a high embedding rate and producing high visual quality of the stego images. Our algorithm outperforms the current state-of-the-art works.